Briefing Note – One Laptop Per Child (OLPC) in Afghanistan

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Executive Summary

It is well established that Education is one of the most important aspects of human development and a key contributor to stability. In Afghanistan however, although relatively rapid progress has been made in the education sector, just over half (52%) of primary school aged children are enrolled in school[i].

Furthermore, due to insufficient school buildings and teachers, which forces some schools to run up to three shifts per day, and to place over 50 children in some classes, each child generally receives only 2.5 hrs (5 x 30min periods) of school a day. Research widely concludes that amongst the most important variables in the quality of education are: the amount of time students are exposed to curriculum (Time on Task); structured Feedback provided through marked homework assignments, quizzes and tests; and, access to information resources and facilities generally found in school Libraries.

For the 48% of children outside of the mainstream education system currently growing up illiterate there have been initiatives known as “Community Based Education” supporting any available literate or semi-literate members of the community to provide education for the children of other community members whose parents are likely illiterate. OLPC addresses:

- **Time on Task:** Afghan children receive approximately half the developed nations (OECD) average time on task to cover their curriculum in mainstream schools. In community based education scenarios the same time is alloted however more time is often needed for basic checks on students (health and welfare) thus depleting time for curriculum learning.
- **Feedback:** Whereas OECD teachers typically spend 15 hours/week providing structured feedback to students, Afghan teachers have no such allotted time; consequently there is little if any way to verify student understanding of the curriculum. The fact that most parents are illiterate, so cannot provide educational support to their children at home, is another major constraint to the improvement of Afghan education. Community based teachers may not even be able to check or work out answers themselves leaving them unable to provide help and feedback in many instances.
- **Library Resources:** Afghan schools have insufficient library resources for the children that they teach, providing little opportunity to widen their horizons and nurture their intellectual potential.

The ultimate measure of success in any education system is the production of more highly educated

graduates who become a more capable and relevant workforce. That workforce in turn becomes the foundation of a sustainable and diverse economy which raises the standard of living, reduces poverty and contributes measurably to prosperity, security and stability. However, if the identified deficits in key determinants of educational quality are not addressed, all the efforts currently being expended in the education sector are at risk, and may never produce the required result.

The conventional remedy of building more schools, training more teachers and providing more materials would require a six fold increase to the education budget (in the order of $1.8Bn USD per year) and would take 10-15 years to yield measurable results. While a steady increase in teacher capacity and educational infrastructure is expected over time, Afghanistan does not have the luxury of waiting 15 years to produce the work force foundations for sustainable economic growth. A cost effective, accelerated method is required.

That measure is found in the judicious application of the OLPC concept, in a blended learning scenario (technology in conjunction with a teacher). As this paper will show, in 12-18 months OLPC can more than double Time on Task, provide Structured Feedback on all curriculum materials, and provide rich Digital Library resources.

The Ministry of Education standard curriculum can be transformed into interactive books with support materials for teachers. A blended learning model (where educational time is comprised of self study with the laptop at home using interactive curriculum material and sharing the learning experience together with the teacher and fellow students in the classroom) will finally give children in both mainstream and community settings sufficient learning time and support to achieve curriculum outcomes.

Small scale OLPC pilot projects have been conducted in Afghanistan since early 2008 in order to gauge cultural acceptance and to test actual increases in educational outcomes. Initial indications show promising results including teacher acceptance and increases in curriculum standardized test results (21.3%)[ii].

It is estimated that in order to address the currently enrolled grade 4, 5 and 6 population approximately 2.2 Million XO laptops would be required in both Ministry of Education schools and community based education deployments. However, as sufficient research into the optimum use of this technology has not yet been conducted in Afghanistan, an integrated pilot of 10,000 OLPC laptops is suggested to scientifically assess the OLPC learning impact compared to conventional control cases. In addition there is a requirement to test practical and logistical challenges such as field support, develop interactive audiovisual standard curriculum, and to establish the institutional and project management capacity to handle such an initiative in the Ministry of Education.

This paper proposes a three phase implementation approach. **Phase 1** is a six month validation of educational outcomes and capacity of the Ministry of Education and partners to implement and support the project. **Phase 2** would be an 18 month nationwide implementation of 1,000,000 XO laptops. **Phase 3** would be the sustainability phase to re-supply children entering the fourth grade.

