Innovative learning in Ethiopia

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1 preface

1.1 why a collaborative report

OLPC has been from it’s very beginning a collaborative effort of many people with different ideas, approaches, and of course interests. The efforts to take OLPC to Ethiopia, to pilot it and eventually deploy 5000 laptops reflects a collaborative effort by many individuals, companies, institutes and institutions as well. Therefore OLPC | Ethiopia has laid a strong emphasis from the beginning to put an implementation strategy in place, which makes optimal use of the ideas, the experience and especially the commitment of it’s stakeholders. The project in Ethiopia might be one of the most versatile and colorful deployments, involving at least as many as twelve main stakeholders in the programme.

It is worth to emphasize that the main stakeholder is the Ethiopian state herself, represented by the Ministry of Capacity Building. Besides the ministry, Ethiopian and international companies, a local implementation team (on.c/ebcp) and last but not least the schools and the educational administration were involved from the very beginning of the project. Besides being a clearly Ethiopian owned programme the main stakeholders – just to mention a few – include the regional education bureaus and their local branches, BlankPage and Apposit Plc, the University of Groningen (The Netherlands – RUG) and GTZ (German Technical Cooperation). In particular the former have been a great asset during the physical deployment and in the capacity building aspects of the programme. Nevertheless the monitoring&evaluation framework has been set up and run by a joint effort of BlankPage/Apposit, the RUG and GTZ.

At the end OLPC|Ethiopia managed to become a platform which drives educational change, not just in policy terms, but in raw physical and capacity (skills) terms. Building and using existing synergies by facilitating the exchange of knowledge and skills became a landmark of the programme’s management. OLPC|Ethiopia being a joint effort and the fact that the project’s success was reached by the collaboration and dedication of it’s many stakeholders we do indeed see the need for a joint evaluation. Nonetheless, it seems to be crucial to provide a holistic review of OLPC|Ethiopia, since media in general tends to simplify both the challenges posed to the project and how these are handeld.

The main aim of this joint working paper is to provide an insight into the programme’s conceptual set-up, management, the deployment process, and the monitoring&evaluation activities. Besides the systemic set-up of the m&e activities this paper also offers a short introduction into it’s main findings.

1.2 on the concept of this paper

As mentioned above, this paper aims at establishing an overview of the OLPC activities in Ethiopia over the last one year. Hereby basically focusing on the deployment of 5000 XO laptops into four Ethiopian schools.

We assume that one of the most important things when assessing any OLPC project is to understand the local context, that is Ethiopia, and it’s social and economic status, educational system. Nevertheless, we would also like to emphasize one —in the Western observation most of the time neglected —aspect, namely the status of ICT’s in this country.

Eventhough we regard the project as an exclusively educational project, where hardware —that is the XO laptops —only play the role of a carrier, but many aspects of this “carrying role” had to be reassessed and local solutions found given the scarcity of both computing resources as well as the availability of internet. Therefore it is of major importance to deal with the status quo of ICT and the limitations resulting out of it.
Secondly, this paper will give an overview about the implementation process and its conceptual backbone. We would like to point out again and again that the implementation of OLPC in Ethiopia has taken place within a capacity building concept endorsed by both the Ministry of Capacity Building as well as by the Ministry of Education. Understanding the concept and all the efforts to translate this into reality is a prerequisite for dealing with both the educational as well as the social and psychological effects of the introduction of XO laptops into the Ethiopian classroom environment.

The Ethiopian authorities and the implementation team has regarded a factual impact assessment as one of the main issues during the deployment and integration process. In order to assess the impact of the XO laptops a detailed monitoring & evaluation concept has been established and put in place. The m&e system is probably —besides the emphasis on capacity building — one of the most unique features of the Ethiopian implementation. On contrary to other deployments impact has been assessed and studied on a scientific basis, seeking to collect fact based, statistically representative data on changes in the educational performance of the children, as well as on change in the social structure and psychological phenomena.

Also we would like to emphasize that this paper only reflects on a period of effectively nine months (September 2008 - May 2009). Of course within such a short time apt educational and social outcomes can not be properly shown. Even the most optimistic opinions assume that at least two years are needed to prove change in the educational performance or in the psycho-sociological environment. Therefore in this paper we intend to show tendencies over a period of nine months, which hopefully will be reconfirmed within the next project year.
2 Ethiopia —a country in transition

Ethiopia has experienced change and transition during the previous fifteen years at an unprecedented rate. Social change driven by economic development, political transformation turned Ethiopia into the second most populous country in Sub-Saharan Africa (79.1 M by mid 2008\(^1\)), and nevertheless one of the youngest ones. With forty-four percent of the total population being under 15 years of age Ethiopia has an energetic and powerful young generation to fulfill the country’s strive for economic and social prosperity.

Rising GDP, per capita income and life expectancy are just a few of many positive signs which show that Ethiopia might experience a fast recovery from long years of economic downturn and social turmoil. Education plays a very important and central role in the country’s transformation strategy. The transition to a modern and state-of-the-art educational system is happening at all academic levels. Between 2000 and 2007 the primary school completion rate rose from 22 to 46% and girl’s enrollment from 65 to 83% (ratio girls to boys in %\(^2\)). All these resulting in an overall enrollment ratio of 93%, which is by far the highest in whole East Africa. These positive factors, combined with a slowly declining women fertility rate and rising immunization rates could create a young and highly literate population which can drive change to an even higher level\(^3\).

Ethiopia is a large and ethnically diverse country. The constitutional change in 1994 has re-created the ethnicity-based regions of Ethiopia, resulting in a federal structure based on independent regions. Ethiopia has currently nine federal states and two municipal cities (one of them being the capital, Addis Ababa), which have complete authority. Eventhough these positive tendencies the country still has a long way to go to reach general social and economic welfare for all. Especially underdevelopment of the logistical, health care and the communication sector can be named as barriers to the healthy development of Ethiopia. Nevertheless one has to note that the government has been putting concentrated effort to develop these sectors (e.g. by large investments in both the road and communication network and the building of hospitals). Positive change – self-evidently – does not include all sectors and spaces of society, let alone the educational sector. Besides all the positive factors, in particular the reform of curricula at primary, secondary and tertiary level did not effect the framework of educational methodology and didactics.

2.1 the educational system —a systemic approach

Ethiopia is facing significant educational challenges from primary through to tertiary level. Despite efforts to provide free universal access to primary education (UN 2000, EFA 2000), national figures demonstrate that only 60% of children are enrolled, with an average of 72 primary school pupils for every teacher (EFA, 2008). As with other countries across the region, increasing class sizes in Ethiopia are leading to significant difficulties in maintaining levels of attainment (Fredriksson, 2004; Naidoo, 2003). Improving educational quality, whilst ensuring equity, therefore constitutes a major challenge and is dependent upon the manner in which teaching is undertaken, in regard to both pedagogical approach and curriculum structure. Widespread lack of textbooks and inadequate access to extracurricular learning materials also constitute significant challenges.

It is of special importance to note that the schools system comprises different types of schools in terms of it’s ownership, supervision and curriculum. Primary education is almost completely run (in percentual

\(^1\)PRB2008

\(^2\)WDI2009

\(^3\)Of course, this has to be put in the perspective of the current data, which in fact show that Ethiopia has one the worst literacy rates on the whole continent (37.3% – WF2008)
terms) by the government, however in regional urban centers – especially in the fast developing regions – private elementary education is also available. Eventhough it’s prevailing presence in certain towns private education does not play an important, let alone central role, in the education of Ethiopia’s children. This is a significant difference to many other African countries, where private education – or privately financed governmental education – constitutes a substantial part of elementary education.1

Due to a high population rise and in particular due to the awareness of it’s people, the capital, Addis Ababa, has a rather more differentiated primary education system. Since the government could not cope with the fast rising numbers of students and the urge for enrollment, communities (kebele's) were granted the permission of building and running elementary schools. The so called public schools are completely run by their communities, however supervised by governmental bodies. These schools take a – normally – low school fee and offer elementary (Grade 8) or even up to secondary school education (Grade 12).2

2.2 models of education

The dominant mode of school-based education in Ethiopia can best be understood within a long established model of teaching, influenced by both cultural and religious traditions (Lasonen et al. 2005). Student obedience and subservience are prioritised and emphasis is placed upon teacher authority. This model plays a significant formative role for the educated population as most current teachers and related professionals received their schooling within a similar context and often perpetuate the top-down, rote-based approach to learning (Smith and Ngoma-Maema 2003; Negash, 2006).

Such an approach stands in contrast to the notion that a goal of education should go beyond learning a set of prescribed answers which form the basis of assessing attainment (Croft 2002). Within this, a priority aim is better conceptualizing as the development of capital for oneself (Ellerman 2004), providing education which fits ‘the present and future needs of the particular learners in question and the community, given the particular circumstances and prospects’ (Fredriksson 2004 p.2). At one extreme, this approach can constitutes constructivism, a highly student centered, autonomous discovery-based approach to learning where the teacher adopts the role of facilitator (Cromer 1997). This is the pedagogical stance promoted by OLPC and reflected in the Sugar applications, tailored to activity-based tasks that a child completes without direct supervision.

Much educational discourse related to ICT for education presents learning as occurring at the rote-based extreme, and advocates constructivism as a solution to this. However, such a dichotomy fails to acknowledge the nuances of classroom teaching which do not fit easily into neatly prescribed categories. Whilst there is clear need for more flexible approaches to education, this does not mean that constructivism should be viewed uncritically as a solution to the current challenges (Mayer 2004). Any attempt to impose a fully constructivist approach to education within Ethiopia, as promoted by OLPC, would be culturally inappropriate and face significant challenges. The Sugar-based applications are not contextualised nor suited for incorporation within the formal school curriculum. Thus, any form of integration within the classroom would require a radical and unrequested shift in established pedagogy.

2.2.1 didactics and methodology

One of the main contraints to the current education system is the didactical lopsidedness – that is the almost exclusive role of frontal teaching, which draws it’s legacy from the teacher’s authority. Subordination and discipline are seen as the main characteristics of students, which at the end enable the simple – but rather ineffective – transmission of factual knowledge. Abstract thinking and problem solving are not taught or supported by the curricula.

We have to distinguish between the motivation of children to go to school and their concentration level. Since education – attending school – is generally seen as very positive and appreciated by all levels of society, childrens motivation is generally much higher than in any developed country. Still, attending school is often mistaken for effective and useful learning.

Since frontal teaching is neither participatory, nor based upon challenging pupils, concentration level
in the class remains low. Distraction is of course also caused by high class numbers and a rather rigid competitive structure. Even though the openly declared policy of interactive learning by the MoE, it’s implementation lacks both skills and incentive. Employing interactive methodology would need a higher level of attention and spontaneity both from the curricula as well as from the teachers. Given the fact that teachers are rarely trained in interactivity and at the same time receive no incentive for putting such methods in place, it is completely dropped.

