An Assessment of Learning Needs
to Inform Complementary Instructional Strategies
for the Democratic Republic of Congo

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EXECUTIVE SUMMARY

The Learning Needs Assessment reported on in this document was conducted by the Education Development Center (EDC) to define the key characteristics of dot-EDU's second intervention in the Democratic Republic of Congo (DRC). The focus of the assessment was on determining the type of complementary instructional strategies that will best support selected basic education efforts in the DRC and how different technologies can play a role in implementing those strategies with a view to opening up meaningful learning opportunities to youth inside and outside the school. Crucial to the needs assessment is that the use of technologies is analyzed as a means to supporting learning and not as an end in and of itself.

The overarching conclusion of the assessment is that, in order to best achieve meaningful learning outcomes, the proposed solutions – focusing on materials development and teacher capacity building –need to reflect the reality of the environment in which learners live and are expected to spend their lives. Thus, an integrated approach to learning that reflects contexts, particularly relating to issues such as health, nutrition, and agriculture, will form the core of dot-EDU's second intervention in the DRC. It will be geared towards creating local capacity so that the following instructional strategies are implicit in the development of instructional materials and in the performance of trained teachers and learners:

- Reduction of rote learning and increase of active learning
- Increase of relevance of content to the immediate environment, thereby providing a solid basis for conceptual and theoretical development that has its roots in practice and concrete experience.
- Increase of relevance of content by including project-based learning activities that use problem areas such as HIV/AIDS, nutrition, and agriculture as basis for learning that is not artificially limited by concerns with separation between the various school disciplines.
- Use of local knowledge and technologies available in the local environment to support teaching and learning.

Project activities proposed in this assessment include:
- Identification and elaboration of an inventory of local problems and locally developed technologies that can inspire problem-based learning in and outside the classroom.
  - Output: Inventory of relevant local problems and locally developed technologies, constructed such that new problems and technologies can be added as needed and appropriate.
- Selection of a limited number of the above problems and technologies to inform a first pilot intervention, resulting in the development of complementary instructional strategies in support of the national curriculum.
  - Output: Teacher resource packages to support and strengthen pedagogies under the national curriculum geared towards building capacity to interact constructively with problems. Completed training of teachers (and other facilitators of learning) in the development and implementation of these instructional strategies.
- Dissemination of life skills (social behavior, self-management and problem management) modules via a mix of radio formats.
  - Output: Modules adapted, radio programs produced and broadcast.
- Establishment of a community of practice for teachers supported by a community radio station and basic digital technology.

o Output: Self-generated initiatives to support colleagues and use the support of colleagues in developing new teaching methodologies.

This report consists of the following three parts, serving diverse audiences:

- **Part 1: About the Needs Assessment.** Here we explain the background of the exercise, its scope and limitations, and our assumptions and methodology in carrying it out. The detail provided is justified by the need for project development to be a learning opportunity. Not clarifying these issues sufficiently would compromise the depth of learning possible. This part is particularly relevant for researchers and evaluators who will later want to understand why and how specific choices were made.

- **Part 2: Findings, Analysis, Conclusions and Recommendations.** This part is particularly relevant at the level of making the executive decisions about the proposed project development.

- **Part 3: Considerations for Project Development.** The first section, 3.1, of this part consists of an extensive description, with reference to and analysis of explicit examples, of what the nature of the project should be. This first section is particularly relevant for those involved in the on-the-ground implementation of the project. The three remaining sections (3.2 to 3.4) about the use of technology, the proposed activities, and the recommendation to conduct project development in a phased manner, are relevant for both implementers and decision makers.

AUTHOR INFORMATION

This report has been written by:

- Jan Visser, President of the Learning Development Institute and Senior Consultant to the Education Development Center, who led the needs assessment exercise and is first author of this report, and
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In addition to the authors, several people were involved in different capacities in carrying out the present Assessment of Learning Needs to Inform Complementary Instructional Strategies for the DRC. These were:

- Monica Biswas (EDC),
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- Meta Mobula (USAID/DRC),
- Cindy Mutombo (AED consultant),
- Darfour Ndakakanu Masegi (USAID/DRC), and
- Kathy Ntalaja (Chief of Party for EDC's dot-EDU activities)

We would like to thank these individuals who either participated in portions of the work organized by the two principal researchers or were the organizers of activities in which the two principal researchers participated for their own independent learning needs assessment purposes. The resulting collaboration turned out to be highly useful and effective. It spared the population from being bombarded with too many questions by too many people. We thank our colleagues for the quality of their collaboration.

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1   ABOUT THE NEEDS ASSESSMENT

1.1 Background of the needs assessment

At the heart of the analysis and recommendations presented in this report is the realization that important challenges are being faced by the people and government of the Democratic Republic of Congo (DRC). Donors and financial institutions are willing to invest in activities that engage citizens in meaningful learning opportunities to meet these challenges. Specifically, a USAID/DRC initiative seeks to establish a small number of pilot activities in the basic education sector of selected regions of the DRC to experiment with innovations in varying circumstances. In each case the initiative aims to uncover how a particular innovation may or may not be effective and how it could possibly be optimized within its given context as well as settings to which it me be generalizable.

This report has the above USAID/DRC initiative in mind. It considers its focus on "the cross-sectoral benefit of IT tools for strengthening access to information, communication and learning in targeted pilot communities in DRC," particularly the two ideas being promoted at the current stage of the initiative:

1) the establishment, in targeted communities, of Community Learning Telecenters *(TAC – Télécentres d'Apprentissage Communautaire)* and
2) the development of complementary instructional strategies via pilot modules that can be implemented to support information, communication and learning needs in schools, clinics, or local associations.[1]

The latter specification indicates that the initiative defines learning needs as not limited to the school context *per se*. Such a position is in line with current views of human learning as being lifelong and lifewide as well as with a development perspective that takes into account that in all potential target communities covered in this report – Luozi, Vanga, and Kikwit – a variety of development activities[2] are already underway and that mutual benefits can be derived from the interaction between those activities and the projects expected to be developed following the present learning needs assessment.