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Objective

Enhance access to and quality of education in primary schools across Afghanistan through the introduction of interactive educational content on the OLPC laptop platform. As a result, students' learning achievements, as measured using standardized tests, problem solving / logical skills tests and life skills scenario tests will increase substantially.

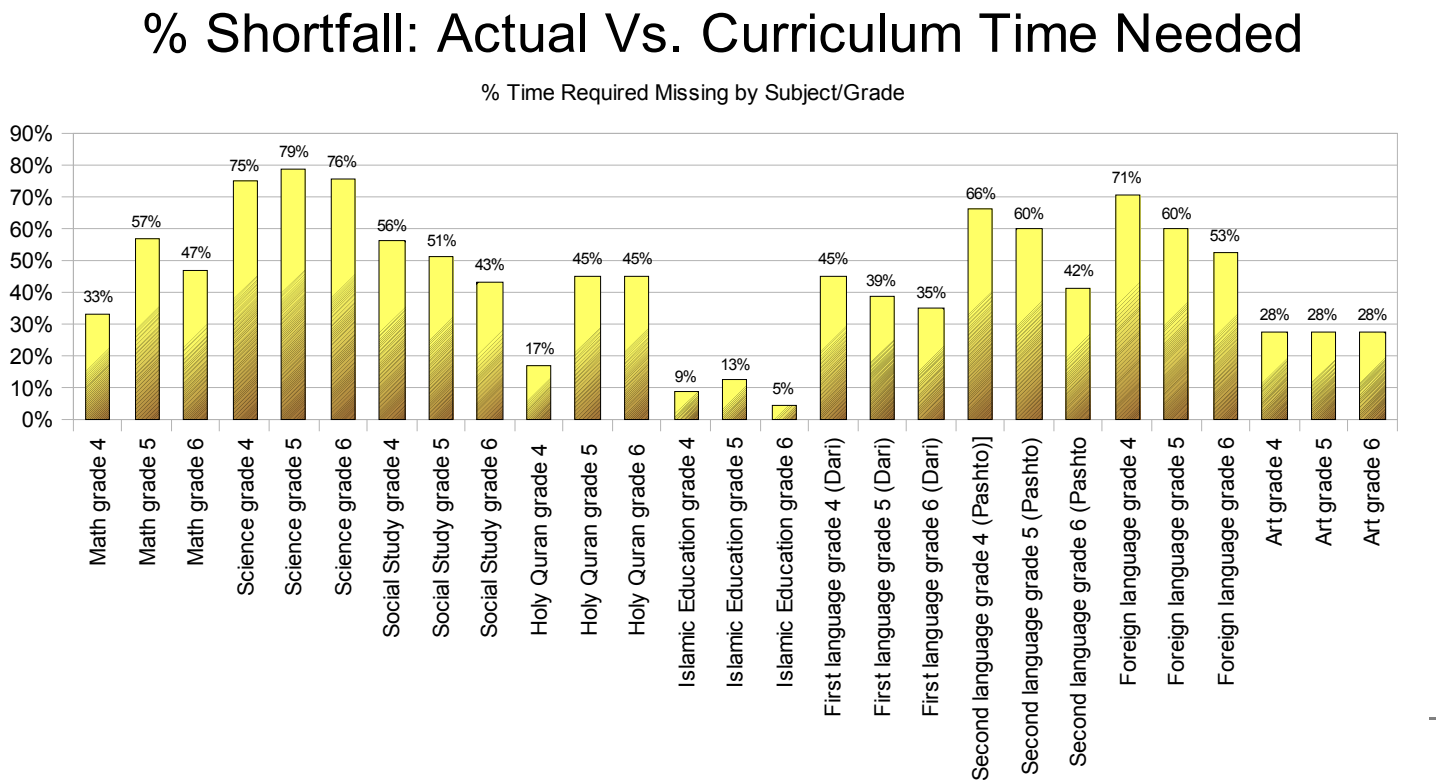
This paper presents the case for the introduction of rich, interactive content to selected Community Based Schools and to Ministry of Education schools at grade 4, 5 and 6, in blended learning scenarios using the OLPC XO laptop. It will propose a six month stage gated trial to confirm the results of the initial pilot initiatives and establish the required support infrastructure leading, if successful, to full implementation over a 12 -18 month period. It will also propose the implementation of a world-wide appeal to make the project self-sustaining at the end of the implementation period.