2.2.2 challenges to the system

Of course the main challenge to the educational system is posed by the fast rising numbers of children reaching school age every year. In this case – however – the main problem is not the number of pupils, but rather the lack of teachers. On average teachers work with 60 students per class. Even though the large class sizes mixed classes (multiple grades thought in one class) are almost none existent in the system. Still, teaching in large classes reasonably decreases the efficiency of the teaching-learning process and eventually, the academic output of the primary education. Nevertheless, large classes are effectively the main hurdle to introduce a sophisticated and multiverse didactical approach to primary schools. Even though schools and teachers are required – by a policy declaration of the Ministry of Education – to diversify their didactical platform this is in fact not taking place due to many factors.

1. First of all insufficient input and guidance is offered to the teachers both during their training as well as during their daily work. This actually means that teachers are left alone in terms of didactical approach and automatically apply methodology, what they are used to.

2. Secondly the system doesn’t foresee any incentive to support the introduction or let alone use of interactive methodology.

3. Thirdly, normal school curricula are overloaded, which makes it hard to finish even along the traditional, teacher-centered didactical narrative.

All in all the current educational system, due to its set up and to the enormous performance and enrollment pressure can not facilitate a change to a more student centered and interactive learning environment. Even though this issues should be addressed since otherwise both the performance will decrease and the information/knowledge will be out of date. These would clearly result in a mass abandonment of the public (in the sense of government run) elementary education (similar to tertiary education) and a further deterioration of educational equality of the children (see education for all). Among further challenges here we restrict ourselves to refer to only one more, namely the quality and the provision of content. In general we can say that textbooks are neither reflecting current academic knowledge, nor the interest of the children. In particular children in urban areas live and learn in two different worlds, where that of the school can not live up to their personal interest and curiosity. Besides the fact that content is ageing and suffers from logistical shortcomings, it’s amount is alarmingly low! Unfortunately many Ethiopian children have only their school textbooks as a window to the world, since public libraries or bookshelves at home are almost non-existent. Therefore children have no opportunity to freely browse and gather information and widen their worldview.

To sum it up – and eliminate some major misunderstandings – the actual bottleneck is localised content, not the price of it’s publishing or distribution.

This study will later show that in fact additional books – other than school textbooks – can drive creativity among children and function as the main self-learning device.

2.3 IT-opia | information technologies in Ethiopia

As mentioned above Ethiopia scores very low in terms of both communication infrastructure as well as the utilization of it’s benefits. In the networked readiness index of the World Economic Forum it ranks
129 out of 134 countries, whereas tendency upwards. From Orbicom – a UN thinktank on ICT4D – we get even more alarming data as to the development of the ICT sector in Ethiopia. The country scored 8.6 at the info-state rate in 2005, a complex aggregative scala of multiple technological, infrastructural and social indicators. To put it in perspective the world average was 113.4 points, while the highest value – that of Denmark – reached 254.9 points. Here we would like to emphasize the lack of skills-development rather than the status of the telecommunication networks.

The government’s efforts to fight backwardness by massive investment into infrastructure is – unfortunately – still lacking the appropriate capacity building measures. Ethiopia is already making extensive use of ICTs in it’s administrational and educational system. In both areas infrastructure has been deployed to connect mid-level administration (WoredaNet1) or an approximate number of 250 high-schools all around the country (SchoolNet). Moreover another similarly satellite based system to support healthcare is planned to be implemented.

Still internet-peneration remains low, and is mainly seen as pure communication device. Information, due to the low speed, lack of localized content and the emergingly low level of ICT skills, is hardly retrieved for research or educational purposes.

However, high enrollment rates at elementary level can be good reasons for optimism, since schooling will hopefully result in the steady and fast rise in both literacy as well as information retrieval skill. These efforts show that there is no lack of commitment for raising ICT standards and widen the use and benefits of these technologies. Still, because of inappropriate content (or it’s non-existence), training and employing synergies these technologies are not utilized optimally. We have to note that this is mainly due to inefficient donor coordination as well as the lack of solid monitoring and evaluating instruments.

2.3.1 ICT 4 Education

There is significant attention focused upon the potential for ICT to assist in leapfrogging educational constraints within developing nations (Pye and Stephenson 2003, Tinio 2003, Leach 2005), with much enthusiasm for a possible technology-enabled breakthrough in learning (Wagner 2005 p.6). It is suggested that the last decade have resulted in the emergence of ‘a new landscape for education’ (Keats 2005) with technology positively effecting student motivation (InfoDev 2005) and, when implemented with fidelity, leading to a significant increase in learning (Lemke and Fadel 2006). However, this is challenged by sceptics who suggest an absence of substantial evidence that the introduction of technology into education has actually instigated more than incremental changes to the field (James and Miller 2005).

Wagner et al (2004) note that ICT for education projects have had a variety of outcomes with negative impacts including the reinforcing of dependencies, imposition without community involvement and collapse due to lack of funding or political commitment. Having assessed a wide variety of studies, Kozma and Wagner (2005 p.21) supports this in concluding that there is ‘no consistent relationship between the mere availability or use of ICT and student learning’. As summarised by InfoDev (2005 p.5), ‘the impact of ICT use on student achievement remains difficult to measure and open to much reasonable debate’. Within this context, there is increasing recognition regarding the role of rigorous monitoring and evaluation to assess the educational impact of introducing ICT into the classroom.
3 OLPC in Ethiopia

To create educational opportunities for the world’s poorest children by providing each child with a [...] laptop with content and software designed for collaborative, joyful, self-empowered learning. When children have access to this type of tool they get engaged in their own education. They learn, share, create, and collaborate. They become connected to each other, to the world and to a brighter future.

OLPC Mission statement

OLPC’s approach was very clear from the beginning when it came to the design of it’s first deployments. Two main requirements were placed, the one looking for government’s expressing interest in participating, the other completely avoiding piloting and directly going into massive distribution of the XO machines. Ethiopia – eventhough it fits most of the requirements of an ideal OLPC implementation site – was not even ranked at the post-launch plan of the OLPC Foundation (see figure). In fact the country’s environment, climate and educational system makes it a perfect testing ground for OLPC. Fortunately this strict scale and commitment approach1 could be changed by both implementing a smale scale pilot in 2007, and bringing the Ethiopian government’s as well as OLPC’s initiatives together. A successful pilot in two schools in the capital, Addis Ababa, could convince both parties about the viability of a deployment in Ethiopia.

The conceptual development for a mid-sized development were done in 2007, which was based on combining the than only expected positive effects of the XO machines with one of the most alarming problems of elementary education in Ethiopia, namely the quality of content and didactics.

This concept has been termed under Innovative learning Ethiopia, which is based around two main ideas:

1. the educational system in the country needs serious innovation, since only this would be able to transfer the positive potential of the massive upscaling (see quantitative expansion) into high quality education.

2. the concept does not rely or is dependent on any single technical solution. At the time of the project start OLPC’s XO machine was the only educational device, which fitted to the Ethiopian reality and was not driven by commercial interest. For these reasons it was chosen as a „carrier“ for the concept.2

3.1 the concept —Innovative learning

The nature of work in a globalized work environment requires future Ethiopian employees to perform increasingly complex occupational tasks. To cope with challenges, students or future employees have to be enabled to act in a flexible manner, solve problems, learn and perform independently and co-operate with others.

1Hermes-Rolf2007
The concept of Innovative learning considers learning as continuous innovation which is based on the ability of the children for self-learning. As mentioned above, skills critical to this are not taught at Ethiopian schools. Therefore waste innovation and a change in mindset is needed to drive change from within the system.

Either we want it or not Ethiopia has entered the era of globalisation as well, which poses new requirements for its workforce. It should not come as a surprise that flexible manners and problem solving are at the very core of these new terms. Therefore Innovative learning aims to provide an educational framework which suits these requirements, that is to provide competitive and competent self-learners for Ethiopia’s labour market. This could help schools becoming places of active learning, instead of being domains of extensive repetition. Which would mean a qualitative change from a qualification driven education into a skill and knowledge based one. Nevertheless it would also foster such culturally rather unfamiliar educational values such as knowledge sharing and team work.

Of course the challenges to such a change are more than wellknown and have been partly described in XX chapter. However, it is always easy to say that the present educational system is too rigid to absorb or let alone carry out change at such a pace. Experience shows indeed that to jump-start such a process needs enormous efforts and concentration. However, two points should be considered when it comes to either dismiss or endorse Innovative learning:

1. Ethiopian teachers and educational experts do not dismiss didactical and pedagogical change, but are rather highly motivated to update their knowledge and skills in this areas. In particular due to the fact that state-of-the-art educational methodology and up-to-date trainers/multipliers are not available in the country.

2. Classic change management in the educational sector (quantitative upscaling of teacher training, textbook provision on scale, etc.) did not bear fruit over the last 40 years of aid which has flown into this segment.

“Innovative learning”, for exactly the same reason, has abandoned OLPC’s original idea of an implementation process, where teachers are left out. In order to reach even a small level of classroom integration teacher can not be left out and can not be left behind. Both would cause a total abandonment of the initiative and degrade the laptops to a simple toy. Therefore in the “Innovative learning” concept teachers in fact play the major role in the implementation. However, it has to be recognised as well that reaching out to teachers is not an easy task. On the one hand it needs to build up motivation and acceptance for the project, whereas on the other hand it has to invest in continuous training for and communication with the teachers.

To reach these goals an appropriate way for raising awareness and deconstruct misconceptions and mistrust has to be found. Doing so not just formal, but a rather actual and solid ownership can be created.

### 3.1.1 Embeddedness and Ownership

How to embed “yet another fancy educational project” in an educational environment where donors are since decades actively involved in reform? To put it in another way, the question how to create ownership for pilot was most probably one of the major challenges.

In order to make the project run smoothly and become successful the original OLPC implementation concept had to be slightly altered. The main reason is that ownership does not appear parallel to the XO machines, but has to be created. In terms of ownership issues we can say that OLPC’s original concept represented a rather top-down approach where the major stakeholder and initiatior is the government itself. This is indeed the case in the Ethiopian implementation, and was assured by two visits of Nicholas
Negroponte in late 2006 and mid 2007. The meetings with prime minister Meles Zenawi resulted in the commitment of the government. The mandate to carry out the first pilots was then given to the Ministry of Education and the Ministry of Capacity Building; the latter taking the lead in the organization. MoCB than BEAUFTRAGEN the engineering capacity building programme to prepare, carry out and monitor the first OLPC pilot activities.

