

Seven Major Challenges for E-Learning in Developing Countries Case Study eBIT, Sri Lanka

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ABSTRACT

By using an extensive framework for e-learning enablers and disablers (including 37 factors) this paper identifies which of these factors are most salient for an e-learning course in Sri Lanka. Comments and opinions of 1887 students and staff were collected from 2004 to 2007. A quantitative approach is used to identify the most important factors followed by a qualitative analysis to explain why and how they are important. The study identified seven major challenges in the following areas: Student support, Flexibility, Teaching and Learning Activities, Access, Academic confidence, Localization and Attitudes. In this paper these challenges will be discussed and solutions suggested.

Keywords: *e-learning; challenges, developing countries; support; flexibility; access; academic confidence; localization; interactivity; attitudes.*

INTRODUCTION

Education is one of the most important factors for poverty alleviation and economic growth in developing countries (UNDP 2005; UNESCO 2005; WSIS 2005) and the use of Information and Communication Technologies (ICTs) for dissemination of education is believed to have huge potential for governments struggling to meet a growing demand for education while facing an escalating shortage of teachers (UNESCO 2006). E-learning is, however, facing a lot of obstacles and challenges in developing countries (Dhanarajan 2001; Heeks 2002; Rajesh 2003) and drop-out rates are usually much higher than in traditional classroom based teaching (Eastmond 2000; O'Connor et al. 2003; Simpson 2004). It is therefore relevant to investigate which e-learning obstacles are of particular importance for developing countries. This paper does so by using a conceptual framework covering e-learning enablers and disablers to analyze empirical material from a case study on e-learning in Sri Lanka.

The conceptual framework (based on Andersson 2007) was generated by means of an extensive literature study on facilitating and inhibiting factors for e-learning. From keyword searching at Google Scholar and Web of Science a total of 59 journal and conference papers were selected based on relevance and rigor criteria. The literature study showed that most investigations and models focused on one or a small set of selected factors such as computer anxiety (Brown et al. 2006; Muse 2003), or, as is typical in research on developing countries, a cultural level (Burn et al. 2005; Friesner et al. 2004; Pagram et al. 2006). While each of these factors was found to be relevant, due to this fragmentation of prior research, it is unclear which factor was the most important and what interrelationships existed among the factors. Therefore there was a need to investigate e-learning cases using the full set of factors. Hence a framework was constructed which clusters the factors on key elements, student, teacher, institution, support, course, technology, costs and society. In total the framework includes 37 factors in 8 clusters (Table 1).

Table 1: Factors affecting success in e-learning

Student	Teacher
Motivation	Technological confidence
Conflicting priorities (time)	New learning style confidence
Academic confidence	Motivation and commitment
Technological confidence	Qualification and competence
Learning style	Time
Gender	
Age	Course
	Curriculum design
Technology	Pedagogical model
Access	Subject content
Software and interface design	Teaching & Learning Activities
Costs	Flexibility (delivery mode)
Localization	Localization
	Availability of educational resources
Institution	
Knowledge management	Support
Training of teachers and staff	Support for students from faculty
	Social support for students
Costs	Support from employer
Technology	Support for faculty
Access rates	
Tuition, course fees	Society
Books	Role of teacher and student
Institutional Economy and funding	Attitudes on e-learning and IT
	Rules and regulations

The factors in the framework can obviously be either enabling or disabling – lack of access to technology is disabling while ample supply is enabling. All factors are variables where some level (not always easily specified!) is required for success, too low levels may inhibit e-learning. Consider for example “learning style”; many students in developing countries are used to traditional class room teaching where teachers spoon-feed students during lectures whereas e-learning models are usually based on proactive learning where students are expected to search, manipulate, and analyze study material individually and in groups. Hence, a traditional learning style may be detrimental to success in e-learning.

Objectives of study

This set of factors, as presented above, completely covers the research literature as of date. In this paper, the entire set is applied to a Sri Lankan case for the purpose of investigating which factors are most important (including why and how) in a developing country where ICTs has recently been introduced and e-learning courses are still very rare. This is done for the reason of not by default taking progress in only one field (typically technology) and hoping that this would also lead to progress in the other areas. A second objective is to demonstrate the often innovative solutions that have been tried out that should have a practical relevance for other actors in the field.

eBIT programme Sri Lanka

In Sri Lanka the adoption rate of computers and Internet is still relatively low. With a population of 21 million there are only 428.000 internet user (CIA 2008). The e-learning setting in Sri Lanka is still in its infancy even though students have the possibility to take overseas courses (mainly from England and Singapore). The major player in Sri Lanka’s distance education market is the Open University of Sri Lanka (OUSL) which has around 18.000 students. Compared to other state universities that together have about 32.000 students we find the need for distance education in Sri Lanka well demonstrated

(Hole et al. 2002). Most OUSL courses are provided through printed materials and study centres so the eBIT program as provided by UCSC can be regarded as pioneer work.