Challenges and Traditional Solutions

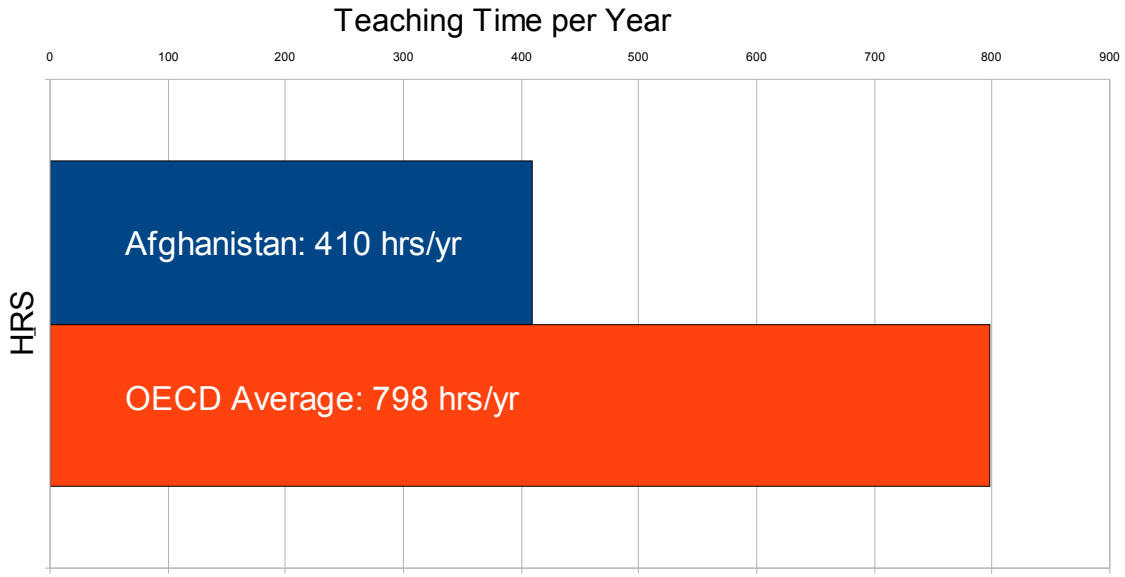
Time on Task

Probably the greatest challenge to the delivery of education in Afghanistan's Ministry of Education schools is the fact that student "time on task," or exposure to the curriculum, is limited to 410 hours per year as opposed to the 798 hours which children in developed nations generally experience[iii]. School overcrowding obliges many schools to adopt a shift system with 2 or 3 x three hour shifts per school day. The graph below illustrates the gap between the time available in class per subject and the time required to reasonably cover the subject for textbooks in Grade 4, 5 and 6. Time for the three core areas of literature, maths and science is missing between 40% and 79% of the time needed in class[iv].

Time on task is amongst the most researched variables in educational effectiveness in developing



countries (Fuller and Clark 1994, cited by Scheerens 2004). Fully 15/17 studies conclude it to be the most significant variable in educational effectiveness. Writing in *Education for All 2005: The quality imperative background paper on research into educational effectiveness*, Scheerens notes, "At classroom level instructional and teacher effectiveness studies have indicated medium to large effects of variables like: time on task, content covered or 'opportunity to learn', and aspects of structured teaching like; frequent monitoring of students' progress, feedback, reinforcement and cooperative learning."
The graph below shows the relative time on task experienced by Afghan children (410 hours[v]) compared to that of OECD children (798 hours+). It should not be surprising that quality educational outcomes are difficult to achieve in less than half the required average time, and with teacher to student ratios that often exceed 1:50.



The traditional solution to increasing time on task, thereby improving the quality of education, would require a sustained investment over 10-15 years in new school buildings and teacher training. This would reduce class sizes and increase class time, thus increasing time on task and the feedback that teachers can provide. To meet the recommended time on task would require around triple the currently available teaching hours per class.