**the engineering capacity building programme** One of the unique features of the Ethiopian deployment is exactly the ownership and mandate given to a completely local programme (ecbp). Instead of short term „deployment agents“ sent by OLPC in Ethiopia, the complete management has been carried out by a local programme. Ecbp is fully Ethiopian reform programme and one of the eight capacity building initiatives of MoCB. However, ecbp is set up as a joint action between MoCB and the German government. As one of the most ambitious reform programmes of the Ethiopian government, ecbp has all the capacities and qualifications to act not just as a distributor of laptops, but also to support and build local capacities. The deployer being local and having the knowledge about local structures meant not only that the distribution could be done in an effective and definitely more secure manner. But have created an environment, where more than just a distribution could be done.

Ecbp’s OLPC deployment plan – based on the Innovative learning concept – has strongly focused on assessing and creating the right capacities to sustainably run a project at this level. To put it differently driving systematic educational change needed a partner and owner of the project which can bring together and coordinate all interested partners and actors. This in particular meant a thematical and structural focus on the training of the teachers and the adequate monitoring of the project’s impacts.

**the OLPC|Ethiopia team** For managing the first pilots in 2007 and the main deployment of the 5000 laptops a team of five Ethiopian ICT experts have been set up within ecbp. They have been integrated into the one | eCapacity Development department of ecbp. This department of ecbp concerns with enabling change processes through the introduction of appropriate ICT measures. The training of the OLPC team has also taken place within the one department, where also further coaching and mentoring was done by the German Technical Cooperation (GTZ).

The team’s main tasks included the selection of schools, the preparation of the school staff, logistical preparation and the management of the distribution, the technical maintenance (3rd level) of the XO machines, the implementation of the monitoring-evaluation, etc. As the above mentioned tasks show, the team had to react on and interact with a number of very diverse factors, in particular the training of teachers and basically making the project an Ethiopian project by coordinating all stakeholders in the project.

The latter two do play a crucial role in reaching the project’s main goals, namely:

1. educational transformation by shifting from unilateral to interactive communication in the teaching-learning process.

2. educational transformation by changing the educational process in which children learn; reorienting priorities from repetitive to constructive learning. This can not be done without capacitating the teachers and involving the educational administration at all levels.

**first phase —the pilots** The first pilot was carried out in May-June 2007, only involving 20 XO laptops (β machines) and selected students of Atse Naod primary school in Addis Ababa (see detailed information on the school in chapter XX). Within this pilot only after-school activities were involved, that means that the laptops were not included in the normal classroom teaching. The main aim being awareness creation than testing itself.

In the second pilot project —November-December 2007 —a total number of 60 XO laptops (still β-machines) were involved. However, this time only one class has been selected and extensive training and the integration of the laptops in the normal teaching-learning process was done.
3 OLPC in Ethiopia

3.2 phase two —the deployment of 5000 XO machines

After two successful pilot projects with XO machines in Addis Ababa enough evidence has been gathered that a mid or large scale deployment of XO laptops is both technically as well as didactically possible in Ethiopia.

These pilots have shown that —eventhough serious lacks in telecommunication infrastructure (cf. internet) —the deployment and classroom integration of the laptops can be done.

These foundings were also well taken at the OLPC Foundation, which made possible that within the frames of it’s G1G1 (Give One Get One) initiative 5000 XO’s have been donated to Ethiopia.

The second phase of the OLPC initiative in Ethiopia thus involves the deployment of 5000 laptops and includes the following main steps:

1. preparation: the preparation phase reached from January to June 2008 and included the selection of the schools (see XX chapter), a set of capacity building measures for teachers and the set up of the monitoring and evaluation framework (see XX chapter).

2. laptop deployment: the XO machines arrived in mid June 2008 to Ethiopia, and were accordingly registered and in three different phases distributed to the schools (June-October 2008).

3. implementation phase:

3.2.1 parallel phased integration

In order to assure a fast and safe integration of the laptops an “aurea mediocritas” had to be found, with other words an implementation procedure which provides a gradually rising integration level in the classrooms. A too fast integration process, where the teachers can not keep up with the development would only harm the project. The assumptions was —which in the end proved to be reality —that teachers will need a lot more time to adapt to the technology, that is to become computer literate. However, sole computer literacy skills are not enough for appropriate integration of any digital device in the classroom. Therefore any concept aiming at integration has to provide additional capacity building measures to update and upgrade the teachers’ skills. In the end this would create a slow process where interactivity and constructivist learning is phasing in parallel to rote learning phasing out.

Another aspect of parallel phased integration is related to the role of the two ministries which have a stake in the project, the Ministry of Capacity Building and the Ministry of Education. As mentioned earlier the former has the full ownership about the project and takes care of the implementation of the pilot by making both the financial and the human resources available. Whereas the MoE’s role restricts itself to educational consultancy during the pilot and is basically represented by it’s regional administrative bodies, that is the Regional Educational Bureaus (REB).

However, when it comes to scaling up —which is the main aim of the pilot —the MoE is going to take over the lead in the implementation process. Since the core element of Innovative learning is capacity building the most crucial skills will be built up in MoCB and slowly shifted and scaled up by MoE.

3.2.2 awarenessraising —risks and wins

Besides gradually building up the teachers’ capacities in terms of computer usage and didactical integration continuous interaction with all the stakeholders has to be established.

However, given the tacit environment and the fact that awarenessraising

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\[This~initiative~offered~private~persons,~private~and~statal~bodies~to~purchase~XO~machines~for~themselves~and~at~the~same~time~donate~another~one~to~children~in~developing~countries.~The~total~cost~of~the~purchase~was~360S\]
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3.2.3 schools

selection of OLPC experimental schools  Along the government’s Innovative Learning1 plan the following regions had to be included in the deployment: 1. Addis Ababa, municipal city 2. Oromiya Regional State 3. Amahara Regional State

The selection of schools have been done in an organized manner from the beginning, based on four main groups of criteria. The following has been considered when assessing candidate schools2 for OLPC:

- Social background of pupils
  The school has to represent pupils from less or least privileged social spheres [...]. Therefore an assessment is carried out into the number of socially deprived pupils in relation with the total number of school attendants. The school has to be socially representative (in an academic sense).

- School size and equipment
  The school has to represent an average town school in Ethiopia. For this reason the total number of pupils (TNP) and the average number of pupils (ANP) per class has to be taken into account. Equipment will be measured through three (3) categories: poor – limited - good

- School staff
  The involvement of the school staff is of an outmost importance concerning the success of the test, let alone the roll-out of the project! This is to say, that during the assessment attention should be paid to the willingness, curiosity and engagement of the staff. This regards to the safety of test environment in particular as well. This will be measured at a scale of: non-satisfactory – satisfactory - cooperative

- Location
  The school location should be easily accessible for the support team [...] and for further visitors (educational experts from MoE and international organisations, etc.) Location is depicted by the following categories: central - remote3

In total eleven schools have been visited. For the deployment of the 5000 XO machines two schools in Addis Ababa, which fulfilled the above mentioned criteria and have been using XO ß-machines during two previous pilots (in 2007) have been automatically selected:

1. Atse Naod, public primary school
2. Menelik II., governmental primary school

For the deployment in Oromia the primary school in Mullo Sayyo, a small village school, have been selected. Whereas, in the case of Amhara Regional State, the selection —besides the above criteria —have been based on the possibility of deploying laptops with solar power. Here a German-Ethiopian Foundation —Solar Foundation —has offered to import and deploy 500 solar kits for children in the region. Based on this possibility of cooperation, the Foundation’s test site, Rema, has been chosen as experimental school.4

Four schools with an approximate deployment capacity of 4500 laptops have been defined as first deployment sites. Due to still free laptop capacities (from stock) one more school in the region of Tigray has been selected.

3.2.4 schools’ profile

Dagmawi Menelik Primary (Menelik II; experimental school)  Menelik II is a big governmental school in Addis Ababa. The school has in total 2175 students (2008/2009). Classes are starting from grade one up to grade eight. Parents do not have to pay school fees at governmental schools in Ethiopia. In general, children at governmental schools come from families that are less rich than the children at the public schools. Public schools are not free. Menelik II is located in the sub city Arada which is situated
in the northern part of the city centre. Menelik II is located on one of its main roads. Most of the students also live in Arada, some come from other parts of the city. They come to school by public bus or minibus and some of them have to walk more than an hour. Students belong to different tribes and religions. They are taught in Amharic which is the first language of the majority of inhabitants in Addis Ababa. Students have classes in the morning and in the afternoon. Menelik II is an experimental school in this research. Students have laptops since October 24, 2008. At the time of the second wave, not all students used their laptops in the classroom. In total, there are 2390 laptops deployed in Menelik II. Some teachers are encouraging the usage of the laptops in the classrooms, others are not enthusiastic about it. Of the 649 students in grade five and six 271 students are currently participating in the study.

**Arbegnoch (control school)** Arbegnoch has been selected as the control school for Menelik II. It is also a governmental school in Addis Ababa, situated near a main road in the sub city Arada. There are in total 1903 students in the school (2007/2008), from grade one up to grade eight. Students differ in religion and tribe and most of them live in the area of Arbegnoch. Amharic is spoken at the school and children have classes in the morning and in the afternoon. In Arbegnoch there are no laptops deployed. The living circumstances of the students at Arbegnoch are comparable with the living circumstances of the students at Menelik II. The most important difference between Menelik II and Arbegnoch is that most of the students at Arbegnoch have never used a computer. Of the 662 children in grade fifth and sixth grade 251 of are participating in the study.

**Atse Naod (experimental school)** Atse Naod is a public school in Addis Ababa. Since 2006/2007, Atse Naod has two more grades in their school system. They now have classes from grade one up to grade ten. During the last two years, the student number has almost doubled (2006/2007: 867 students; 2008/2009: 1618). Parents have to pay schools fees (appr. 4 dollars monthly). In general, the students’ families at Atse Naod are richer than families at Menelik II and Arbegnoch, which are both governmental schools. Atse Naod is also located in the sub city Arada. Most children live in Arada in walking distance from Atse Naod. Some students come from other sub cities and have to travel by minibus, public bus or have to walk for more than an hour to go to school. Students belong to different tribes and religions. They have classes in Amharic in the morning and in the afternoon. The students of Atse Naod have laptops since the 13th of October 2008. In total, there are 820 laptops deployed. 180 of a total of 187 students in grade five and six are participating in the study.