The University of Colombo School of Computing (UCSC) provides graduate programs at campus in Colombo for internal degree students, but the vast majority of their students study at a distance (external degree students). The external degree is an option for all those students that have the right qualifications for admittance to university but cannot attend university due to work, geographical distance or simply because there is not enough admissions at the university. Only 10 percent of students qualified for university admission is being admitted in Sri Lanka (UCSC 2004). UCSC launched their external Bachelor of Information Technology (BIT) in 2000 as a response to a perceived need for more diversely skilled IT personnel in Sri Lanka. Previously universities only produced strict code writers by having all computer courses habitually restricted to students of mathematical stream. The external BIT program (eBIT), on the other hand, gives admission to students from other fields such as Arts, Commerce and Bio Science – something that has increased the number of female applicants to the programme. Learners from the natural science field has so far performed better and retain longer in the program (Gamage 2007b) which indicates an advantage over the others in understanding the content. It could also be that it is easier for them to get used to e-learning by being better prepared for the use of technology required to follow the course.

By 2003 UCSC established an e-learning centre and the external BIT program was the first pilot program. More than 17.000 students have registered for the eBIT since the start and every year approximately 1500 new students register. Graduate rates were initially extremely low - the average graduate rate being only 1,5 % in year 2003 and 2004 (Hewagamage 2005) - and mainly ascribed to students being left to self-study. Students were only given a very general syllabus including some reading instructions (SU 2004). As a remedy for this the eBIT project started with the aim of launching a completely new net-based version of BIT with the hope of drastically increasing the number of graduating students and by 2007 the graduate rate had increased to 22% (Gamage 2007b).

BIT is a three-year, full-time, programme with three different exit points - after first year the student is awarded a certificate in IT, the second year grants an advanced certificate and the third, and final, year yields the bachelor degree (the BIT). The content is accessed via a Learning Management System (LMS) and the student can chose to follow the program by self-study or by going to training institutes teaching the BIT curriculum. The content delivered for eBIT is the same as for the internal BIT (covering topics from basic computer operation skills to file handling, IS development process and project management). The technologies and activities used for eBIT have, however, changed over the years. The first LMS used (2003-2006) "Theeducation" (www.bit.lk) only provided the syllabus, program schedule and past exam papers. An evaluation made in 2006 (Hewagamage et al. 2007) showed that students needed more support and that there was a lack of constructive alignment between curricula, content and assessments. This initiated a number of activities including curricula revision, content development and also a change to a new Moodle based LMS (<http://lms.bit.lk/lms/>) that provided more opportunities for interactivity. Today the LMS provides a multitude of interaction possibilities such as quizzes, learning forums and video lectures. These activities are much appreciated by the students and external evaluators have been impressed by the magnitude of content and activities.

METHOD

By applying a conceptual framework on inhibiting and facilitating factors for e-learning (Andersson 2007) to a specific case in Sri Lanka, the paper aims to identify factors that are most salient for e-learning in developing countries. The selected case is the e-BIT learning program of the UCSC. The eBIT case study was chosen based on the close fit to the study's objectives - Sri Lanka is a developing country where ICTs has recently been introduced and e-learning courses are still very rare. Data about the case has been obtained on site in Sri Lanka from the beginning of 2004 to late 2007 not only via observations, letters, interviews and questionnaires, but also from a distance via additional questionnaires and course discussions taking place in their LMS. The findings have been mapped out on the conceptual framework and quantitative measures have been used in order to identify the most important themes for e-learning in this setting. When the most frequently mentioned challenges were identified a qualitative analysis of their meaning was made.

Case study data collection

Data for this case study were collected from 1838 eBIT students and 49 staff. Staff includes all staff and managers at the e-learning centre at the UCSC and the teachers at the training institutes, so called 'facilitators'. Training institutes are external telecentres, internet cafés or lecture halls where students can go for eBIT classes. Table 2 shows how these informants have been addressed over the period of investigation.