Structured Feedback

Another extremely important variable in determining the quality of educational outcomes is the availability of feedback. In OECD countries teachers have an average of 387hrs/year for non-teaching tasks, such as provision of structured feedback by marking homework, preparing and marking tests and providing individual support to students. Assuming that only half of this time was used for providing feedback in various forms it would equate to 9hrs per individual student per year, compared to 0 in Afghanistan. Because classes regularly have a 1:50 teacher to student ratio, whereas the OECD average is 1:21, teachers are unable to offer structured feedback to each student. This is further exacerbated by the lack of time to cover the curriculum mentioned above. Consequently students, teachers and parents lack an understanding of an individual's progress and accomplishment. The traditional solution would be to lengthen class time, adding more teachers and schools, and training teachers better to mark work,

but this would take many years to yield results so does not address the immediate problem.

No standardized testing mechanism other than the national university entrance exam exists, so student progress is not measured at any point before this. Because of the lack of standardized testing students are grouped by position holders in a class rather than by objective, evidence based measurement of a student's achievement compared to curriculum objectives. Consequently individual corrective actions cannot be taken, and overall education policy cannot be guided with reliable evidence. To remedy this traditionally would require the creation of paper based standardized tests and sufficient invigilators and qualified external markers in schools. (Marking exams within the schools would not be objective, thus not provide the quality of feedback required).

High Quality Learning Support Materials

While standardized curriculum has been developed and is widely distributed and taught across the country, learning support materials to augment these books is meagre at best. It has been well established that the availability of high quality learning support materials is a significant variable in the promotion of quality education[vi]. Without them research skills cannot be learned and practiced, and students cannot be taught the art of disciplined inquiry. The availability of such learning support materials in Afghan schools is inconsistent, with the greatest concentration being available in urban schools as might be expected. But even in these relatively privileged cases, those materials that are available are insufficient to service the student population that requires them.

The traditional solution based on supplying a wide selection of books to a school library requires first of all the content and secondly a content manager or librarian. However, the content available in Dari and Pashto is not widely available on all subjects and what is available is not necessarily rich and compelling. The paper medium itself deteriorates rapidly under the harsh environmental conditions, having a mean time to failure of three years, and is expensive to maintain and refresh. The above assumes enrollment in one of the MoE schools, but the issues are the same only worse for the 48% of Afghanistan's children who are un-schooled or enrolled in Home Schools or Community Based Schools. Out of the initial pilot project of 10,000 laptops an attempt will be made to place approximately 40% in Community Based Schools which can be identified in relatively safe areas of the countryside.

Teaching Standards

Afghan teachers generally have not completed the concours exam for university admission, may not have graduated high school, and in many even urban schools (for example Kandahar) they are just one or two grades ahead of their students. Efforts to professionalize the once excellent Afghan teacher corps are underway, but results will take a generation to become tangible. While these efforts must be encouraged and sustained, means must be found to increase the effectiveness of the teachers in place now or risk losing a generation of Afghan graduates.

Traditional rote learning techniques also represent an impediment to quality education. Although the new primary school textbooks advocate active learning methods, lack of time and teacher confidence often results in their not being implemented and rote learning remaining the de facto teaching standard. There is little doubt that Afghan teachers want to see their pupils develop, but there is also little doubt that they lack the capacity and the tools to do so. Conventional remedies through improved teacher education will require a generation to yield results, assuming the other issues of overcrowding,

motivation, feedback mechanisms and infrastructure are all rectified.

Parental Support to Children's Education

The level of parental support to their children's education is another key variable in children's educational outcomes. Because of high rates of parental illiteracy, particularly among women - adult female literacy is still recorded at just 12.6%[vii] - support to children is very limited. Economic factors obliging men to work long hours out of the home have an adverse affect on the time men have available to support their children's education, even if they are literate and therefore would otherwise be in a position to assist.

The Gender Gap

Gender gaps vary across the country, and are particularly high in rural / southern areas where culture demands that girls study in segregated "girls only" educational environments – if they are even allowed to attend school outside their homes. In such areas a key constraint is the number of female teachers. The nationwide ratio of girls to boys in primary, secondary and tertiary education, the ratios of 69, 49 and 28 percent, respectively, indicate continuing large inequalities in access to education[viii].

To address the gender gap by traditional means would require many more female teachers, particularly in rural and more conservative areas where families do not allow their girls to be taught by men. However, persuading those female teachers available to attend teacher training colleges is culturally more difficult than for men, and high female illiteracy rates means suitable female teacher trainees are hard to find in many areas. Also, existing female urban teachers and their families are generally not inclined to move to rural areas where they would find fewer facilities than they are accustomed to and where security is in question.