1.2 Underlying assumptions and prior considerations

The current round of USAID/DRC financing foresees pilot projects within a twelve-month time horizon. Even a superficial analysis of the situation of the DRC makes it abundantly clear that only limited results can be obtained within that timeframe. Pilot activities should thus be designed accordingly. The authors thus assume that the idea of carrying out the pilot projects is part of a longer term in-principle commitment on the part of USAID and other donors to the development of education in the DRC. This assumption was supported by discussions with USAID Mission officials who recognized the inadequacy of the current short-term funding and asserted that it would be reasonable to assume continuity of the concern with educational development in the DRC in a longer term perspective.

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[1] Source: DOT-COM Alliance, dot-EDU Associate Award: Democratic Republic of Congo – Télécentre d'apprentissage communautaire (TAC) et Stratégies éducatives complémentaires. Program Description (USAID/DRC, December 2002).
[2] We are referring here to projects in areas such as rural health (SANRU), agricultural development and food security (SECID), and UNICEF's life skills curriculum.

The learning needs assessment covered in this report relates to the second part of the dot-EDU grant[3] awarded to the Education Development Center, Inc. (EDC) as prime grantee and the Academy for Educational Development (AED) as sub-grantee. With several projects in the areas of rural health, agricultural development and food security underway and a first part of the dot-EDU grant already under implementation for the establishment of a Community Learning and Resource Center in Vanga, Bandundu province, the question arose as to whether replication of current initiatives, such as the Vanga community center should be sought or rather if alternative innovations should be explored. The discussion by the needs assessment team with USAID/DRC Mission Director Tony Gambino left no doubt regarding this question: innovation is called for and taking appropriate risks is indispensable in a situation where it is clear from the outset that problems are too big to be solved by traditional means. It may be necessary to use advanced technologies in response to lo-tech needs, thus creating flexibility, speed, and localization in the provision of products and services for the improvement of education in the DRC. To explore how this can best be done, diversification of pilot approaches, rather than replication of similar approaches in different circumstances, is essential.

The present needs assessment came in the wake of visits undertaken by earlier teams. A technical team from EDC, AED and The Mitchell Group (TMG) visited the DRC in November 2002 to prepare the implementation of the Community Learning and Resource Center in Vanga and to draft a monitoring and evaluation plan for it. The needs assessment team was aware of the findings and recommendations that had come out of this work. It was also aware of strategies proposed in a document with the title "Draft Report – Education Project Strategy Paper – Improving Basic Education For Children, Especially Girls, in the DRC," dated June 2002.

Several other donors, such as UNICEF and the *Coopération Belge*, are active in areas that intersect with projects that could potentially result from this needs assessment. Where this was the case we have looked for options that could constitute value added on the part of dot-EDU to the efforts of those other donors.

The learning needs assessment was undertaken using a multichannel approach to solving educational problems. Multichannel approaches typically involve a mix of different technologies, both of the well-established traditional variety, such as radio and print, and emerging digital technologies; they address learning needs pertaining to formal, non-formal, and informal learning settings; and they recognize the usually wide diversity in learning styles, habits, and circumstances among individual learners. Often in multichannel approaches, radio has been the medium of choice due to its generally widespread availability in developing countries and the pedagogical opportunities of that medium as compared to, for instance, TV and the establishment of a highly successful and cost-effective model of educational use of radio called Interactive Radio Instruction (IRI). The desire to replicate such a proven model when confronted with new problems is natural. However, proposing to do so without further investigation would contradict the spirit of any serious needs assessment. The findings of this learning needs assessment will lead to proposing a multichannel approach that includes a mix of community radio, using diverse audio formats; computer technology; solar energy; print; and technologies that use and transform local resources to meet the unique instructional challenges faced in DRC.

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[3] The dot-EDU grant is a component of the Digital Opportunity through Technology and Communication Partnerships (DOT-COM Alliance). This award is designed to assist countries in strengthening learning systems to improve quality, expand access, and enhance equity through application of digital and broadcasting technologies.

1.3 Needs assessment: The why, how and what

In this section we explain what a needs assessment exercise entails and why it is important to carry it out. We also provide information about the scope of the exercise and its limitations, and how we went about doing the job.

1.3.1`What a needs assessment entails

A needs assessment is an exercise at clarifying options and avoiding making unfounded choices. As the previous two sections of this report show, a number of expectations, preconceptions, work in progress, and prior decisions often surround the start of any newly proposed intervention. Thus, to ensure that one makes the right choices and stays on the right course, one must ask the right questions to start with. Not doing so puts one at risk of *confusing means and ends*.[4] The tendency to do so is particularly strong when technologies are involved. The mere absence of a technological facility, such as Internet connectivity, does not necessarily signal a need. It only signals a need when first a serious purpose had been identified and it had then been concluded that such purpose could best be served through the technology in question.

In carrying out our investigation we have thus followed a rationale driven by the following sequence of questions:

- What is the current situation of a particular community? (The '*What is?*' question.)
- In what respects does the community in question – or do stakeholders in the well-being of that community – perceive the current situation to be different from what they would like it to be and for what reasons do they aspire to change? (The '*What should be?*' question.)
- By what alternative means can the transition from '*what is*' to '*what should be*' be achieved?
- Does one or more of the above alternatives involve learning?
- If so, is this a preferred alternative and why?
- If it is a preferred alternative, is technology an option to facilitate/enhance the required learning?
- If so, is technology the best way to facilitate/enhance the required learning, what specific technology would best do the job, and in what way(s) can it best be employed?

1.3.2 Scope of the exercise and limitations

The research covered communities in three different areas of the DRC: Luozi, Vanga, and Kikwit. Besides observing what happens in those communities and talking to community members and leaders, the research team also held discussions in Kinshasa to learn from the perceptions and experience of others; to exchange, adjust, and validate views; and to explore possible collaboration regarding potential initiatives.