Altogether six questionnaires have been distributed to the different groups within the eBIT project. Four of these were targeted to students, one to the teachers and staff at UCSC and one to the facilitators at the BIT teaching institutes. All questionnaires have been distributed physically on site in Sri Lanka.

The interviews and letter writing took place in May 2007 during a visit to UCSC. Three training institutes were visited where students and facilitators were interviewed and letters were written. A general interview guide (Patton 1990) was used which contained pre-defined set of issues (i.e. categories and factors in the framework) to be addressed in any order as the conversation moved on. This made the interviews very open ended to their nature, giving the informant the role of someone informing the researcher and free to come up with own suggestions and ideas at the same time as it allowed the interviewer to be focused and tick off topics as they fitted into the framework. This approach made it possible to have an open mind to discover new factors at the same time as the framework provided the full set of aspects suggested by the literature. Interviews were conducted with one informant at a time, but in one case eight facilitators, on their own suggestion, conducted a group interview. All interviews were tape recorded and transcribed.

Another source for student input is a discussion forum at the eBIT website where students discuss their opinions and feelings towards the program and the "Virtual Learning Environment as whole" (<http://lms.bit.lk/lms/>). The total number of postings is 164 (80 separate threads) of which 64 are made by individual persons.

Table 2: Summary of empirical material

Data capture tool	(n)	Respondents	Date
Questionnaire	1348	Newly Registered Students (Y1)	Oct 2004
Questionnaire	297	Students (Y2, Y3)	Oct 2005
Questionnaire	34	Academic and Academic Support Staff of UCSC	Oct 2005
Questionnaire	32	Students (Y1)	Jan 2007
Discussion forum	64	Students (all semesters)	Nov2006-Sep 2007
Group interview	8	Facilitators at training institutes	May 2007
Individual interview	1	Facilitator at training institute	May 2007
Questionnaire	8	Facilitators at training institutes	May 2007
Individual interviews	2	Students at training centres (Y1,Y2)	May 2007
Letters	81	Students at training centres (Y1,Y 2)	May 2007
Questionnaire	14	Students at training centres (Y1)	May 2007
Notes board meeting	7	Staff at UCSC	May 2007
Individual interview	1	Staff at UCSC	May 2007

Data analysis

Pre-defined questions in the questionnaires have been summarized and the result has been described in percentage form where the number of informants has exceeded 100 and otherwise the exact numbers have been used. In cases where scale based qualitative measures have been used (ordinal data) the median has been calculated.

A qualitative analysis has also been made where quotations from staff and students were interpreted in order to illustrate in what way these factors are important. All open comments (from questionnaires, letters and interviews) have been analyzed by using a computer based tool for qualitative analysis (Atlas.ti). The coding strategy has been to search for quotations corresponding to the factors in the

conceptual framework. These comments were marked and thereafter all codes (together with the quotation attached to it) were reviewed for connections and similarities. After one cycling round a few quotations were relabelled, but after the second round the coding was stable and included 37 codes plotted out according to their frequency in text occurrence. The coding was in most cases straightforward where quotations such as “*Not enough facilities such as electricity/telecommunication in the area*” easily translated to the factor ‘Access’ whereas the re-labelling of factors mainly concerned quotations such as “*I am girl. Majority of girls are not interest in IT. But I want to win it*” - a statement that could refer to both gender and motivation (it ended up with the latter). In a few cases where interpretations have been impossible due to language problems (usually referential errors) the informant has simply been excluded from the study.

For the extraction of typical comments to use for illustrating the meaning of the factors a list of all corresponding quotations were made and frequent key words and phrasings were highlighted.

Finally, comments are made on how the UCSC has addressed these issues. These comments are based on observations and discussions on site as well as control questions sent to members of the e-learning centre during the process of writing.

MAJOR CHALLENGES FOR E-LEARNING IN DEVELOPING COUNTRIES

Starting out with the mapping of addressed factors to the framework it was found that most factors are mentioned by the informants. In order to assess which of these factors are most important two approaches have been used. The first approach is to look at those factors that are persistent over time because if a factor is really important it probably will sustain over the years. Persistence has been checked for each group and over time *and* groups. The second approach has been to only look at the open comments that are made (thereby overcoming the problem of questionnaires containing pre-defined questions only giving answers asked for) and ranking the factors most commonly addressed. In order to make the assessment a final test was made on the material by excluding the weakest measure point which is year 2006. The material from 2006 is only obtained from the discussion forum (which is of course open, but biased towards several factors since it was initiated in order to give comments to the LMS, and in 2006 it only contains 49 postings from 39 individual users).