Regional Disparity

As parents become increasingly aware of the connection between quality education and the economic well-being of their families, so they are seeking higher quality education options for their children. Notwithstanding the enticements of "super salaries," teachers are less willing to go to rural areas to teach due to the lack of amenities and deteriorating security. In urban settings the private sector is responding with a proliferation of private education facilities (of varying quality) offering lower teacher to student ratios, structured feedback, richer learning support resources and regular progress reporting. Some even offer ICT based curriculum support at the primary level. But these options are not available to rural families, even those living above the subsistence level. Consequently, public-versus-private education standard gaps are growing rapidly, reinforcing the gender gap and the urban-rural divide. Reversing this trend using traditional means would take at least 10-20 years, with a major investment in more schools, more teachers and better training to reinforce rural education.

Information and Communications Technology (ICT) Literacy

Unfortunately in the normal curriculum children will not encounter a computer, if at all, not until grade 10. In most cases this encounter will be rather brief given that in even the best situation (in city schools) there may only be 10 computers for 1,000+ students. Those who can afford to send their children to private schools where IT is an integral part of the curriculum or ICT institutes where they can learn ICT, do so. The others who cannot afford this luxury are being left behind and their intellectual potential is being lost. This of course affects the regional competitiveness of the emerging Afghan work force compared to neighbors such as India or Iran. And 21st century learning skills are not just ICT literacy, but the ability to search through, consider and analyze information from different

sources. The traditional solution would be provision of adequate library resources and time for students to search in the library for information on a topic, which could improve critical thinking and resource gathering skills even though they would not enhance ICT literacy. Providing physically adequate numbers of books to remote areas and updating literature would be logistically challenging.

The OLPC Solutions

It would be disingenuous to suggest that any learning aid such as OLPC could resolve all of these challenges. This paper does suggest however that by using the OLPC laptop to deliver interactive curriculum content and rich digital libraries, high quality education can be provided to this generation of Afghan school children immediately and in a cost effective way. Teachers must still be professionalized and more schools must be built for the long term, but Afghan school children must be provided with quality education now so that they can form the foundation of the modern Afghan workforce that will bring prosperity, security and stability to this country and the region.
Any solution must be described in the context of its benefits compared to traditional means. To that end the proposed OLPC benefits are compared to those achievable using conventional means in terms of the outcome, the time to achieve tangible results and, where possible, the relative costs.

Time on Task

Within 12-18 months OLPC can deliver high quality curriculum based educational content on the XO platform (that remains with the students 24/7) in a blended learning model (supporting the teacher) to compensate for the lack of time in school. This effectively doubles the time on task and closes the gap between Afghan students and OECD students.

Structured Feedback

The interactive element of OLPC overcomes the challenge of severely lacking student feedback under the present system. Research shows that positive reinforcement is a significant determinant of a quality education and a significant motivational factor[ix]. OLPC feedback can be effectively reinforced by teachers (e.g. praised or constructively criticized) and video messages can even be delivered to parents who can understand them, even if they are illiterate. Automatic marking systems for interactive content on the XO platform allow the generation of student profiles, allowing individual performance to be monitored. This has the dual benefit of monitoring individual student progress while also creating a national statistical base which will then be available for educational policy-making within 12-18 months.

Standardized testing is a key component of feedback in most developed education systems enabling parents, teachers and students to understand their progress and curriculum achievement. The OLPC model would enable multiple choice, blank answer, and comparison answer tests to be marked automatically and could be supervised by the teacher making a video recording in a similar manner to industry certification exams such as those found in *Prometrics* testing centres.

High Quality Learning Support Materials

OLPC offers infinite access to rich multi lingual content that can be refreshed for a fraction of the cost of the traditional library. Studies show also that students given a new object of interest (the XO laptop) with more room for discovery amongst rich resources will naturally share with each other as well, enhancing collaborative problem solving skills. The overnight arrival of practically infinite knowledge through the OLPC library helps to remove the paradigm that the teacher has to know everything. The teacher can act as “guide” and mentor on the journey of discovery thus removing the burden of omniscience. Indeed, studies have often shown blended learning models to be even more effective than traditional, purely face-to-face methods[x].

Teaching Standards

OLPC provides teachers with access to world class teacher support aids such as lesson plans, classroom activities and rich resource materials together with teacher education modules to provide teacher upgrading in the field. All these supports are available within 12-18 months and can be refreshed frequently. The ultimate effect is to bridge the gap between the education available to rural and urban children and to level the playing field between public and private education. OLPC can in fact be viewed as a great leveller.