**Kedamawi Menelik (Menelik I, control school)** Menelik I is a public school in Addis Ababa, located in the sub city Arada. It is chosen as the control school for Atse Naod. Classes are given from grade one up to grade eight. Menelik is comparable in terms of the distribution of tribes and religions. Children life in the neighbourhood of the school. The living circumstances of the families are in general better than the ones of the governmental schools. Parents have to pay for the children’s education. The monthly amount for the fifth and sixth grade appr. 2.5 dollars. Students go to school in the morning and in the afternoon and classes are given in Amharic. The total amount of students in the school is 850 (2008/2009) and 199 students are studying in grade five and six of which 170 students are participating in the study.

**Mullo Sayyo (experimental school, countryside)** Mullo Sayyo is a governmental school 70 km north-west of Addis Ababa in Oromia. The schools is located in a rural area, 20 km away from the main road. Classes are given from grade one up to grade eight. There are 660 children in the school. Most of their families are farmers and have a low or medium living standard. Classes are given in Oromifa. Students have classes in shifts. They go to school either in the morning or in the afternoon. All children walk to school, although some of them live far away. Some of them have to walk for more than three hours per day. Students have different religions, but almost all of them belong to the Oromo tribe. Since the 24th of September 2008, the students have laptops. Because most of the children do not have any energy supply at home, they have to charge their laptops at school. Only 50 laptops can be charged at once
3 OLPC in Ethiopia

and approximately 200 laptops per day. All 273 students in grade five and six are participating in the study.

Wararso Malima (control school, countryside) Wararso Malima is another governmental school in the rural area of Oromia. It is located approximately 40 km to the north of Addis. It has been chosen as the control school for Mullo Sayyo. Both schools are comparable to each other. At Wararso Malima most of the parents of the students are farmers. The families do not have electricity at home. The school neither has electricity. Students walk to school which some of them takes three hours per day. Students have classes either in the morning or in the afternoon shift. Students differ in religion, but almost all of them belong to the Oromo tribe. The total amount of students at Wararso Malima is 585 (2008/2009). All 196 students in grade five and six are participating in the study.

Meyweni, Mekelle (experimental school, regional town) This elementary school is located in the capital of Tigray region, a federal state in the northwestern part of Ethiopia. The pupils come from solid, regional middle class families. This school was added to the deployment of XO laptops in Ethiopia in early October 2008, given the fact that still 100 laptops could be released from stock. Meyweni has 1400 pupils and 50 teachers representing an average regional urban school. The school received a total of 140 laptops, which were deployed in grade 6 and 7. Teachers received computer literacy trainings twice, for the first time before deploying the laptops in October, and one recap workshop has been offered later in December. Due to its distance to Addis Ababa a new approach had to be found for both technical support provision as well as for carrying out the monitoring activities. This lead to the activation of the concept of regional hubs, a proposal part of the Innovative Learning plan.
4 the monitoring and evaluation framework

4.1 motivation for monitoring the change

The goal of OLPC in general and Innovative Learning in particular is to improve the educational performance of the pupils. How to measure the impacts of both the device and the educational concept—interactive learning—does pose a challenge.

First of all the educational impacts of ICT based educational concepts Nevertheless we assume that there is so called primary (i.e., educational) consequences of ICTs. We propose to also look at secondary consequences: changes over time in social networks (also referred to as social capital), cultural values, beliefs and practices, self concept, as well as changes in social equality (e.g., with respect to gender). These "unintended" changes in social networks, communities, culture and psychology may occur when laptops open new communication opportunities. The project focuses on potential changes at three interrelated levels: psychological (self-concept, goals and expectations), social (networks and communities) and cultural (values).

4.2 Partners

The monitoring&evaluation of OLPC in Ethiopia is carried out by ecbp/one in strong cooperation with the following partners:

- Eduvision Ltd. (CH)
- University of Groningen (NL)

While ecbp’s tools are mainly focusing on the primary effects of the laptops, Eduvision and the University of Groningen are focusing on the secondary consequences and evaluating both effects.

Both Eduvision and the University of Groningen have personnel for data-collection and evaluation on the field.

Further ways for research cooperations and funding is being discussed.

4.3 Aims&objectives

The aim of the m&e activities for OLPC in Ethiopia is to assess the feasibility and impact of introducing ‘Innovative learning’ in Ethiopia consisting of capacity development, XO laptops and Melepo. In fact M&E serves to gain detailed information on the preparation (in particular teacher training) and the implementation phase (both in- and outside of the school). Through a variety of methods (see below) we assess the outcomes of the capacity development activities and the teachers, students and additional stakeholder’s perception of the programme (awareness and ownership).

Monitoring the preparatory and implementation activities and at the same time the perception among the stakeholders gives an insight of both the level of integration of the laptops in the classroom and the development of the social environment (awareness and involvement). Given these data the implementing team is able to follow-up processes during the whole duration of the programme, moreover to adjust internal steering mechanisms among local stakeholders.

In the methodological set-up we aimed at an comprehensive approach gathering data on both in- and outside of school usage of the laptops. Nonetheless the methodologies applied cover all stakeholders (students, teachers, parents, wider community, etc.).
4.3.1 Goals

- Track effects of OLPC over time:
  1) primary effects (e.g., educational outcomes)
  2) secondary effects (e.g., psychological, social and cultural changes)
- Compare with control schools (no laptops deployed)

4.3.2 Outcomes

1. Primary effects: some improvement over time initially not much, bigger effects after the first year
2. Secondary effects:
   - gradually over time; first changes after 3-6 months
   - changes in self-concept
   - changes in cultural beliefs (more autonomous and changes in dependency)
   - social networks [quite abrupt changes for some students (students highly interested in technology) immediately after deployment of OLPC]

4.4 Monitoring the primary consequences

Inspite of the fact that the original OLPC concept does not aim at increasing the educational attainment of the children—or to be more precise it does not explicitly formulate it as a goal within the classical classroom environment—within the framework of Innovative learning it has been playing an important role. One of the main reasons for doing so is that one can not expect from any educational system—neither in developed nor in developing countries—to wage a jump from a teacher centered academic environment to a constructivist one (cf. to parallel phased integration; chapter XX). This being a rather unrealistic assumption one can be sure that the assessment of children’s performance can not be changed overnight either. For this sole reason there is a clear need to assess children’s performance in a way, which does correspond with the educational system.

4.4.1 Monitoring activities inside the school

The in-school usage of the laptops are monitored and evaluated on the following basis:

- classroom observation forms - these forms gather quantitative information on the teacher-student interaction, the use of different tools (blackboard, textbooks, laptops, etc.), activities with the laptop, social forms and methods of teaching;

- focus groups with teachers - this method offers a platform for teachers to discuss progress and problems related to the implementation of the laptops in the school in general and in the curriculum in particular. Teachers participate on a voluntary base. Focus groups are moderated by one of the one team members. Notes are taken by the moderator or, if teachers agree, the whole session is recorded. Focus groups are conducted on a 6-monthly basis. The method offers quantitative data on integration and overall progress;

- focus groups with students - discussions with approx. 8 volunteers focus on children’s experience with the laptop. However according to the age of children it is conducted using different methods to discuss (e.g. drawings, pictures, toys, etc.). Moderation and frequency similar to teacher focus groups;

- baseline test - a general test is conducted with 6th grade students (30 students/school) to assess their level of knowledge in different subjects. The first test takes place before the implementation of the laptops while the second one after six month of laptop usage. The test offers a comparison of impact on child attainment between the 4 schools involved and two Control schools;
4.4 Monitoring the laptops

4.4.1 The monitoring and evaluation framework

- teacher diaries - we distribute diaries for teachers who are willing to report and reflect on their experience with the laptops on a daily basis. (Unstructured but with prompts to assist in completion);
- student diaries - same as teacher diaries. Both data are qualitative with respect to their datatype.

4.5 Monitoring out-of-classroom usage of the laptops

The out-of-school usage of the laptops are monitored and evaluated on the following basis:

- interviews with parents and community members - these data offer exquisitely important information on the acceptance and awareness concerning the laptops in the local communities. Communities are defined on the closer living environment of the students (in the case of Addis Ababa therefore we speak about multiple communities);
- process samples - by using a simple script data on laptop usage will be extracted. The aim is to evaluate the frequency and the length of using each application on the laptop. Data collection only takes place with the agreement of the owners of the laptops.

The data collected is stored on a local database, access to the database is granted to all stakeholders involved.

Besides assessing the educational impact of the laptops these data are very important to understand and analyse the process of implementation. With other words, to follow up upon the acceptance of the machines by the children, the teachers and generally by the whole community.

Therefore monitori

4.6 Monitoring the secondary consequences

4.6.1 Acknowledgements

There is an extensive literature on the secondary effects of ICTs, although not in Least Developed Countries. This literature shows, firstly, that user characteristics and technology use have a strong influence on each other. Users very readily transform and adapt technology to meet their current needs. It may not be that obvious therefore that ICTs would radically transform educational practice. Moreover, technologies are powerful vehicles for the expression and maintenance of social identities. Thus, it may be that one of the key benefits of OLPC is not in education, but for social purposes, networking and the identity-expression. In this respect, it would seem especially important to explore the indirect benefits of OLPC for the accumulation of "social capital" in the form of social networks and/or knowledge sharing. In sum, it seems likely that OLPC will bring social and cultural transformations, although these transformations may crop up in unexpected places. This is one prime reason for taking a broad measure of psychological, social and cultural impacts of OLPC in Ethiopia. If we succeed

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in conducting a systematic longitudinal survey of primary and secondary effects of OLPC, this would create a database of great scientific value.

4.7 Research methodology

We believe that the focus on secondary consequences would complement and strengthen the study on primary consequences, and would be theoretically Innovative. We would track the impact of the laptop usage on psychological, social and cultural indicators. Students would be monitored longitudinally, starting with the introduction of laptops to schools, and carrying on for (at least) 2 years after introduction. During this time, they and their teachers will be regularly interviewed, and quantitative and qualitative data is collected. Key indicators include educational performance, indicators of self-concept, social networks, cultural values and future (career) goal orientations. Additionally, to understand what drives students to use the laptop and to understand what activities predict the expected changes, their laptop activities should also be investigated (we are particularly interested in the communication tools of the XO laptops such as chatting, emailing and exchanging materials). With input from social and developmental psychology, communication science, education and computer science, the program of research aims at thoroughly investigating the impact of the implementation of OLPC in Ethiopia over two years.

We expect secondary outcomes to be important for three reasons.

1. Certain secondary outcomes (e.g., changing personal networks and the growth of social capital) are themselves highly valuable outcomes of OLPC.

2. Educational outcomes are related to and stimulated by the secondary consequences of OLPC.

3. Psychological social, and cultural factors are not just outcomes —they are also independent predictors of successful adoption of educational technology.
5 lessons learnt

5.1 monitoring the deployment

As mentioned above, the various indicators and methods applied during the implementation process not only fed into the categories of educational or social and psychological outcomes, but have helped to adjust the implementation process over time. Here, we only intend to mention a few obstacles or challenges to the management and steering of the project.