Percentage figures in the table (Table 3) refer to how often the factor is mentioned in relation to the other 37 factors.

Table 3: Top challenges both groups

	Factor persistence over time and groups	Factor Persistence over time and groups excluding year 2006	Open comments all years and groups (nr=761)	Factor Persistence over time (students)	Factor persistence over time (staff)	Student open (nr=604)	Staff open (nr=157)
Support for students	X	X	15,5%	X	X	18%	
Flexibility	X	X	11%	X	X	12%	
Motivation*	X	X	10%	X	X	11%	
Teaching and Learning Activities	X	X	8%	X	X		
Access	X	X	7%	X	X		
Academic confidence					X		13%
Localisation of content					X		10%
Attitudes on e-learning							8%

* Student motivation is hereafter removed from the discussion since the paper is focused on challenges whereas motivation in this case proved to be a main enabler.

By looking at those factors that are persistent over time by both groups, separately and together, and by thereafter sorting them according to their frequency in open answers we find the major challenges to be Support, Flexibility, Teaching and Learning Activities, Access, Academic confidence, Localization and Attitudes. Other factors were of course mentioned and may have an influence but the point in this study was to pinpoint focus areas for concern. It was seen reasonable to make the delimitation to the seven factors that constitute the ones that are either most commonly addressed (more than 5% of informants addressing the issue) or persistent over time.

Qualitative analysis

Now that these factors have emerged as more persistent and more frequently addressed than others we will go through them in some more detail by looking at what they mean and in which way are they important.

Support and guidance for students

'Support and guidance' refers to the support systems needed for students to easily make it through the course. Contact or intervention from the institution and support from the tutor and other staff (including IT help desk) are said to improve learning and pass rates (Bhalalusesa 2001; Bollag et al. 2001; Simpson 2004). In the eBIT case this is the most commonly addressed factor in open comments and is consistently addressed over time and groups. Support functions addressed in the eBIT case are study guides, training institutes, administration and technical unit.

Support function	Illustrative quotations*	Comment
Study guides and curricula	<p><i>"If the university can provide the syllabus of the BIT and some study guides to the student it will be very important for us"</i> (Student 2004)</p> <p><i>"Student manuals are very rich in content and covers a very broad area, not only the subject content. [...] It guides us seamlessly from small points to advanced points. That transition is hardly noticeable and that's one of the many features I like about the BIT LMS"</i> (2007)</p>	The students are often confused as to what to learn and how to learn. Study guides and curricula are essential tools for supporting this and by following the comments from 2004 we find that initially eBIT was very weak on this point but in later years there has been great improvements concerning this area and students complain less.
Training institutes	<p><i>"I don't think you could complete BIT self studying, which is very difficult. It's a far fetched idea. You need a learning institute"</i> (Student 2007)</p> <p><i>"I want to know which institute is the best to follow BIT. I am already going to IDM. I haven't done any computer course before. So I have feeling that bit will be hard to follow"</i> (Student 2004)</p>	The main support function for students seems to be the training institutes which fill a huge gap of information and support needed. It should therefore be relevant to investigate what the students get at the training institutes that the self-studying students miss and provide this support via the LMS as well. It could also be relevant to certify the quality of the training institutes thereby ensuring them as a positive resource for the students.
Administration	<p><i>"Is it mentioned anywhere about schedule or deadline of the LMS modules or quizzes? Or any one know about these?"</i> (Student 2006)</p> <p><i>"Being one of the students who is waiting eagerly for semester 2 lesson materials I too bit nervous for the delay. It would be greatly appreciated if the administrators announce their plans and"</i></p>	The eBIT students are often confused about what they are supposed to do and are in need of more information and guidance. When going through the material it is remarkable how much the students do not know about the course they have embarked on. They do not know which assignments are graded, they do not know what the exams will be like and they do not know what will