Parent support to child education

Because children keep their laptops with them to use in the home, OLPC can help compensate for the lack of parental support in their children's education. Additionally, parents will have an opportunity to collaborate with their children on the XO platform to complete tasks and assignments, so the project may contribute to improving parental literacy by providing them with access to educational content through their children.

The Gender Gap

OLPC would enable better use to be made of existing female teaching capacity and could also be used to deliver interactive teacher training materials to rural teachers unable to attend teacher training colleges. OLPC also offers a unique solution to this challenge by allowing girls to study the same curriculum together in community or home based education settings where they are secure under family supervision. OLPC can also deliver female role model exposure through quizzes, games and videos so that female students understand the value and application of their education upon graduation and seek meaningful careers. The XO laptops with interactive digital content can play an important role in girls' education and compensate for existing female teacher competency deficit. OLPC thus has the important additional benefit of actively empowering girls through the education process. And, the OLPC laptop will also enable girls enrolled in a CBS to do much of their studying within the confines of home, through interactive materials and quizzes. A girl can even, through the Mesh Network (a non-Internet-based local network which is standard on the OLPC computers), work in collaboration with other nearby students who have their OLPC laptops, without needing to go outside the home.

Regional Disparity

OLPC could dramatically and rapidly improve both the quality and reputation of public education. In improving the quality of public education it would act as a pro-poor agent compensating for the lack of teaching hours in the public system, and the disparity between rural and urban education quality. For the children without the benefit of existing Ministry of Education schools, in Community Based Education or Home Schools, the difference will be even more dramatic. .

Information and Communications Technology (ICT) Literacy

The OLPC solution provides extensive libraries (that do not depend on Internet access), with thousands of artifacts available to every child with a laptop. This teaches not just ICT, but the use of ICT as a means to solve a problem and find the information needed for any other purpose. Thus, OLPC helps meet the challenge of providing an education that improves Afghanistan's regional competitiveness.

Conclusions

Despite the significant advances made over the last 7-8 years, education in Afghanistan still requires significant investment. The persistent problems mostly stem from the harsh reality that there are not yet enough schools or sufficient human capacity to meet the educational needs of a rapidly growing population. The long-term solution must be to address this need for more schools and teachers, along with better teacher training and increased learning resources through a concerted long-term investment in the overall education infrastructure.

However, even such massive investment would simply improve access to education without significantly addressing the quality of education delivered, and it will take many years (probably a generation) before it could start to deliver quality education to the average Afghan child. This is time which the children of Afghanistan and their families cannot afford to lose. Consequently it is imperative that alternative solutions be identified to meet these challenges in the short to medium term, and One Laptop Per Child (OLPC) is a very powerful solution that could rapidly improve many of the key variables in the quality of education.

OLPC, using the XO laptop platform, is probably the only medium that can augment teachers in a blended learning environment, providing children with access to a wealth of interactive localized learning materials that can be accessed whenever they wish. Crucially, this will extend the contact time children have with the MoE school curriculum, closing the gap between the actual and optimum contact period as children study independently or in groups beyond their allotted classroom 'shifts'. By giving practical support such as lesson plans to teachers, and offering other opportunities for them to enhance their classes, OLPC also helps to compensate for the human capacity deficit. The fact that OLPC offers structured feedback to children through interactive quizzes, puzzles and tests integral to the educational content is one of the most important ways in which it can help make up for the teachers' lack of time and capacity. And because standardized testing can be conducted through this medium, not only can individual student performance be tracked, but statistical databases can also be built up over time, providing an extremely useful resource for future policy making in the education sector. Further, for the 48% of children who have no regular school at all, OLPC has huge potential to particularly benefit girls, rural children, and other disadvantaged children who would otherwise almost certainly remain 'ICT illiterate', and probably go without any quality or even substantial education whatsoever.

OLPC for Afghanistan can actually deliver savings in terms of providing equivalent quality educational content and resources to children digitally vis-à-vis traditional paper-based resources such as high quality text books and paper book libraries. The need for renewal of content to accommodate changes and improvements to the curriculum means that traditional methods (distribution of paper text books) are also logistically complicated and inefficient compared to the easy electronic transfer of new data. OLPC content is electronic so is infinitely durable whereas paper-based resources will deteriorate in the harsh environment within 3 years. The fact that OLPC content is interactive, stimulating collaborative intellectual enquiry and problem-solving skills, is of significant importance when one considers the need to evolve the culture of rote learning in Afghan schools.