A full list of persons contacted and sites visited is provided in annex to the trip report that accompanies this assessment. We refer to that list for further detail and for possible follow-up to our discussions by others. Suffice it to say that the interviews, site visits, and team discussions were continuous from well before we arrived in Kinshasa until after we returned. It is thanks to

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[4] Further elucidation on this matter can be found in, for instance, the classic work on *Needs Assessment: Concept and Application* by Roger Kaufman and Fenwick W. English, published in 1979 by Educational Technology Publications, Englewood Cliffs, NJ.

the intensity of the work that we feel confident about our conclusions despite the short a period of time available for the work.

The choice of geographical locations is limited due to the current instability in the East provinces of the DRC. The places that were visited provided a good mix of factors that are generally representative of the diversity of conditions in the largest, and at the same time most deprived, regions of the country. A summary description of the reality we found and its diversity should make reference to circumstances such as:

- poor to moderate accessibility whether by road or air;
- limited to no electricity;
- absence or embryonic presence of Internet;
- access to none or a few national or local radio stations depending on one's location;
- existence of out-of-school as well as in-school youth;
- schools with widely varying conditions;
- parents with insufficient resources to support a child's education; and
- well intentioned, relatively competent teachers who are, however, motivationally challenged to explore their innate resourcefulness in resolving problems due to poor remuneration.

Figure 1: Inside Grade 1 at Kibu-Manza primary school in Ngundu, Bandundu province.

1.3.3 Method of work

The investigation started well ahead of the actual visit to the DRC with an exploration of the documentation produced by visitors to the DRC in the running-up to the present needs assessment as well as relevant documentation available on the World Wide Web. This exercise also included teleconferences with PANOS Paris in France (Françoise Havelinge and Pascal Berqué) and Communication for Development in The Netherlands (René Roemersma). These latter contacts were made with a view to exploring current and planned future developments of community radio infrastructure, possibly in conjunction with use of the WorldSpace digital satellite radio system.

At each of the three sites visited, approaches to get to know the circumstances and the views of the communities took into account the local expectations that one should do so without bypassing – and preferably going through – various hierarchical layers of representation of the communities' interests. This was done most conscientiously in Luozi, where we started off

Figure 2: Meeting with teachers in Luozi.

visiting the territory's administrator, then met with the president of the council of elders (*Conseil de notables*), and subsequently spoke with the president of the *Haut conseil de l'éducation* in the presence of members of the inspectorate responsible for schools functioning under the patronage of the major four different religious groupings present in the Luozi Territory (Roman Catholic, Protestant, Kimbanguist, and Salvation Army), before going on to see schools, parents, and teachers, as well as visit projects in the areas of rural health and agriculture.

While moving through the programs of interviews, meetings, and visits to schools and projects, a method of interviewing was employed that went from the broad and general – i.e. the major discrepancies between 'what is' and 'what should be' – to the narrow and specific. Special care was taken to allow – and at times encourage – our discussion partners to spontaneously express themselves. Sometimes this was accomplished by asking generative questions such as what people thought had been their own most valuable learning

Figure 3: Meeting with parents in Vanga.

experiences and what it was that had brought those experiences about; what people thought about the fact that far fewer girls than boys attend school; what they thought about the relative value attributed to their local languages as compared to the official language French; or what they thought about changing the emphasis in school towards equipping children with skills they could usefully employ in their immediate environment rather than on preparing them for pursuits that would lead them out of that same environment. At other times it was not even necessary to provide prompts.

As in the course of the above referred interviews, meetings and visits a picture started to emerge, subsequent opportunities were used to triangulate what we thought we had found and check it against the reality experienced by other people and communities. In doing so we were looking both for consistency and variation so as to arrive at project proposals that would stand a good chance to respond to problems felt in large portions of the country.

2   FINDINGS, ANALYSIS, CONCLUSIONS AND RECOMMENDATIONS

2.1 Salient problems

The situation of the Democratic Republic of Congo is grim but not hopeless. The country's ranking on the scale of UNDP's [5] 2002 Human Development Index (HDI) puts it at the 155th place from the top among a total of 173 countries listed, a statistic that one can actually *feel* while traveling through the country.

In none of the relevant areas that are commonly associated with human development does one find a satisfactory situation. Almost everything calls for immediate attention, a situation that can easily turn a needs assessment into a largely unfocused exercise. Following is a list of problems identified by the persons we spoke with. Their concerns are confirmed by our own observations. The way these problem statements are sequenced is not intended to express a specific order of priorities nor is the list in any way complete. Rather, it is our intention in presenting this list to give a fair idea of the comprehensiveness and complexity of the problems faced by the DRC.

- The state is perceived by most people in the DRC as largely irrelevant to their well-being and to the advancement of the interests of their communities.

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[5] The "Human Development Indicators 2002" for the Democratic Republic of Congo are available at http://hdr.undp.org/reports/global/2002/en/indicator/indicator.cfm?File=cty_f_COD.html.

- Transport infrastructure leaves much to be desired, making it difficult for even basic services, such as for health and education, to function properly and for productive activity to become marketable.
- Communication infrastructure is greatly deficient. Essential information necessary for the adequate functioning of systems such as for schooling over the extent of a particular territory, let alone the entire nation, may take weeks to disseminate.
- Electoral democracy is dysfunctional. Much work needs to be done – despite laudable efforts underway promoted by for instance IFES[6] – to create awareness of and capacity for every individual's role in shaping civil society and to overcome disenchantment with and disbelief in electoral democracy.
- Health and sanitary conditions are greatly lacking. Those conditions are aggravated by lack of access to safe water. The prevalence of many diseases (including the obvious threat of the spread of HIV/AIDS) is contingent upon awareness and knowledge among the population for recognizing symptoms as well as taking basic health and sanitary measures. Malaria is currently still the most important life threatening disease.
- Food security is deficient. Poor dietary habits remain unaltered due to lack of adequate nutritional knowledge among the population; attitudes of not challenging traditional practices; poor agricultural performance; and the inability to market agricultural produce beyond the immediate environment.
- Generalized poverty impacts gloomily on people's chances of survival and of living a life that provides a minimally positive outlook, i.e. a life one feels motivated to be living and in the enhancement of which one is ready to invest.
- Gender disparity is noted by those concerned with gender equity but often not perceived as such by most of the population, which is a problem in its own right.
- Prospects for local economic development are limited due to restricted marketability as a consequence of the poor infrastructure and because of lack of access to (micro) credit as well as lack of mastery of skills and access to tools (basic tools are a luxury even in vocational technical training facilities).
- Education – or more in general learning in whatever way or context – is both an end (for which reason it has been defined as a human right) and a means towards addressing any of the above problems as well as a correlate to important human development indicators. The poor state of development of the education infrastructure (physical, organizational, and human) is therefore a great overall concern.