	<i>time schedule of the courses in order to clear doubts” (2007)</i>	happen next semester. Much of the confusion could be overcome by putting more efforts into the administrative functions by sending out detailed schedules on what is mandatory and submission dates for assignments.
Technical unit	<p><i>“I think it is very helpful if someone gave me descriptive instructions about every activity in LMS Moodle...I didn't find any place that helps the novice students in this matter.” (Student 2007)</i></p> <p><i>“Still the situation is same... I also tried to contact them [IT unit] yesterday on the same number. But no one was there to help us. They should have given some mobile numbers at least... to contact the admin in the case of failure like this... We should ask them to keep somebody 24 hours contactable since we are depend on the LMS.” (Student 2007)</i></p>	The students also call for technical support. Sometimes they know that the information they are looking for can be found in the LMS, but the students still do not know how to find it which means the students also need more guidance in how to use the LMS. And in using the LMS the students also need a technical support unit they can contact at any time. Today there is a service for students to contact the staff and the web master by telephone or email but obviously some students do not know this and some who do know still find waiting for replies taking too long.

* Quotations used are original and no corrections to grammar and spelling has been imposed.

The students in Sri Lanka are not very technological confident and therefore need much technological support. They are neither used to the e-learning culture or learning at a distance which makes many of them expect immediate feed-back as provided in face-to-face classroom teaching. This makes the requirements for interactivity, presence and support extremely important.

Flexibility

Flexibility refers to the classical mantra of e-learning being learning for “anyone, anytime, anywhere” (Broadbent 2000; Casella et al. 2007; Hasan 2006). The factor concerns many issues such as whether students should be allowed to learn at self-pace and take the examinations when they want and if they should be allowed to choose the medium of content delivery. Above all flexibility in assignment pace and course delivery has proven to lead to good results (Patton 2000; Rekkedal et al. 2004; Sankey 2006). In the eBIT case this is the secondly most commonly addressed factor in open comments and the factor is consistently addressed over time.

Flexibility level	Illustrative quotations	Comment
Anyone	<i>“As I didn't qualify to the university, because of the lack of the A/L results; here I found chance to obtain a degree while working” (Student 2007)</i>	Flexibility in the aspect of 'anyone' being able to take the course is one of the strengths in eBIT. One has opened up for students with different educational backgrounds and for students who admittedly did not have the best results from schools. 'Anyone' can also refer to a person being able to follow the program even though they are working or taking other courses concurrently (which is the case for the large majority of eBIT students).
Anytime	<i>“We have to complete repeat subject but we have to wait around one year for that. We don't like that. We want to complete our repeat subject immediately.” (Student 2007)</i>	According to the students and facilitators this is a major problem for students. There are no repeat exams and exams are only held at the end of each year. Students do not know how they are progressing and if they fail they have to take the full year again. The staff at UCSC is fully aware of this problem and is in the process of implementing computer based repeat exams.
Anywhere	<i>“This registration system is not good. Since we have to come</i>	Theoretically the course can be followed from anywhere in the country but due to infrastructural

	<p><i>here [to Colombo]. It is better, if we had a post registration system, because this is a external degree course" (Student 2004)</i></p> <p><i>"There are no classes every areas in Sri Lanka so BIT students have to come Colombo or Kandy to complete this course." (Student 2007)</i></p>	<p>problems in reality this is hard. It is also hard due to the civil war situation for students to be allowed to go to Colombo for registration and exams. Because of this students from Jaffna are today allowed to be registered and take their exams in Jaffna. The registration process still have to be place based due to regulations on documents having to be inspected for originality (risk of fraud) but registration does take place at other districts than Colombo depending on the number of candidates from each area.</p>
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Flexibility in course pace is important because most students are working or taking other courses concurrently to eBIT. By reaching out to poorer students you get another kind of student – hard working to finance their studies or studying several courses at the same time to get maximum benefit in short time. This makes it harder for them with inflexible deadlines and a great help to them would be to allow repeat exams and let them learn at their own pace. Another dimension of flexibility is the delivery media for the educational content. Connectivity is a problem in Sri Lanka and students have problems accessing and doing the assignments in the LMS. By providing different media for education delivery (CD ROM material, print outs of assignments) more students could get hold of the full eBIT content. Today eBIT does provide some material on CD for purchase (Gamage 2007a) but according to the students more is needed.

Teaching and Learning Activities

This challenge refers to the different Teaching and Learning Activities (TLAs) that can be undertaken during a course. Research shows that activities that affect students performance are the level of interactivity (Jiang et al. 2000), the level of collaboration and interaction with peers (Bruckman 2002) and the possibility for hands on practice for students (Mason et al. 2000). In the eBIT case TLAs are discussed in terms of interactivity, assessments, hands on practice and peer collaboration.