OLPC laptop computers, deployed not only to increase the quality of existing regular MoE schools but deployed also in the irregular Community Based Schools, are an educational tool that most benefits children who come from the most difficult of backgrounds, especially girls, and puts them in a position

where they can better compete with their more privileged counterparts (domestic and foreign). Therefore OLPC can be regarded as a potentially important agent to support stabilization and peace-building efforts – giving hope for a better future to the families who are most likely to be radicalized by violent extremists. Finally, OLPC offers hope and support to teachers, and providing such a support tool is expected to have a profound and positive impact on OLPC teacher motivation by enhancing teachers' "can-do" attitude[xi], which in turn will lead to raising standards and quality of education.

Recommendations

Research evidence on factors affecting the quality of learning is well established over time and provides reasonable indications of key variables in the quality of learning and their effect on educational outcomes. OLPC is a recent development and insufficient research has been conducted to verify its impact in the Afghan context[xii]. It would therefore be irresponsible to introduce OLPC on a large scale in Afghanistan without first verifying the promising results from the initial pilot to confirm that they generalize across the target population. An integrated trial project to deploy 10,000 XO laptops with interactive curriculum is therefore proposed to confirm the pedagogical results and to implement and test the required support infrastructure prior to a large scale deployment. This is also in line with the recommendation to identify and implement suitable 'local' approaches to utilizing ICT for education rather than rely on 'universal' approaches[xiii].

The key research activity in this trial would involve bringing an external research team from the ICT For Development / Education Discipline (ICT4D) to quantitatively assess the learning impact of the XO laptop to ascertain that the XO laptop, not other factors, are responsible for the improvements (if any are in fact recorded). Research would be conducted comparing schools with XO laptops to control schools that would have conventional interventions made such as highly skilled teachers and well equipped libraries. (It is impossible to predict to what extent the Hawthorne effect may work to change results as a double blind test will not be possible unless using fake laptops). The initial report (6 months after the first deployment under the new pilot scheme) from the research findings would provide guidance as to whether or not to proceed with a larger deployment.

End Notes/ References

[i] i *National Risk and Vulnerability Assessment, Afghanistan*, 2008 (p.65)

[ii] *OLPC Afghanistan: 2nd Education Evaluation Report*, Paiwastoon, October 2009

[iii] *Education at a Glance, Organization for Economic Cooperation and Development (OECD) INDICATORS,* 2009 (p.366)

[iv] Graph Data is for each MoE (new version) curriculum textbook. Data as per reports from Kabul schools. Desired time per lesson on the basis of the time that would be pedagogically desirable to allow for instruction, reflection, and exercises. Does not include time that would be needed for marking homework / provision of feedback. (Paiwastoon, 2010)

[v] Afghan time on task calculation based on: 5 classes daily x 0.5 hours (per class) = 2.5 hours per day x 164 school days per year = 410 hours

[vi] *Education for All – Global Monitoring Report*, UNESCO, 2004 (p.230)

[vii] *Afghanistan Human Development Report,* (commissioned by United Nations Development Programme - UNDP), Centre for Policy and Human Development, Kabul University, 2007 (p.24)

[viii] *National Risk and Vulnerability Assessment,* Afghanistan, 2008 (p.106)

[ix] *Education for All – Global Monitoring Report*, UNESCO, 2004 (p.228)

[x] *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies,* U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, Washington D.C., 2009 (p.14)

[xi] *Teacher Motivation in Sub-Saharan Africa and South Asia*, (commissioned by the United Kingdom's Department for International Development, DFID, Central Research Department), Paul Bennell and Kwame Akyeampong, 2007 (p.16)

[xii] *Evaluation of OLPC programs globally: a literature review (Version 2)*, Dita Nugroho and Michele Lonsdale, Australian Council for Educational Research (ACER), March 2009 (p.8)

[xiii] *Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries*. Wagner, Daniel A., Bob Day, Tina James, Robert B. Kozma, Jonathan Miller and Tim Unwin, Washington DC, InfoDev / World Bank, 2005 (p.1)