2.2 No quick fixes

While looking at the picture that emerges from the above inventory of problems, most striking is perhaps the realization that dealing with one particular problem at a time is likely to remain ineffective. Any positive effects of such an intervention are easily undone by the continued existence of other major problems that are related to the problem one addresses. In fact, most problems are connected to other problems. To be effective one must address clustered rather than isolated problems, aiming at an impact that can be felt in people's day-to-day life. Without getting a clear awareness that addressing problems actually helps, people will continue to feel fatalistic about their condition. A loud and clear message transpired from our conversations and observations during this needs assessment exercise, namely the inevitability to come up with **integrated solutions** that address multiple interconnected problems if one is to be relevant in the

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[6] See http://www.ifes.org/reg_activities/DRC-reg-act.htm.

DRC context. The lack of capacity to solve problems is the greatest and most overarching need we were able to identify.

2.3 Promoting meaningful learning: A key strategic option

Considering the plethora of problems that confront human beings in any set of circumstances, including those that characterize the DRC, the capacity to interact with them in a constructive manner stands out as a key human behavior to enhance existence (one may call this latter notion "development," giving the concept its rightful expanded meaning, beyond the usual emphasis on mere connotations with economic progress). Thus, furthering the capacity to interact with problems is an important development objective. The best way to meet this objective is to actually engage in the interaction with problems and, by doing so, to become better at it. Education is supposed to contribute to this process. Unfortunately, the educational processes taking place in schools are often less than effective in pursuing this goal. There is no particular reason why this should be so. We thus argue in this report that important steps can be taken in a country like the DRC and in a context such as the formal school system to improve this factor. We also make specific proposals to make a start with processes that help both teachers and those they teach to make learning meaningful, exploring at the same time technological options that help not to limit the impact of proposed interventions to the school context alone, considering that many children in the school age do not go to school.

2.4 What happens in school and how it could be different

Part of our effort to explore the conditions that surround opportunities for citizens of the DRC to develop their capacity to learn focused on the infrastructure that is supposed to play a major role in this area: the school system. Here is what we found.

Figure 4: Teaching the decimal system in one school.

Figures 4 and 5 show contrasting examples of how the same subject matter, the decimal system, is being taught in different schools in the

Figure 5: Teaching the decimal system in another school.

same province (Bandundu). Second grade students of the Kikoti primary school near Kikwit (Figure 5) will no doubt end up having a different grasp of the concept of decimal fractions, having been able to relate their active learning experience to every-day practical situations, using objects they can find in their own environment, than the Grade 4 students of the Kibu-Manza primary school in Ngundu (Figure 4), whose passive learning experience has remained at a purely theoretical level, numerical and operational concepts contained in an expression like $4.12 + 12.5$ (the first problem presented on the blackboard in Figure 4) remaining

unrelated to practical situations and concrete artifacts. While visiting schools in the DRC, one encounters much more frequently situations like the one depicted in Figure 4 than those suggested by Figure 5.

Figure 6: Grade 1 students in Kibu-Manza primary school in Ngundu.

Conditions in the schools are usually poor. It is typical to find students of the lower grades cramped together on long benches, having no desks to write on. Blackboards may be as dilapidated as shown earlier in Figure 1. Students have no textbooks, nor do teachers have teacher handbooks or access to other sources of information to support their pedagogical activity. A single dictionary in a school is considered a luxury.

While there normally is a relatively reasonable balance between the numbers of boys and girls in the lower grades, one sees the proportion of girls dr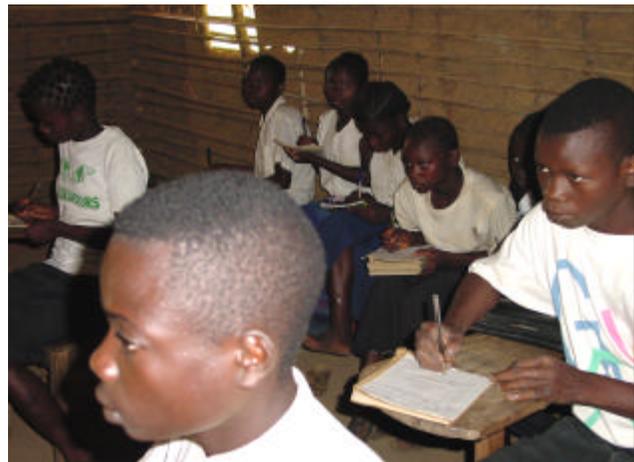op rapidly as one progresses to observe the class composition of the higher grades. Also, the conditions under which girls undergo their schooling experience can be considerably different from those experienced by boys. In making their choices about who should go to school when family resources are limited, parents give unquestioned priority to boys over girls. The few girls who remain in school beyond Grade 2 may receive far less material or other support than their male counterparts. Figure 7 documents this stark phenomenon. In a second grade of a secondary school in the vicinity of Kikwit, we found that the only four girls in the class were seated on a single bench at the back while the boys were individually seated in

Figure 7: Second grade secondary school girls and boys in the Kikwit region attending a French language lesson.

chairs with writing tablets. We asked the director of the school to explain the situation and were told that the girls were being "penalized" because their parents had been unable to provide them with chairs. It could be worse, he said. Indeed, in some of the other classrooms girls sat on the ground.