TLA function	Illustrative quotations	Comment
Interactivity	<p><i>"I am much obliged if the TV programme may at least twice a week giving live answer to student" (Student 2004)</i></p> <p><i>"The questions, or doubts, that arise when going through e-learning materials cannot be solved immediately as in a face to face lecture". (Student 2007)</i></p>	<p>The students miss the interactivity they get in a classroom setting and, above all, the possibility of getting immediate feedback and a feeling of someone being there. Training institutes are probably very attractive because they can deliver just that whereas the LMS has so far not provided enough interactivity. This issue has, however, been strongly focused by the eBIT staff and they are now in the process of recruiting several on-line tutors.</p>
Assessments	<p><i>"These exams have minus marks system. Because of that student are failed in high ranks". (Student 2007)</i></p> <p><i>"MCQ type questions may not fully explore the knowledge of a student" (Facilitator 2007)</i></p>	<p>Assessing students online can be tricky and many find the multiple-choice-questions not fully reflecting the students' knowledge. In the exams a minus-mark system has been used that the students are dissatisfied with. The continuous assessments (self assessments tool) are, however, much appreciated by the students where almost all students (94%) believe they help getting good results.</p>
Hands on practice	<p><i>"Actually, there are some subjects in this Bit program which are feel so hard to us to understand, because these are not actually practically" (Student 2007)</i></p>	<p>Staff and students frequently discuss whether the course provides enough training in practical skills and a majority of the students believe that they learn</p>

	<i>"Theory side is more. We want practicals more than we get"</i> (Student 2007)	most from practical sessions. A majority of the students are satisfied with the lab sessions provided by the learning institutes which may be another reason for the training institutes' popularity.
Peer collaboration	<i>"Grouping students by the UCSC for Group assignments is a very good method to share knowledge"</i> (Student 2005) <i>"E learning is also interesting as [we] get a chance to collaborate with each other"</i> (Student 2007)	About 3/5 of the students prefer group assignments and going to training institutes whereas 2/5 prefer self studies. But even those who prefer self studies often say that they miss the collaboration with other students that they get in a real classroom setting and believe that more collaborative on-line activities would make the studies easier.

The Teaching and Learning Activities used during the course affects the learning and is widely discussed by the informants. Underlying all discussions on preferred activities is an, often implicit, view of how one learns (i.e. which pedagogical model will affect the learning). E-learning and distance education involves a shift from a more instructor centred approach to a learner oriented approach where students take ownership of their learning (Govindasamy 2001; Siritongthaworn et al. 2006; Zhang et al. 2004). In order to manage this change one has to take measures to support this and the teaching- and learning activities is a big part of this. In the eBIT case students discuss their preference for continuous assessments, and interactivity in order to manage whereas staff often talks about a learning culture with students wanting to be spoon-fed.

Access

The use of ICT for distance education evidently makes access to the technology an enabling or disabling factor (Burn et al. 2005; Rajesh 2003; Siritongthaworn et al. 2006), but access also refers to the quality of the connectivity (Bon 2007). The reliability of this connection and the bandwidth will affect the users' ability to access the full range of the content needed. In the eBIT case this issue is discussed in terms of infrastructure outreach and the quality of the connection.

Access issue	Illustrative quotations	Comment
Infrastructure	<i>"In our country as well, the rural areas are really, really rural. They don't have IT at all. You'd be surprised. Some of the parts of our country still do not have electricity. So forget about IT".</i> (Staff 2007) <i>"Students from the outstation areas find it difficult to access the LMS. I personally know a few friends of mine who have not found it very pleasant in accessing the LMS [...] Even if you keep the content out of it accessing the LMS is a very difficult thing."</i> (Student 2007)	Basically all students have access to a computer for their studies. The infrastructural problems concern those living in rural areas and outside Colombo and mainly refer to Internet not being available and bandwidth problems.
Connectivity	<i>"Bad thing is students in rural area cannot access internet because of the connection speed. And some times students will not be able to follow the studies because of this."</i> (Student 2007) <i>"But there are some things that</i>	Some students access the Internet via an ADSL or broadband connection whereas others use dial-up (modem) connection. Most students and staff say that it is the speed of the connection that is the major bottleneck. Connectivity also affects <i>where</i> students access the Internet. Even though most students have access to a

	<i>make us fed up. Like sometimes we have to wait more than 20 minutes to download a study content"</i> (Student 2007)	computer at home, when accessing the Internet we get a rather equal distribution between the home, training institutes, Internet cafés, university, work and parents offices.
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As we can see from above, the main access-issue is not that of having a computer but that of connectivity. It is usually the speed of the connection that is the limiting factor and even those who go to internet cafés find the connection too slow for required assignments. This raises two issues – one is how to increase bandwidth and another is how to make e-learning content smaller; multimedia and computer graphics should be adjusted according to the prevailing bandwidth situation.