5.1.1 project image

As mentioned a number of times before OLPC in Ethiopia is completely run by the government, represented by MoCB and the engineering capacity building programme. However, due to the social and educational environment the project was and is still often mistaken for being a private initiative of one of the numerous donors present in the country.

Of course there are a number of factors which contribute to this image. First of all ecbp’s joint Ethio-German set-up, which often creates confusion among local partners. Eliminating misunderstandings on this issue is a long process, where local partners need to be continuously communicated and addressed by MoCB or MoE.

Secondly, the young age of the team also supported the NGO-like image of the project in the eyes of both teachers and local governments. In a cultural and social environment where age and hierarchical status plays a central role when it comes to decision making this seems to be a major issue. On the one hand through the unbalancing nature of young trainers educating elder and experienced teachers, on the other hand a young management team trying to influence and guide decision processes within the Ethiopian public administration (in particular in the educational administration).

Thirdly, the sheer innovative and unusual” nature of the OLPC project. Strangely enough monitoring data —especially personal interviews and reflections from focus groups —show that many of the major stakeholders (teachers, school principals, parents, public servants) do not believe that innovation at such pace can come from the government. In fact changing this perception will need most probably a few other decades.

To sum it up the main problem concerning the image was and partly still is that being mistaken for an NGO implies a lot of extra effort especially in terms of awarenessraising. Nevertheless, it also triggers expectations and demands from the recipient’s side, which harm the sustainability of the project. Just to mention one of these false expectations” is being payed extra for participating in the project or receiving per diems when taking part in the training. Unfortunately, these effects of a long-established donor community basically endanger the longevity and the sustainability of any change process.

5.1.2 local involvement —steering committee

In order to create local ownership for the project and through this build up the capacity and the long term involvement of all stakeholders coordination and organized communication is needed among them. In fact without the latter the project can neither be sustained nor enlarged in the future.

The aim of establishing steering committees in the different regions/regional states of Ethiopia is to create a stable framework for stakeholder interaction and to secure effective problem solving mechanisms. Therefore the role of the steering committee is to provide a platform for all stakeholders to exchange information, discuss current problems, elaborate on solutions and to monitor the impacts of the project. However the steering committee has to be understood as a supervising body where all stakeholders are represented in an equal setting. The Committee is supported by a number of Technical Working Groups
(TWG), which work on practical issues related to the project’s implementation.
The Steering Committee should be hosted by the Regional Education Bureau in order to secure the highest level of involvement and to help fasten up decision making processes within the educational system.
The Steering Committee is intended to meet once in a month on a regulated basis.

**Technical Working Groups**  Technical Working Groups (TWG) aim to tackle particular issues related to the implementation of the project. This issues should be defined and accordingly assigned by the Steering Committee. The TWG’s consist of representatives from the Steering Committee and additional stakeholders or external experts. The issues assigned to the TWG’s might involve budgeting, educational/methodological expertise, the harmonisation of curricula, or any relevant technical issues. The TWG’s responsibilities consist of gathering the required skills and knowledge in order to solve and/or administer the assigned tasks. This might involve external experts as well as stakeholder from any level (e.g.: school teachers, supervisors, etc.).
The TWG’s head is to be defined by the Steering Committee, who then has the responsibility for organizing and leading the work of the group. He/She also takes care of the proper implementation of the task and reports to the Steering Committee on a monthly basis.
Reports from the TWG’s head might be required in either written format or (at least!) being presented at the Steering Committee meetings.

**Roles & Responsibilities within the Steering Committee**  The following stakeholders are suggested to be involved in the regional olpc Steering Committees:

- Regional Education Bureau
- Zonal Education Bureau
5 lessons learnt

• olpc Project School
• Parents-Teachers Association (PTA)
• engineering capacity building programme (ecbp)
• additional representatives from local partners (teacher education colleges, etc.)

Regional Education Bureau  The head of the Regional Education Bureau chairs the Steering Committee, which involves calling for the meetings and reserving place&date for the meetings. Nevertheless oversees the project’s progress in cooperation with the technical working groups formed by the stakeholders.
At the same time it is the chairman who assigns specific tasks to the respective Technical Working Groups and is responsible for installing additional ones if needed.

Zonal Education Bureau  The Zonal Education Bureau (ZEB) participates by it’s highest ranking official (or his/her permanent representative) in the Steering Committee, at very same time it takes a leading role in organizing and running the activities assigned to the TWG’s. It has also a central role in supervising and monitoring the implementation, and in particular the methodological usage of the laptops in the respective schools.

olpc Project School  The olpc Project School is represented by it’s principal or his/her permanent representative in the Steering Committee. Nevertheless the school(s) are also integral and focal member in any of the to-be-established TWG’s. Schools play an important role in the project and the challenges which occur during the implementation. Therefore they play a central role when defining central issues and also in tackling them.
For this sole reason schools should be represented in all the TWG’s being established under the Steering Committee. School representation in the TWG’s is dependent on the principals decision, however it should be permanently assigned to one person.
All stakeholders have to bear in mind that the focus of the project are children and through this the project schools! For this reason cooperation and constant exchange of information, nonetheless the mutual support is necessary.

Parents-Teachers Association  The Parents-Teachers Association (PTA) of the olpc Project Schools is represented by it’s head or permanent delegate. The PTA’s can take part in the TWG’s upon request or by appointment from the Steering Committee’s chairman. PTA’s play an important role in facilitating the project in the schools and to provide information for the community.

engineering capacity building programme  The engineering capacity building programme (ecbp) is one of the capacity building programs of the Federal Ministry of Capacity Building in Ethiopia. The major focus of the programme is the support and assistance for building up local engineering capacities.
In this framework ecbp supports universities and TVET colleges in order to make use and fulfill the criteria of modern education. At the very same time it also provides support for small and medium enterprises (SME’s) and introducing production standards.
Besides these major fields of technical cooperation, ecbp is also aiming at introducing innovative ICT solutions in these respective areas. These tasks are carried out by ecbp’s eCapacity Development department, on.e.
ecbp/on.e’s role in the olpc project is restricted to the deployment, the technical support and especially to the capacity building aspects. ecbp/on.e’s role in the Steering Committee is to assist stakeholders when local capacities are missing in terms of organization, training or additional capacity building issues.
ecbp/on.e is represented by it’s olpc project coordinator or assignees. The olpc project coordinator can be represented by ecbp’s regional coordinator.

ecbp does not take responsibility by appointment of MoCB for the budgeting of the project. That is to say that ecbp is not allowed to provide any kind of financial support when it comes to per diems, transportation costs, food & accommodation, etc. of the stakeholders.

**additional representatives from local partners** In case need arise either within the Steering Committee or in the TWG’s additional partners or experts can be involved in different phases of the project. However the modes of their involvement (task definitions, timeplan, budgeting), must be decided upon by the chair of the Steering Committee or the particular TWG.

## 5.2 educational progress

### 5.2.1 pupil’s attainment

Through changing educational methodology and didactical approach inside the classroom OLPC aims at improving the academic performance of the children. This can only be reached with extensive teacher training and continous support for educational staff in the schools.

In our monitoring activities we have compared the attainment of children from all OLPC schools with their peers in the control schools. Comparing their test scores from the end of 5th grade (June 2008) with their results at the end of the first semester in grade 6 we have found a slight increase. Children with laptops scored generally 3% higher in their semester tests as their peers without laptops. In the test 1750 children were involved in total.

However, here we have to emphasise that first of all — as mentioned a number of times already — six months time is to short to show real increase or change in academic performance. At the same time 3% might still fall within the limits of statistical error. Nevertheless, we see that the statistical fluctuation (change in test scores) in classes without laptops lies within 1.5%. This in fact tells that the level of change within laptop classes is already outside the normal fluctuation in attainment.

Secondly, it is important to note that this change in academic performance is not caused by the laptop per se, but by a changing didactical environment. That is the change in the teaching-learning process. In classes where the teachers made extensive use of the laptops we have seen academic performance soaring by up to 13%. Meaning that only continous training for the teachers can make a real dierence when it comes to pupil’s attainment.

### 5.3 technology adaption in developing countries

by: Nina Hansen, University of Groningen

There is an extensive literature on secondary effects of ICTs in developed countries. This literature shows, firstly, that user characteristics and technology use / benefits have a strong influence on each other. Users very readily transform and adapt technology to meet their current needs. It may not necessarily be the case that OLPC dramatically transforms educational practice. However, especially among children and adolescents, technologies are powerful vehicles for the expression and maintenance of social identities. Thus, it may be that one of the first impacts of OLPC is in terms of social development, networking and identity-expression. In this respect, it is important to consider effects of OLPC for the accumulation of “social capital” in the form of social networks and/or knowledge sharing. In sum, it seems likely that OLPC will bring educational, social and cultural transformations, although these transformations may crop up in unexpected places. This is one prime reason for taking a broad measure of educational, psychological, social and cultural impacts of OLPC in Ethiopia. Furthermore, this systematic approach would be a basis to draw conclusions and learn lessons from the introduction...
of OLPC in Ethiopia for all involved stakeholders and policy makers around the world.

5.3.1 research focus
This research examines primary consequences (i.e., educational outcomes, retention) as well as “unintended” secondary consequences. The project focuses on potential changes at three inter-related levels: psychological (self-concept, goals and expectations), social (networks and communities) and cultural (values). On the basis of past research, we expect the study of secondary consequences will complement and strengthen the study of primary consequences, and would be theoretically Innovative. We expect secondary outcomes to be important for three reasons.

1. certain secondary outcomes (e.g., changing personal networks and the growth of social capital) are themselves highly valuable outcomes of OLPC.
2. educational outcomes are related to and stimulated by the secondary consequences of OLPC.
3. psychological social, and cultural factors are not just outcomes—they are also independent predictors of successful adoption of educational technology.

Thus, we focus on individual change over time. To be able to investigate the impact of the laptops on the children, we have included control schools (without laptops) because children at this age rapidly develop. We expect that children with a laptop develop to a greater extend than children without a laptop who develop gradually (see graph 1). To date, the first two waves have been collected. First results from before laptop deployment and two months after are being presented in this paper.

5.3.2 study sample
In total, 1078 children participated in the first and second wave. Among the children 59% girls and 41% were boys. Their mean age was 12,7 years (ranging from 7 to 21 years). At the begin of the study all children were either in the 5th or 6th grade. Three schools were equipped with laptops of which two are situated in Addis Abeba and one on the countryside. These schools were matched with control schools which were specifically chosen to be comparable to the experimental schools. 662 children within the
experimental schools and 582 children within the control schools have participated in the study. These schools were chosen to represent the country (see XX. Chapter).