The above situation illustrates yet another phenomenon. Schools that function are the result of direct negotiation between parents and teachers. The overwhelming majority of those schools are the so-called "*écoles conventionnées*," i.e. schools run under the auspices of the different churches (Roman Catholic, Protestant, Kimbanguist, or Salvation Army). A small minority of schools are "*écoles privées agréées*," private schools that are recognized by the government and operated by some group other than a church. Having this particular status allows students, just like those of the *écoles conventionnées*, to take the national exams and obliges the schools to follow the national curriculum and to accept government inspection. The "*écoles privées non-agréées*," of which there are even fewer, don't have these obligations or rights. State run "*écoles non-conventionnées*" are hard to find and reportedly of negligible merit. The non-state schools don't receive government subsidy. Their resources come entirely from the parents'

contributions, a proportion of which the school has to pay to the state, which finances some of its oversight operations from these taxes. In some cases parents also contribute to the schools by providing labor. We saw one case of buildings for the administration of the school system of a territory (Luozi) being constructed with financial contributions from parents. Considering the very low income level of parents one can easily imagine how difficult it is to get all children in school, to provide them with minimal conditions for effective learning, and to keep teachers motivated by paying them a decent salary.

Figure 8: View of the river Congo. In the foreground school children. In the background buildings under construction for the administration of the Luozi school system being erected with the financial support of parents.

Few of the children who enter primary Grade 1 make it to Grade 6. Even fewer transit to secondary school and of those who do only a minor proportion actually graduates. While schools maintain records and school system administrators request statistics, any notion of cohort analysis was absent among school directors and educational administrators we spoke with.

Teachers are referred to by both parents and educational administrators as competent, at least at the primary level. This perception should probably be seen against the background of our respondents' own overly theoretical schooling experience. We could indeed see that teachers know their subject matter at a superficial theoretical level but generally found no evidence of deep understanding. Such understanding could have been exemplified by teachers' ability to creatively relate their teaching to children's immediate experience; the choice of relevant examples; and encouragement and facilitation of active dialogue between students and teacher, the case represented in Figure 5 being indeed a rare, though most heartening, exception. Much more frequent were situations like the one depicted in Figure 9 in which children are led to perform calculations involving objects (marbles is this case) they never see. It would involve only a minor intervention, aimed at awareness building and the provision of professional guidance, such as through the distribution of printed teacher
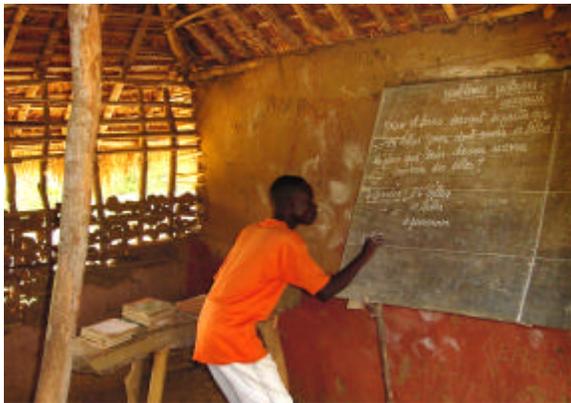

Figure 9: Teaching based on objects – represented only verbally – that are alien to the local environment.

guidance materials or the production and broadcast of radio programs to support the teachers' pedagogical activities, to change such practices. When these flaws were brought to the attention to those involved, people would immediately recognize them and show no difficulty comprehending how things could be changed.

More difficult would it be to improve the integration of girls in the schools. It proved extremely hard, even for the well-educated among our respondents, to see that a biased choice was being made when, due to lack of family finances, those children who were not given the opportunity to attend school were invariably the girls rather than in some cases girls and in other

cases boys. It should be noted that people in the Vanga area were remarkably less prepared to critically challenge their own beliefs and practices than those we met in Luozi, a factor that contributes to our recommendation to situate an intervention in the area of complementary instructional strategies in the latter geographical region. We raised the question of girls' education oriented towards active involvement of women in professional and social life with the Luozi parents. They responded in a surprisingly positive manner and showed conviction that girls' fate is not limited to becoming housewives but could also include such things as leading entrepreneurial roles. Luozi parents were also determined that education geared towards the development of relevant competencies that can be used in the local environment would serve their children better than the kind of theoretical knowledge children now end up acquiring without being able to apply what they learn in any sort of practical setting.

2.5 What should be done

The following strategic considerations can be derived from the above description of the state of education in the DRC.

There is an acute need for materials development and teacher training to meet learning goals and objectives that allow the educated to participate in a constructive manner in the solution of problems that the community faces. This leads to the idea of a pilot project geared towards creating local capacity so that the following instructional strategies are implicit in the development of instructional materials and in the performance of trained teachers and learners:

- Reduction of rote learning and increase of active learning at formal, non-formal and informal level.
- Increase of relevance of content to the immediate environment, thereby providing a solid basis for conceptual and theoretical development that has its roots in practice and concrete experience.
- Increase of relevance of content by including project-based learning activities that use problem areas such as HIV/AIDS, nutrition, and agriculture as basis for learning that is not artificially limited by concerns with separation between the various school disciplines.
- Use of local knowledge and technologies available in the local environment to support teaching and learning.

Working on the above issues will support the implementation of the recently introduced new primary education curriculum (developed with the support of UNICEF and the *Coopération Belge*, the latter continuing to be involved in textbook production for the same curriculum). It will result in the establishment of innovative pedagogical practice in the framework of the new curriculum, which, without actions such as the ones foreseen for the pilot project, is at risk of being interpreted in ways that will continue current practices of rote learning and teaching that is dissociated from meaningful contexts. In addition, the pilot project will equally support the life skills curriculum edited and financed by UNICEF. The project should focus on using multichannel approaches to enhance the print-based materials so far developed. This life skills curriculum has an implicit HIV/AIDS-related agenda with emphasis on problem management skills.

In the framework of the pilot project the authors suggest (see below for further detail) the use of a mix of information and communication technologies (ICTs) to support the above developments in a sustainable manner. We propose that this include the use of digital and analogue radio, a small community radio station, audio cassette players, print, and some computers. Appropriately deployed, these will support and strengthen the quality of instructional

strategies, provide access to information sources, and allow teacher capacity building to occur through a community of practice.