Academic confidence

Academic confidence refers to the students' previous academic experience and qualifications - not only in relation to their Grade Point Average (GPA) but also in relation to which subjects they have studied). Moreover the student's parents' educational level and the student's cognitive skills are often key ingredients to this confidence. The student's academic confidence is a good predictor of a student's success or failure in e-learning courses (Osborn 2000; Simpson 2004) and according to some research (Muse 2003) academic factors outnumber other important factors in discriminating between successful and non-successful web-based students.

Confidence issue	Illustrative quotations	Comment
Quality of students	<i>"We are not getting the best A-level students"</i> (Staff 2007) <i>"Our students have a lack of analytical skills"</i> (Facilitator 2007)	By opening up the BIT program for more students one has received students that attend the external mode because they did not qualify to the university. Whereas this is an admirable effort to disseminate knowledge to more than a selective few it will still be challenging.
Previous subjects studied	<i>"It is the course contents, it's... in particular in BIT in the first semester... it is in my opinion too technical for a beginner [...] if first subject is too technical in the beginning they tend to drop out. Especially girls."</i> (Facilitator 2007) <i>"I have done my A/Ls in Physical Science. I think it gives me lods of push ups in my studies"</i> (Student 2007)	Opening up the admission for students of various educational backgrounds has proven to be difficult where students from physical science and mathematics are doing much better whereas students from arts, languages and combined sciences are doing poorer. This, above all, affects the girls' performance because they are underrepresented in the technical stream (Gamage 2004). As a remedy for this the UCSC is preparing a 'bridging course' which will give the students from other streams the possibility to catch up on mathematics and IT skills.

For any education you will get better qualified students (or students with better grades at least) the harder the selection for attendance is. In most developing countries the admission to universities is highly limited which means that there are still many students out there which are qualified for higher studies even though they may not belong to the absolute top performers (GPA wise). So comments on the students' qualities must also be viewed in terms of the academic staff not being used to educating anything but the top layers of the full student population and it may just be a question of getting used to it – by experimenting with different pedagogical models for instance.

Localization of content

Localisation of content is about how the course material is adapted in order to fit local culture, language and religious beliefs (for instance images and symbols should be appropriate for the local culture in order to not be offensive or simply confusing). Much research shows that localisation is of benefit for the students and language is often a good predictor of outcome (Eastmond 2000; Pagram et al. 2006; Usun 2004). In eBIT the factor is only discussed in relation to language.

Localization aspect	Illustrative quotations	Comment
Language	<p><i>"I feel also that the language has a small aspect here. ...question papers are hard to understand - English language is a barrier"</i> (Staff 2007)</p> <p><i>"I have come off several instances where there was confusing usage of English language in the answers. Please double check as this can lead to us selecting the wrong answers."</i> (Student 2007)</p>	eBIT program is run in English which is not the students' native tongue. People speak Sinhalese or Tamil and would probably do better in their own language. In the eBIT case the choice to use English serves two purposes: one is to unite students from different parts of the country and choosing either Sinhalese or Tamil would fuel the dispute between the two groups. Another reason is how job opportunities are expected to increase if English is improved. Students do, however, have the option of choosing Sinhalese or Tamil for navigating the LMS.

The question then, for any non-English speaking country, would be to decide what is most important – to get more students to complete the program (by providing it in local language) or to make students more globally competitive by adding on English proficiency to learning a subject. In the eBIT case one has chosen the latter but one has also taken measures by initiating a bridging programme that includes English proficiency.

Attitudes on IT and e-learning

Attitudes (positive or negative) come from society, politicians, students and teachers themselves and can be made visible in the political agenda or in how people perceive e-learning as not being 'as good' as face to face teaching. Attitudes can become major challenges for e-learning if not addressed openly (Gammill et al. 2005; Rajesh 2003; Usun 2004). In the eBIT case attitudes are manifested in the way some teachers and students are questioning the credibility of e-learning courses as such.