### 5.3.3 Study design

We track the impact of the laptop usage on educational, psychological, social and cultural indicators over two years. OLPC has been introduced in three different schools. Two of these are urban and one is rural. Development of 662 children in grade 5 and 6 in schools equipped with laptops is compared to development of 582 children in matched control schools (without laptops). Children are regularly surveyed, and quantitative and qualitative data is collected.

First data collection (t1) took place before introduction of the laptops and the second two months after the introduction. Each subsequent phase of data collection will take place after significant changes in technology or communication infrastructure (see Table 1).

### 5.3.4 Measures

We are assessing three interrelated levels: psychological, social and cultural transformation. Psychological transformation is being assessed with indicators for self-efficacy, self-esteem, future (career) goals and aspirations. To assess social transformation, a network analyses of friends inside and outside school is included. Cultural transformation is being assessed with changes in cultural beliefs and practices. Additionally, to understand what drives students to use the laptop and to understand what activities predict the expected changes, their laptop activities are investigated at time 2 and later (e.g., we examine how often they use communication tools such as chatting, emailing and exchanging materials). Finally, we examine school outcomes such as retention and grades.

### 5.3.5 Results

We predicted that changes at all three inter-related levels will occur slowly after the deployment of the laptops. Some schools have been facing challenges in for example providing enough electricity. Furthermore, trainings for the teachers were still being conducted. These reality constraints have slowed down the active usage of the laptops in the first two months (see also this report). Thus, we did not predict huge changes to occur after two months.
Laptop usage

We were interested in finding out in what children imagine they would do with a laptop (before deployment) and what they would actually do when they have received their laptop. The majority of children in the city and in the countryside indicated on an open question that they would use their laptop to learn. Furthermore, children in the urban cities compared to the rural school already had more ideas in mind what they could use a laptop for.

Asking children two months later after they had received their laptop, 79.1% indicated that they use they laptop to learn (20.9% no). Only 17.6% of the children indicated to only use it to play and already 9.8% used it to communicate with each other. These results suggest that children mainly see the laptop as learning device. This of course could also be influenced by the fact the laptops were distributed in the schools. The laptops were deployed within the schools and the children are allowed to take them home. Two months after deployment the laptops are not yet used regularly in school. More interestingly, however is that children indicated that they very often use the laptops at home (for a further discussion see chapter 6).

To find out how motivated children are to use their new laptops, we have asked them to decide with what they they like to play with most. Fortyone percent indicate that they prefer to play with their new laptop, 39% prefer to play with their friends and 20% enjoy playing with their favorite playing toy (which is not a laptop).

This result might suggest that children are only playing alone with their laptop. However, further results suggest the opposite. 41.5% of the children use the laptop together with their parents, 34.9% with their friends in school and 22.6% with their friends outside school. They explain it to them and play together with it.

These results suggest that eventhough the laptops were not yet regularly used in school, children were frequently using them at home, they were already creative in how they could use their laptop, are motivated to use it and share it with family and friends.
First social transformation

We did not predict any major changes on the three inter-related levels of psychological, social and cultural transformation two months after deployment. However, we were interested whether the laptops have shaped the children’s perceptions of life in general. The data suggests that children with a laptop do change their cultural values over time. Children who own a laptop value power (money and leadership) and tradition (do what religion requires and do things in traditional ways) to a lesser extend after receiving a laptop compared to children who do not own a laptop. They do not change their perception of life over time. These first results might suggest that owning a laptop changes children’s perceptive of life. Things that have been valued before seem to become less important. Data from the third wave will help to further explore this transformation.

Attitudes towards education

As mentioned above the children are frequently using their laptops in their freetime. However, does this motivation also have an impact on their attitudes towards education? The laptops have been distributed in school which is likely to impact on their motivation to got to school. Children in urban areas are in general highly motivated to got to school – independent whether they have a laptop are not. However, the data suggests that children on the countryside who do not have a laptop are less motivated to go to school. Among them the laptop lead to an increased motivation to attend school. This result illustrates the motivational power a laptop might have - especially for children in the countryside.

5.3.6 Discussion

This longitudinal study was set out to track individual changes of children with and without laptops over time. Even two months after deployment first changes have occurred. This first report mainly focusses on how the children use their laptop. They already had clear ideas how they would use their laptop before they had received it. The results suggest that they see it as primarily learning device. So far they mainly use it at home and often also share it with their family and peers. This suggests that the laptops will not only change the children’s lifes but also very likely that of their family and peers. Furthermore, having a laptop seems to shape children’s perception of life. They value power and tradition to a lesser extend compared to children who do not have a laptop. This first results might
5 lessons learnt

Motivation to go to school

- High status
- Low status
- Countryside

Without laptop  |  With laptop

indicate that children start thinking about their life differently. Owning and learning with a laptop might open up new directions in life for them. However, it has to be noted that these are small effects which have to be followed up in the next assessment.

A laptop might not only shape children’s perception of life but also their attitudes towards education. Especially children on the countryside who have received a laptop are more motivated to go to school compared to children without a laptop on the countryside. Within the urban area the laptop does not impact on the motivation to go to school. Children are in general already highly motivated to attend school.

Future research has to explore these first results further. Furthermore, we will focus additionally on educational outcomes such as cognitive skills which are very likely be triggered by using a laptop as well as the educational approach. We will further investigate the classroom interaction. Additionally, we are interested in more social outcomes. By investigating their social networks of friends, we hope to provide a better understanding in how their friendships might be affected by the laptop. The current results have shown that children share their laptop with their parents. This might influence the relationship between parents and children over time.

To conclude, even after two months after deployment first changes have occurred. In this line of research we are focussing on the psychological, social and cultural transformation of children over time. Results of the third wave should help to draw conclusions and learn lessons for all stakeholders with respect to the “unintended” secondary consequences.
5.4 comparative analysis between the implementation of OLPC in Italy and Ethiopia

5.4.1 Introduction

This paper examines the OLPC project implementation in two different realities - Italy and Ethiopia – linked by the Give One Get One initiative since September 2008. It argues that analyzing the digital divide concept in a developed country and in a developing one can be useful to find similar models of technology access and to retrieve some constants in the project evolution.

It considers some positive and negative aspects of the XO laptop implementation, trying to find out the reasons of success and failure, to further draw on some guidelines to make a step out of the pilot phase.

A model that extends the concept of digital divide will be used as a framework to expose the main points of interests.

Inequality in access is important because it is likely to reinforce inequality in opportunities for social and human capital development. Access to technology will be here considered from two different points of view: on one hand as a problem depending on infrastructures and physical access (material devices, power, connection, etc.); on the other hand as an issue related to cognitive skills and abilities, the so-called digital competence.

These two sets of aspects are to be considered, with obvious differences of context, as part of the digital divide problem both in Italy and Ethiopia.

5.4.2 OLPC pilot project in Italy

Project implementation In September 2008 the Brescia Provincial Office (USP) distributed 300 XO laptops to fifteen classrooms spread in ten schools of Brescia area, northern Italy. The USP addressed three main issues:

1. First, to provide children with continuous access to technologies at school, replacing the ICT lab with the new formula of a transversal use of the XO laptop in all different subjects.

2. Second, to allow them bringing home the laptop, to learn how to use it at their own pace and speed, rather than following adults’ directives. The underneath idea is that the free use of XO can stimulate children’s natural passion for discovery and creativity.

3. Third, to change teachers’ approach to didactics, meaning by that an experimentation of new classroom space setups, a different concept of children’s individual production, a paper use second taught, an openness to new kind of softwares.

Main objective was introducing the laptop into daily activities, achieving cooperation and communication between children and teachers’ interest towards a new way of teaching and relating to children. The USP underlined some opportunities and some critical aspects related to the XO implementation:

There was no initial organized involvement of teachers in planning, because of the USP choice of leaving schools the autonomy of organization, management and realization of the project. The only suggestion was to use a didactics based on Learning Objects, in order to involve teachers of all subjects to work on units of contents, for a transversal use of the laptop.

Infrastructural divide With respect to Italian infrastructures situation, we might say that the digital divide is far from closed, both for private and public use of ICT. High-speed connection to Internet is not a frequent resource at home as well as at school, especially in
rural areas, where most of the selected schools were situated. Schools usually have an ICT lab where children spend one to two hours per week, depending on teachers’ will and confidence with technology, but also sometimes on the amount of children unregistered in a school. Computers themselves are not of new models and often not enough for an individual use, so that children have to use them in pairs or more.

In other words, it was a very much plausible hypothesis that XO implementation would give children more chances to work on a technological tool, both at home and at school, in order to develop what we can call a “digital literacy”. Furthermore, the mesh network and the XO Internet connectivity made grow up among teachers the expectation of a solution for infrastructural problems that normally Italian schools experience.

After the first year of experimentation, most of teachers agree on considering XO laptop not on a level with their expectations, at least from the point of view of an infrastructural solution. At this regard, two main issues can be mentioned.

On one hand, the laptop in itself has operative limits (for example, too limited memory to store some children products, which sometimes get deleted without warning; battery life; sudden standby, etc.). It was acknowledged by teachers that it happens more frequently with some laptops than with others (approximately in the 25% of cases per class).

On the other hand, all teachers acknowledge that the mesh network does not work properly. It was occasionally possible to connect 5 to 7 laptops as a maximum amount of XOs connected, but sometimes not the ones children wanted to be connected with. This problem implied many difficulties for the prepared activities realization, partially overcome only with the use of a pen drive. Many technical problems were also experienced with the Internet connection (for example, only few laptops could access to Internet, or there was interference between Internet and the mesh network).

Given these unexpected technical problems, teachers motivation towards the XO use was lowering during the year, leading in some cases – we might estimate about the 30% of them - to a complete abandon of the laptop integration in the didactics.