The pilot project is proposed to be located in the Luozi territory. Doing so will introduce variation in the conditions under which different dot-EDU activities will be implemented, thus allowing more varied lessons to be drawn from them. Luozi is a territory of great need. The community dynamics is quite distinct from that of Vanga and Kikwit. Despite the deprivation of the region, the communities in Luozi appear to have a more highly developed sense of their ability to intervene in improving their lot.

The project will recognize the linguistic diversity of the country and take into account the pedagogical needs and opportunities arising from such diversity.

2.6 Parameters of the proposed pilot project

Before entering into more detail about the nature of the proposed project, we present below an itemized overview of some of the important factors that should be kept in mind while preparing and implementing the pilot project. These factors are believed to either affect the chances of success of the project in a positive way and to push it forward (drivers and opportunities) or to impact negatively on the project implementation and its chances of success (barriers and obstacles). We delineate separately the needs of teachers and students and needs relating to the teaching and learning processes in which both teachers and students take part. These needs provide the setting for the project and should be kept in mind while developing it without necessarily attempting to respond to them all. Subsequently we briefly highlight infrastructure needs and limitations that we expect to impact on the scope of the project activities. Finally, we pay attention to the consequences of not carrying out the project or not doing it correctly, i.e. the threats surrounding project implementation.

2.6.1 Drivers and opportunities

- Despite the obvious problems and the demise of the state school system, schools are still functioning, thanks to a process of what basically comes down to direct negotiation between parents and teachers and patronage by the various religious institutions present in the DRC as well as non-religious interest groups. It is generally believed that the fruits of what will now be invested in what currently functions will eventually be reaped to benefit the DRC's future fully developed school system.

- There is interesting variation in the quality of functioning – administratively as well as pedagogically – among schools, suggesting that schools could learn from each other. In other words, networking schools is potentially a means for improvement. Example: We found one *école privée agréée* where teachers had collaboratively worked out a conceptual road map through the new curriculum (Figure 10), a resource that could well benefit teachers and administrators at many other schools. We also found important variation in the effective interaction between schools and parents resulting in marked differences in the material
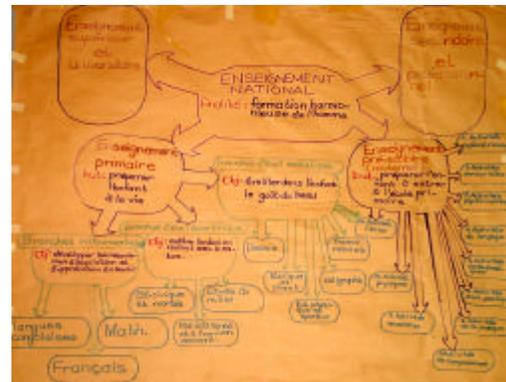

Figure 10: Conceptual road map through the new curriculum, collaboratively worked out by teachers of the Nsemo Private School in the Kikwit area.

conditions in schools as well as in human conditions, such as girls participation.

- Parents are a driving force. Many of them are genuinely interested in the education of their children and have a clear view of what they want. They are well organized through the *Association National de Parents du Congo* (ANAPECO).

- The local environment of many schools is often rich in expression of rural inventiveness that could be brought to bear on solving problems of lack of resources for teaching and learning.

- Teachers are relatively well qualified in terms of prior formal training and familiarity with the teaching profession.

- Committed individuals who are willing and able, even in informal roles, to help project activities advance can be found in several communities.

- Liberalization of the air waves opens opportunities for community radio (several initiatives are already in place).

- In addition to community radio (with geographically limited coverage) the Afristar satellite operated by WorldSpace[7] covers the DRC well. Its technology, allowing to receive CD-quality radio signals on hand-held radio receivers, opens opportunities for community radio-based interventions to later become integrated in schemes of more extended coverage of the national territory. Similar opportunities could be expected to result from the current development by the Digital Radio Mondiale[8] consortium of digital short wave AM broadcast radio, providing wide coverage with near-FM sound quality.

Figure 11: Testing WorldSpace reception in the Bas Congo province (signal strength 4 out of 5).

- Despite generally poor local infrastructure one sees interesting technological developments, such as the rapid spread of mobile telephony, leapfrogging over a highly deficient telephone infrastructure based on land lines. The same dynamics may lead the DRC to follow less conventional routes in creating its Internet connectivity infrastructure. One already finds cyber cafes at many places where one would least expect them.

- There are interesting opportunities for collaborative efforts. Both the *Coopération Belge* and UNICEF are interested in efforts that will strengthen the work they support regarding the introduction of the new primary curriculum (*Programme National de l'Enseignement Primaire*); the production, financed by Belgium, of student manuals; and the UNICEF financed life skills program. The student manuals – one for each school year comprising all disciplines – for the new primary curriculum have no complement that addresses the needs of the teachers. The proposed pilot project could well provide such a complement, attending particularly to supporting teachers regarding matters of pedagogy and psychology. The UNICEF supported life skills program comprises print-based materials for both teachers and students. Complementary action in the framework of the proposed pilot project is welcomed in using complementary technologies to enhance the materials.

- There are also opportunities to receive support from others for components of the proposed pilot project. A case in point is the possibility to use the facilities of the NGO *Search For Common Ground* (SFCG) for capacity building in the area of radio program

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[7] See http://www.worldspace.com and http://www.worldspace.org.
[8] See http://www.drm.org.

production as discussed with Simon Lawson, country director for SFCG, who will be replaced end of March 2003 by Patrick Marienne (during the interim, follow-up contacts can be made with Sally Chin [schin@sfcg.org]).

2.6.2 Barriers and obstacles

- Generalized hardship among the population affects adversely people's motivational disposition to take charge of their own destiny, requiring project work to give adequate attention to motivational factors involved in addition to the more technical aspects of the project.