Attitude	Illustrative quotations	Comment
E-learning as something unreal and not legitimate	<p><i>"E-learning is not a reality. I know that most of the students... they don't take it as an assignment. Most students don't take it seriously."</i> (Facilitator 2007)</p> <p><i>"I think, in my opinion, this is soft, this is virtual. When it comes to classroom, I think best when it's on paper... what I am trying to explain is that it's quite psychological. Here I think the students have respect for exams that are in the classroom... they have more respect. We don't believe in something that is unseen. But I personally believe that, you know, that computer is cool"</i> (Student 2007)</p>	E-learning and ICTs may be so new that it is almost perceived as something unnatural and illegitimate. Computers are described as 'cool', but more like accessories than actual tools for getting something done. The training institutes in the eBIT case may not always be the best promoters for e-learning neither. Even though they officially are very positive towards e-learning they do not support learner centred learning and still teach in a teacher centred manner. In the eBIT project one has discussed the need for promoting and explaining e-learning to students as well as trainers.

Trying to understand the attitudes on e-learning was most difficult in regards to the facilitators because it meant dealing with some contradictions. It is probably a strange dilemma for facilitators (who are private entrepreneurs) that they have to be pro e-learning (or at least pro external modes of education) because otherwise their training institutes would not be needed. On the other hand if e-learning was making students learn by themselves (self studying) they would be out of business. So they promote

e-learning at the same time as they undermine it by reinforcing teacher dependency and an old learning culture.

DISCUSSION AND CONCLUSION

The main purpose of this paper was to identify and analyze major challenges for e-learning in a developing country context where exposure to ICTs is low and e-learning courses rare. By doing so this paper informs both research and practice about which factors to give particular attention when designing and/or researching e-learning in this context. It is considered important because delivery of education carries great potential for the poor but it has to be done in awareness of particular challenges. Seven major challenges (out of 37) were identified in this case: Student support, Flexibility, Teaching and Learning activities, Access, Students academic confidence, Localization of content and Attitudes on e-learning.

These factors concern how the individual student's previous academic qualifications could become a challenge if it is not in tune with course requirements and the support provided. By opening up the admission to more students (which is the overall goal for distance education) one will also get less qualified and confident students. Educational providers should be prepared for this and in preparing a course this should be taken into account by changing the requirements or by providing preparatory courses for the students.

They also concern how the production side has to put much effort into the support functions for students. In a setting where e-learning is new and ICT literacy low the students will be very confused and in need of much guidance (administrative issues, technological issues, how to be an online learner and so forth).

There will also be high demands on delivering the education in a flexible way; pace wise and delivery wise. The students are often working or studying concurrently and this argues for exams and activities to be provided in an open manner where students can chose what time of day assignments and exams should be conducted. As for the delivery mode we find that while infrastructure outreach is low and connectivity erratic one should provide alternative means for education delivery, especially for self studying students. The provision of alternative communication channels would greatly improve outreach – e-mails should be supplemented with letters, LMS lectures with CD ROMs and so forth.

Further aspects to consider are which Teaching and Learning activities (TLAs) to choose. In settings where the educational tradition is very teacher centred one has to understand that introducing e-learning involves a huge change and learner centred learning has to be supported by interactivity, feedback and self assessment tools such as continuous assessments. The novice e-learners needs to feel that someone is there (as a substitute for the classroom teacher they miss so much) and for any e-learner, no matter how self managing, there is need for continuously assessing the personal progress.

Another factor that would make it easier for students is if the course is given in their mother tongue. In countries with many different languages or global educations this may not always be possible but efforts could be made to provide, at least, bilingual information and guidance (study guides, technical assistance and so forth) – even when content is in English.

Finally, attitudes on e-learning should be considered. In the Sri Lankan case we found that even though information technology is considered to be “cool” it is still not regarded as a proper tool for delivering education; it is still second best and not perceived to be ‘as good as’ traditional face-to-face teaching. This could become a major obstacle if e-learning is not promoted or introduced in a proper way. By not using the technologies provided there are no benefits in terms of reaching students at a distance or in enabling a more learner centred pedagogical culture.

Future research is needed to deepen the analysis of these factors. In order to pursue the major research question - on what is of particular importance in settings with low experience and exposure to IT and e-learning - control groups will also be used.

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