Nonetheless, many other positive aspects came out from the same mentioned problems, especially in terms of skills attainment. It will be one of the topics of the evaluation in third paragraph.
5 lessons learnt

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team building</td>
<td>First planning for the following phases</td>
</tr>
<tr>
<td>Teachers to be trained need analysis</td>
<td>Data survey about pupils and teachers to be trained, in order to evaluate target competences</td>
</tr>
<tr>
<td>Specification of training requirements</td>
<td>Analysis of individual requirements, roles and organizational needs</td>
</tr>
<tr>
<td>Specification of training technical characteristics, technological equipment, methodology to be implied and intervention plan</td>
<td>Training objectives definition Organization aspects Economical founds Number and area of trainees Didactical plans and contents definition Methodology definition Monitoring and evaluation plan</td>
</tr>
<tr>
<td>First phase teachers and children training</td>
<td>Technical and didactical training of teachers and children</td>
</tr>
<tr>
<td>Second phase teachers and children training</td>
<td>Content production and supply as from the plan</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>Evaluation of training in terms of learning, individual skills improvement and organizational change</td>
</tr>
<tr>
<td>Training plan update</td>
<td>Re-organization of training plan, considering critical aspects</td>
</tr>
</tbody>
</table>

**Literacy divide** Apart from the problems based on infrastructures, Italian teachers experienced some other difficulties, mainly related with lack of central coordination and training. According to USP approach, each school had to develop its own plan of XO implementation, basing on the following general plan provided by USP:

Before XO laptops were delivered to schools, one representative for every participating school was invited to take part of a two-days training workshop held in Brescia by experts coming from Florence, where the Italian OLPC site is located. Teachers were shown applications to be used at school, and trained with basic technical information about every activity. As from the USP plan, school representatives had to provide the same kind of assistance to other teachers in their own school, to let the XO use spread among colleagues. Even though there was not an organized training activity in the schools, representatives did their best to involve other colleagues in the project and plan a didactical integration of the laptop in daily activities, but many of them refer about some obstacles they sometimes did not manage to overcome.

In particular, three features deserve note.

- First, the general impression among school representatives is that training was not enough. They pointed out how they would have needed a periodical check with experts from OLPC Italia and from USP in order to, on one side, solve technical problems that occurred and, on the other side, learn more about applications use for their subjects. Some applications features were discovered by chance and sometimes teachers did not know how to access them again, with the result of a non-use of some applications.
• Second, organizing a structured plan like the one USP suggested to follow would mean for school representatives much time investment and extra unpaid work. XO project is not the only one schools apply to. Teachers have many activities to follow and little time to spend in such a complex activity as a training offer for collegues.

• Third, collegues themselves were sometimes not interested in OLPC project. This occurred especially in those schools where the headmaster himself did not show much interest. It follows that teachers who decided to use XO in the classroom were often left alone or had this impression. In some cases, this leaded to a lack of motivation. In other cases, they continued to use XOs anyway, finding different reasons to go on with the project (for example children satisfaction or changes, etc.), but not trying anymore to involve collegues in the experimentation and admitting they did not see much valorisation of their work.

These observations lead us to consider training and coordination as an essential part of the project. Technological skills and self-organization should not taken for granted, as well as teachers motivation. On the contrary, such aspects call attention to a broader problem connected with training. The divide in terms of skills and usage of digital technologies should be seen as a very important part of the digital divide: perhaps the main reason why digital divide persists or is even growing.

5.4.3 OLPC pilot project in Ethiopia

Infrastructural divide  Ethiopia is still among the least connected countries in the world. In rural areas access to telecom services and to electricity is still very limited. What this means is many parts of the country are disconnected from the information infrastructure. OLPC project represents an important opportunity for Ethiopian children, for most of whom XO laptop represents the chance to access to ICT for the first time. Three features of the laptop appear to be more important:

1. Low power consumption
2. Sunlight readability, important for outdoor use as well as power conservation
3. Mesh network/automatic connectivity. It allows peer-to-peer communications among children, sharing memory and serving as peripherals for each other.

Four Ethiopian primary schools have been involved in the OLPC project by the Ecbp program in September 2008. Two of them, the ones in the rural areas, still have problems with electricity, so that the first step of the digital divide – the infrastructural obstacle – has not been yet overcome. The other two schools, being located in the city, see the power problem as a minor one (power cuts are frequent but at least children have access to electricity), but have to face the same technical problems that came out during the Italian testing phase: shortage of memory, sudden standby of the laptop, short battery life. ECBP team provides in every school a useful technical support three times per week, to refresh software installation and overcome some of these problems.

In both schools located in Addis Ababa Internet connectivity is not yet available, because of lack of infrastructure and too high costs. Mesh network presents the same problems than in Italy. When it is not overcharged with more than 5 or 6 access at a time, it works quite well and it can be useful especially for text sharing, but not so well with pictures and paint products.

Literacy divide  In ECBP program capacity building pursues an innovative pedagogy model. In this approach teacher has the most important role in planning and structuring the learning process around tasks, problems and questions. He guides students through the learning process and enables them to
5 lessons learnt

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher training</td>
<td>Teachers are trained in the basic applications of the XO. The training takes 1 week and could be conducted in parallel to the student training</td>
</tr>
<tr>
<td>Basics</td>
<td>Main aim is to create an understanding for the use and opportunities offered by XO laptops among the children. Assisting staff focuses on basic applications (word processors, media creation files, networking, games, etc.) and will improve the computer literacy of the participating pupils</td>
</tr>
<tr>
<td>Advanced</td>
<td>This period serves the aim of systematic learning – the teachers facilitate and go through a didactic programme in order to acquire in-depth knowledge and skills concerning XO laptop</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Debugging skills to maintain buttons, speakers, bunny ears, LED strip in backlight, bumpers, hinge, fuse, connectors/cables, keyboard, touchpad, battery, display, motherboard</td>
</tr>
</tbody>
</table>

discover things and acquire knowledges on their own.

The training agenda in the test phase was divided in 4 steps:

After the test phase, ECBP plan was to integrate the educational concept inside the schools, focussing on training the teachers on three basic levels:

1. Information about the laptop machine itself, learning methods and the use of content.

2. Transfert of teachers knowledge and skills to the children, about laptop machine as well as skills in media competence.

3. Change of the instructional and teacher centric approach to a more constructional and child centric one.

The phased integration of the laptop was then organized in three steps:

Phase 1

- Session 1: Get to know the laptop and first introduction to applications; application like eToys are introduced to the teachers.

- Session 2: Interactive teaching methods that support “learning to learn” and problem solved learning.

- Session 3: How to teach with the use of ICT in general; how to overcome the barriers to integrate technology; what does an integrated lesson plan look like; where to begin.

Phase 2

- Laptop: teachers integrate notebooks to their classrooms and within the curricula, by beginning with simple activities; facilitators join teachers some days in the beginning in their classes to get to know the students, the dynamics, and to support them but not to take over the class.
5 lessons learnt

• Method training: when teachers are shown how to better integrate technology into their own classrooms, they become more motivated to use it, and their self-esteem increases.

• Content: lesson plans as showcase for specified subjects are discussed. Digitalized textbooks and ebooks are introduced.

Phase 3

• Laptop: laptops are used in the classroom by students and teachers within the framework of regular lessons. Students help each other in their activities and also do projects on their own, some individually, and some in collaboration with their mates; Ethiopian children must not only own the laptop, but take it home. In so doing the whole family will benefit. Outside the classroom students start to introduce own small projects to other children.

• Method training: afternoon sessions with the teachers on how to integrate the new methodology to the following day’s or week’s class and to reflect on every day’s work. Teachers collaborate with each other by talking about their activities and their results, even by coming to another teacher’s classroom and participating in an activity to later adapt it to their own group.

• Content: teachers ask the students for homework to be done on laptop to do small projects on things students like, on their own and collaboratively.

To have a better understanding of the Ethiopian teachers background, it is helpful to underline two aspects. First, most of the teachers have never had access to ICT before OLPC project and do not know how to use a computer. The laptop challenges teachers openness to a new device, requiring one one hand personal motivation to use it and on the other hand practice, which is more important than formal education in learning digital skills.

Second, the pedagogical model used is teacher-centered, which means students are passive listeners rather than active learners. The laptop use requires this method to be unhinged and it challenges teachers with a request of new teaching skills.

In spite of a deep analysis of the context from ECBP and a strong focus on training, both the last mentioned aspects still represent critical obstacles to the full integration of the laptop in the educational concept of the schools. There seem to be some specific reasons, which will be examined in the next paragraph.

5.4.4 Compared evaluation after the project first phase

According to Van Dijk, “skills access is divided in three types of skills that often assume the following order: first a computer user has to acquire operational skills, than s(he) has to develop and apply information skills and finally strategic skills (the capacity to use computer and network sources as means for particular goals in society). Usage access is the final stage and ultimate goal of the process of technological appropriation in the shape of particular applications”.

USP in Italy and ECBP in Ethiopia implemented projects aimed to achieve a complete skills access, including all these different elements above mentioned, in a very short time and with a strict schedule of actions. Partially goals were achieved. Partially there are adjustments to be done, to adapt the project to peculiarities of each different context.

In order to maximise the benefits gained from OLPC project in both countries, we must first distinguish analytically between children and teachers skills development, in order to understand what were the most critical difficulties to reach a good level of digital skills. Then it will be possible to plan next actions for the future.
5.4.5 Student outcomes: impact on learning

Many technology advocates argue for the inclusion of a more sophisticated set of “21st Century skills” in the curriculum in order to promote economic development. Let us consider what kind of skills Italian and Ethiopian primary school aged children were able to achieve during one year use of the XO laptop. For the sake of clarity, key findings about children skills will be separated into sub-sections, each one concerning an aspect of the laptop and its consequence on use children made of it in Italy and Ethiopia.

1. The XO laptop is a free good  Italy

Almost all of the children involved in the OLPC project in Brescia area already had a personal computer at home, because of a socio-economic background that is on average medium-high. XO laptop was then greeted as an additional technological device, but generally not perceived as an extremely new opportunity for learning. A proof of it is that there are few children per class (an average of 5%) who forget it often at home, even though teacher reminds them to bring it to school, or they forget to recharge it.

Nevertheless, exceptions should be consider very important. Who does not have access to ICT are actually second generation of immigrants, who come from poorer family not able to afford neither a personal computer nor other technological devices like consoles and videogames.

In Brescia region there is an high percentage of immigrants, with an average of 3-4 children per class. These children were the ones who most appreciated the novelty of XO laptop, who used it the most at home (often with siblings), who replaced notebooks with XO when teachers left the class free to decide to use one of the two supports, especially for homework.

This provides evidence for the assumption that a substantial part of the OLPC project importance has to do with social inclusion of underprivileged children, who are the final target of the project itself.

Ethiopia

Almost none of the children involved in the OLPC project in Addis Ababa area had before access to ICT. Some of them did not even know the difference between a television and a personal computer. It follows that the XO laptop was very much welcome from children and their families as a great chance to be included in the Information Society. The object ownership was also very much appreciated, because children had the chance to use a device that is their one. They developed a high sense of responsibility towards the laptop, they treat it carefully and pay attention of whom they let use it. Sometimes families sense of responsibility is even too high: in the fear of a loss or a theft, parents do not let children bring it at school, because they would not be able to refund it afterwards.