- Local languages are taught throughout the six grades of the primary school. In addition, instruction in Grades 1 and 2 in general takes place in the local language. Beyond that level the official language of instruction is French. This generally causes problems for the continuity of conceptual development when no fluency in the new language of instruction has been reached at the time the transition is made, leading to concept development that is dissociated from the emotional content that initially was associated with the development of concepts initiated in the mother tongue. Children exposed to this challenge will often resort to rote memorization

Figure 12: Instructional materials in Kikongo (a rare case of finding any kind of learning support material in schools).

of external features of concepts rather than fully integrating them within the deep structure of prior conceptual frameworks. This problem should receive attention by developing alternative instructional strategies that complement the official curriculum, aiming to smoothen the transition in conceptual development between the official language of instruction, French, and the native national language in question (Swahili, Kikongo, Tshiluba or Lingala, depending on the region). This is likely to require the development of multilingual approaches for which parallel technologies could be used.

- There is as yet no radio use based on a clear and systemic pedagogical vision (one radio station that constituted an emerging exception, Radio Maendeleo in Bukavu, had recently been closed by the rebels). This obstacle should be overcome by attending to the development of pedagogical thinking while building capacity for local development-oriented radio production.

- The prevailing perceptions among most parents that boys should be given priority over girls when it comes to choices about schooling opportunities for their children will adversely affect the impact of close to half of any effort at human development based on interventions in the school system. In view of this barrier it is important for project activities not to limit themselves to the formal school context while at the same time ways must be devised to bring about an attitude change among parents. Such an attitude change should be rooted in the availability of concrete examples of female roles, beyond those of house wives, that fit in with the dynamics of cultural change and the perceptions of parents and children regarding their responsibilities *vis-à-vis* each other in a lifelong perspective.

- Teachers are generally demotivated. The low remuneration they receive for their efforts greatly contributes to their demotivation. It is important to devise project activities such that they give teachers a concrete stake in their development and possibly implementation

and to ensure that they lead, within an agreeable timeframe, not only to improvement of the teaching/learning process as such but also to betterment of the perceived well-being of the teachers themselves. One way of achieving this could be by making the improvement of the conditions of teaching and training part of a wider concern with village economic development, considering the community school also as a basic economic entity.

- The proposed project site, Luozi, has no electricity. It is also out of reach of both mobile and land line-based telephone networks. No local or national radio stations can be received. This sets obvious limits to the extent to which technologies can be usefully and effectively employed in the project. On the other hand, a situation like this one, where almost everything still needs to be done, is an exciting opportunity for creative experimentation, applying the most advanced technological knowledge currently available. It should not be construed to be a reason not to bring the benefits of technology to such an area. The communities approached were acutely aware that their children were growing up in a rapidly changing world. They were adamantly opposed to any development philosophy that would not recognize their right to be part of those change processes.

2.6.3 Teacher and student needs

- Teachers lack documentation and other informational resources they could consult in preparation of their daily pedagogical practice (many schools don't even have a dictionary), assisting them in matters related to subject matter content as well as methods of how to best facilitate meaningful learning in their students.
- Teachers lack didactic materials (teaching aids such as sets of weights and measures) that can help them move away from ways of teaching that promote rote learning to helping students acquire concepts and skills rooted in practice instead of mere theory.
- Teachers are deficient in skills as well as in motivation to explore their innate inventiveness, and they lack tools that allow them to take advantage of resources in their environment, using and transforming them with a view to integrating them in their classroom practice.
- Students lack school textbooks for use both inside and outside the classroom.
- Students and teachers meet in spaces and under conditions that leave much to be desired regarding their suitability for facilitating meaningful learning.
- Teachers and students both suffer due to the limited ability of parents to support their children's attending school (in the absence of investment by the state in this area).
- Both teachers and students require access to the benefits of different technologies that can support educational processes, including for the production of printed materials at the school or community level, radio, as well as basic Internet services.
- Teachers and students lack in awareness of the real reasons why both should go to school, namely to help each other play effective roles in life rather than in the first place to try and comply with the execution of some program. This is not to say that such program was not developed having real life in mind. However, for the program to become effective it requires different – more actively participative – attitudes on the part of those who are being led by it.

2.6.4 Instructional and learning needs

- The teaching/learning process in most classrooms of the DRC is in acute need of transforming itself from a passive, rote learning oriented process, uninspired by the need of DRC citizens to be able to confidently face the practical problems of life, into an active,

participative process of meaningful learning, rooted in an understanding and consciousness of the country's and its communities' problems and the motivation to do something about those problems. This is the overriding need that should drive and structure any of the alternative strategies for the facilitation of learning to be developed in the framework of the proposed project.

- The above formulation makes specific reference to classrooms. However, the need to develop meaningful learning opportunities extends well beyond the classrooms of the formal school, considering the large proportion of children, particularly girls, who will never attend school, or only do so for a number of years that is too small to guarantee sustained literacy and numeracy. Consequently, the same need extends to adults who did not attend school. Society has an obvious responsibility to attend to the learning needs of those population groups in equal measure. The complementary instructional strategies to be developed in the framework of the proposed project should thus be such that they create to the maximum extent possible open access for audiences, whatever their age, in ways not dependent on the school system.

2.6.5 Infrastructure needs and limitations

- There are clear needs to improve the physical infrastructure of most existing schools. Classrooms are dark; offer too limited space; have inadequate, insufficient or no furniture; have blackboards of greatly varying quality and functionality with chalk being a scarce product, anxiously kept under the personal control of the teachers who have it. The proposed project is not set up to address this need in an immediate sense. The described situation constitutes one of the more or less fixed parameters of the project. It is expected to gradually improve thanks to the work of others, such as the World Bank and UNICEF. Indirectly the project should address this issue in developing alternative strategies that depend as little as possible on these negative infrastructural circumstances. Through creating teacher and parent involvement in the project, the project should also alter the disposition of these stakeholders in becoming more forthcoming to make infrastructure improvement a community priority as well as to create physical infrastructure that could cater for the learning needs of those who do not go to school.