The XO laptop introduction changes the school experience  Italy

Italian teachers experimented different kinds of activities, trying to adapt the new tool to the traditional school subjects. Every time it was experimented an interactive teaching method, including sharing activity, cooperation, group work, children reacted very positively. It means they were active in:

- discovering new features of the laptop
- helping classmates with instructions
- remembering procedures, in order to be able to follow them again the next time.

Impact of XO in this case is beyond the curriculum and consists in student motivation and construction of new skills, concerning organization, creativity and cooperation.

Ethiopia

Without any kind of suggestions or help, children learned how to manipulate the XO very well. They reached a very good level of all applications knowledge. Much of their time was spent drawing with paint
programs, recording or playing computer games. They can write in Amharic, which implies knowing the combination of different keys to produce Amharic symbols, they can make animations with different softwares, they are able to record and personalize pictures with graphical effects. They demonstrated creativity, intelligence and logical abilities.

Ethiopian school changed very much since when the XO laptop was delivered to teachers and pupils. But it has to be remarked that it changed especially for extra-school activities, as teachers did not yet integrate it in education. Therefore there are two different sides of school change:

In a positive way, XO represents for children a new world. They might play games, take pictures, record videos and music from tv or radio, they can practice writing English and Amharic learning how to use a keyboard. And during the free time at school, they share contents and activities on XO with other friends, making of the laptop a tool for inclusion and community building.

In a negative way, XO in still considered by children as a sort of recreational tool. It is not integrated in the didactics, except from the use of textbooks, and it means it is associated mostly with free time and recreational activities. Children will is to use XO during classes. They have much more curiosity towards contents than games or pictures, but until now they used the laptop as they learned to use it. It means mostly not for an educational purpose.

**The XO laptop allows to share documents with mates**

*Italy*

The impact on knowledge and information attainment would be very important, if the mesh network would be more stable and support a higher number of children. Communication would have been the first important goal of the XO use, but unfortunately technical problems did not allow teachers to work with mesh network and Internet as they would have liked to. Some positive impacts who might be pointed out are children brilliance in finding solutions to problems through the mesh network. For example, it was thanks to the mesh network that children could recover from each other some files that got lost. The chat activity has also to be mentioned, as it helped to develop videotyping and literacy.

*Ethiopia*

The aspect of sharing is one of extreme importance among Ethiopian children. Not having access to the Internet, and having at the same time a great wish to access information, children found the sharing activity as a partial way to fulfill their need to know. They take pictures to posters in the streets, to tv images, to newspapers and then exchange them with friends through the mesh network. It is their way to own images from the world and to access by them contents otherwise they would never know. It stimulates more curiosity even and more motivation to learn how to use the mesh system, which is not the simplest feature of XO.

**The XO laptop presents some technical problems**

*Italy*

Even though it was not a forecast aspect of the project, the fact that in this first pilot phase XO users encountered many technical problems in the use of the machine, it turned to be a new challenge for students, who learned skills that go beyond traditional school knowledge. They complained about the technical problems. But they had then to realize how to find new solutions and short cuts to achieve a goal. It means they reached a good level of problem solving skill, they became able to distribute or share different roles among a group and they had to improve communication skills, to better explain the problems to classmates and discuss with them the solutions. It also led to an improvement of patience ability. Children are used to fast connection and rapid actions with a pc or a videogame. In this case, they also learned to wait and to be careful not to overload the laptop with too many activities. Sometimes those problems also led up to a lack of motivation towards the project. We can estimate 10 to 15% of involved children gave up to find solutions to some repeated problems. However, it does depends also on teacher and family attitude. When teachers were somehow disappointed by the problems they encountered, children also reacted this way. Some of the families changed their approach during the year, from a very positive initial welcoming of the XO to a bad and pessimistic mood.
<table>
<thead>
<tr>
<th>XO characteristics</th>
<th>Children reaction</th>
<th>Impact on skills and motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The XO laptop is a free good</td>
<td>IT Not very enthusiastic (with exception of a minority composed by immigrants)</td>
<td>More motivation for homework, especially from underprivileged children</td>
</tr>
<tr>
<td></td>
<td>ETH Very enthusiastic</td>
<td>Great motivation to access contents and information, Sense of responsibility, Valorisation of a personal tool</td>
</tr>
<tr>
<td>2. The XO laptop introduction changes the school experience</td>
<td>IT Positive, collaborative and active</td>
<td>Organization, Creativity, Cooperation during the lesson time</td>
</tr>
<tr>
<td></td>
<td>ETH Self-organized, very active and curious</td>
<td>Organization, Creativity, Cooperation, Sharing</td>
</tr>
<tr>
<td>3. The XO laptop allows to share documents with mates</td>
<td>IT Proactive, creative</td>
<td>Cooperation, Sharing, Problem solving, Communication</td>
</tr>
<tr>
<td></td>
<td>ETH Positive, proactive, collaborative and active</td>
<td>Creativity, Sharing, Community building, Motivation to know, Access to information, Communication</td>
</tr>
<tr>
<td>4. The XO laptop presents some technical problems</td>
<td>IT Positive and creative, according with teachers attitude and family reaction, In some cases disappointed</td>
<td>Problem solving, Organization, Cooperation, Communication, Patience</td>
</tr>
<tr>
<td></td>
<td>ETH Positive</td>
<td>Problem solving</td>
</tr>
</tbody>
</table>

**Ethiopia**

Technical problems are seen by Ethiopian children mostly as an unavoidable part of the device. They appreciate very much the laptop and do not complain about what they see as secondary aspects. “What I do when the laptop stucks is just switching it off and waiting”, said a 4th grade student of Menelik II primary school.

With respect to the children, the compared study Italy-Ethiopia can be summarized as follows:

It is interesting to notice how different countries like Italy and Ethiopia, with different situations from the point of view of infrastructures and (digital) literacy skills, might have so many outcomes in common. In Brescia as well as in Addis Ababa, children reacted mostly with positive attitudes, developing by themselves a high number of skills that might not be strictly related with learning contents, but that are important to face contemporary society challenges.
5.4.6 Teacher outcomes: impact on classroom practice

There are also some similarities between Italian and Ethiopian teachers experiences. The problems they encountered were due especially to insufficient training and knowledge of the laptop, which can of course be considered as a self-learning tool, but still requires specific skills whose importance was sometimes underestimated.

Italy

In the Italian implementation of the project, no technicians or instructors were provided to schools all along the year, somehow in line with the concept of XO as a development of self-discovering tool. In schools where there was a team of teachers involved in the project, they discussed between them what kind of actions to experiment to solve some problems they encountered. Not always they could find a way to improve the situation, but sometimes they found good ideas and short cuts to overcome difficulties.

Some problems for teachers derived from families, who complained about the lack of concrete works on paper and notebooks which does not allow to check children work (at school and at home), making a comparison with other classes which were not provided with XO laptops and had to use traditional methods.

Teachers also had to change their methodology. First they were very much concerned about adapting contents of their subjects to the laptop activities. When they got to know better the laptop, they also understood they should think the other way around: subduing the laptop characteristics to their goals. That is how they managed to invent many uses of the XOs in the classroom, turning into positive aspects even the ones that were more difficult to face, like those given by technical problems. However, they would have liked to be trained more about the laptop use, to understand how to embed it in their usual teaching activity.

Ethiopia

Ethiopian teachers still follow an instructivist model for education. They teach by using textbooks, towards a set curriculum that students are eventually tested against. Integrating XOs in the classroom means for them extra job, extra energy and motivation. Not that they did not try. Textbooks were uploaded on laptops, so that they can read them from the display and ask children to open the laptop instead of the paper textbook. The problem is that the XO is much more than a book and pupils know it very well. While teachers try to use laptops as a traditional book, children do not concentrate on the explanation and keep opening games and recording activities. It follows that teacher does not have anymore the control of the class, with problems of order and organization.

Mostly teachers did not change their approach to classroom and we know the way ICT is used can make a big difference in the impact of an ICT-supported project. ICT use includes the extent to which ICT is integrated into the curriculum and the kinds of pedagogical strategies that are used in association with ICT use. When the XO laptop is used only to read textbooks loaded on it, the learning process does not change much and the device use itself it is close to a traditional tool like the book.

Teachers experience also a problem of time shortage. They do not have the time to test laptop features during class, as the didactical programme has to be done by the end of the year. Most of them do not find a real motivation for XO use at school, as they see it more as a game than a useful tool for education. If teachers use the laptop in their classrooms, it is mostly to read digitalized textbooks on it, which is for children a very boring use, compared to what they can already do with the XO by themselves. And that is why actually pupils do not pay attention to lessons and use the XO for different purposes than the strictly “educative” one.

In a comparative study, these findings may be summarized as follows:
Both USP and ECBP programs are motivated by a sincere attempt to improve capacity building and social inclusion through access to ICT. The difficulties the programs ran into in this first phase of implementation make understand how ICT project are complicated to implement and how it can be difficult to foresee problems. The framework given allows us to re-orient the focus, in order to make the next actions as more effective as possible.

### 5.4.7 Follow-up: agenda for the next steps

A synthesis of the above discussion yields three principal conclusions about the next steps. First, training must be effective and continuous during the year, to give teachers the impression they can count on experts who might help them with any kind of problems. Technological skills and self-organization should not be taken for granted, especially when it is important to invest in methodology.

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<thead>
<tr>
<th>Problems</th>
<th>Suggestion for future actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Technical assistance</td>
<td></td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>YES</td>
</tr>
<tr>
<td><strong>ETH</strong></td>
<td>NO</td>
</tr>
<tr>
<td>2. Families complaints</td>
<td></td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>YES (about children control and production)</td>
</tr>
<tr>
<td><strong>ETH</strong></td>
<td>YES (about loss or theft of the laptop)</td>
</tr>
<tr>
<td>3. Methodology</td>
<td></td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>YES (because of the approach to a new educational tool)</td>
</tr>
<tr>
<td><strong>ETH</strong></td>
<td>YES (because of an instructive traditional method of teaching)</td>
</tr>
<tr>
<td>4. Motivation</td>
<td></td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>YES</td>
</tr>
</tbody>
</table>
change and improvement towards a different approach to the learning process. The goal of this training should not be only to increase teachers’ knowledge of ICT but the pedagogical knowledge related to the integration of ICT into the curriculum and their classroom practice. Such questions take us away from the technical elements of the training and call attention to digital literacy, as the main goal to be achieve among Ethiopian as well as Italian teachers.

Second, it is important to underline the opportunities given by the project to children and to teachers too. Motivation cannot count only on teachers personal initiative. Teachers engagement and time should be recognized in terms of economic acknowledgement and institutional valorisation.

Third, it is possible to create a community of reference for a know how exchange. OLPC is a worldwide project, which involves many different countries with very similar problems to face. It would be a great advantage to share knowledges, acquired competences and solutions. If not finding them together.