- A variety of media – broadcast technologies such as radio and TV; audio and video recording, distribution, and reproduction; print-based media; Internet-based media; computer-supported media; etc. – could possibly help compensate for the deficient physical infrastructure referred to above. However, the infrastructure necessary for the operation of such media is even less adequate and available than the aforementioned physical infrastructure. This is thus a further limiting factor, both to be taken into account as a given and as a challenge to be tackled. While others will work on improving aspects of the physical infrastructure, the proposed project must explore how alternative technologies, and alternative uses of these technologies, can equally, or perhaps better, contribute to improving the material environment in which DRC citizens learn.

2.6.6 Threats

- The greatest threat surrounding the proposed project is that, if the issues envisioned by it were not adequately addressed or if the related activities were less than optimally implemented, major indicators of human development included in the Human Development Index would be compromised, indicating failure of the international community to meet an important development responsibility with implications in the area of basic human rights, including the right to education, as well as stability in the region.

- Not or inadequately implementing the proposed project will result in continuation of a school system that does not, in general, contribute substantially to the capacity of the DRC population to take charge of its destiny by interacting constructively and effectively with the problems ordinary citizens face. In fact, current pedagogical practice is at risk of inhibiting the development of such capacity.
- Not carrying out the proposed project will furthermore eliminate an opportunity for large segments among the population, who for different reasons do not attend school, to have access to alternative opportunities to satisfy a number of their learning needs. This affects particularly the female population.
- The relationship between female education and family health, nutrition, and child mortality being a well-established one, it is a corollary of the previous statement that non- or inadequate implementation of the proposed project will have serious implications for the conditions under which the future generation of DRC citizens will face development challenges.

3   CONSIDERATIONS FOR PROJECT DEVELOPMENT

In this final segment of the report we first present in 3.1 (sub-items 3.1.1 to 3.1.4) considerations regarding the nature of the project, using concrete examples, worked out to a fair level of detail, to clarify what we think could be done. This portion of the document has particularly in mind the men and women on the ground who will implement the pilot project. It is intended to serve both as a guide for project implementation and as an initial reflection on project plans that can serve as a reference for future reflections on how the project will actually develop. We stress the importance of such continuous reflection considering that the aim of the pilot project is to learn from developing experience. Without carefully and profoundly documenting one's assumptions, actions and results, depth of learning will be seriously compromised.

In 3.2 we revisit the question of technology use, particularly considering the focus on technological opportunities inherent in the dot-EDU Associate Award. Section 3.3. presents a proposed listing of possible project activities and related outputs. These activities should be seen as opportunities for the development of complementary instructional strategies in line with the suggested nature of the project as described in 3.1. Finally, we briefly comment in 3.4 on the need to develop the project in a phased fashion.

3.1 Considerations regarding the nature of the proposed project

In this section we present considerations, based on our findings, which we judge important for the development of the proposed pilot project.

3.1.1 Guiding principle
While it is appropriate that a relevant amount of planning and preparation be undertaken before the proposed project starts being lifted off the ground, it is important to keep an open eye towards the need to make adjustments during project implementation. The overall concern of the project is to enhance the capacity to constructively and effectively interact with problems. While certain problem areas can be foreseen, important opportunities could be missed if the possibility were not left open to build the road while walking, adapting intelligently to what one finds ahead and

taking into account changing circumstances in the environment. Such an attitude, if wisely applied, will result in a maximum of learning from piloting the different project activities. To make such a formatively developmental approach work, great care should be taken to document the development of the project continuously, critically reviewing the data on a regular basis.

Keeping the above principle in mind, below follow some concrete ideas for consideration during project implementation. They are merely suggestive of what could be done, rather than a blueprint for what should be done.

3.1.2 Luzingu lwa muntu maza

According to Éduard Basiba-Lolo Nkiambi ya Vanga, president of the *Conseil de Notables* in Luozi, with whom we spoke, there are two principal problems for the Luozi territory. One of those problems is communication. It takes weeks for information to reach the recipient. The second problem is water. By way of example we look at the second problem and how it could serve as a generative concept for meaningful learning and inquiry. Without water there can be no human life, or, in Kikongo, *Luzingo lwa muntu maza.* Yet, water is not harmless. Many diseases are water-borne, whence water must be boiled before it can be used for consumption. However, says Marie-Claude Mbuyi, chief medical officer for the Vanga zone, Bandundu province, people have no habit of boiling water. "The ancestors didn't do it either," would be their comment.

Changing behaviors is generally considered very difficult for exactly the reason pointed out above. Without deep understanding of what is at stake it is only too reasonable to argue that what worked in the past should also work in the present. In addition, says Dr. Mbuyi, there is generalized apathy, demotivation, and lack of seeing oneself as in control of things. To change this, it is therefore important that development tracks be explored that lead in a recognizable way to perceived improvement and a sense that one has participated in generating such improvement in order to break the cycle of learned helplessness. A key condition for this to happen is that one understands the world in which one lives. This requires asking questions.

We saw children using a water pump as we moved from one primary school classroom to another one in Luozi. Collecting water is part of the daily routine of many children. Yet, there is generally little going on in school that is made to relate to it. This need not be so. We already saw (Figure 5) how one teacher helped children understand decimal fractions by letting them fill a one liter container with water, using a deciliter container ten times in a row to do so. This is but one example of the use of water in the context of an activity that generates learning. Besides the intricacies of the decimal system, it introduces children to basic – implicit or explicit – notions about a liquid, such as that its volume stays the same while it

Figure 13: Pumping water near a primary school in Luozi. The first water that comes out is visibly dirty. After some time it becomes clear.

may change its shape, or that, when placed in a container, the top surface is always horizontal, allowing it to be poured out of the vessel in which it is contained. Clearly, those things were not mentioned by the teacher of the class shown in Figure 5. However, playing with water in a setting that encourages questions to be raised, one may expect the inquisitiveness of children to be prompted beyond the level of the specific classroom activity and additional queries to be generated, thus creating the next level of opportunities for further inquiry.

Water being one of the most common substances around, it can be related to a wide array of interests and problems. As the cleanliness of water (see Figure 13) is an obvious issue for discussion, different kinds of contamination (physical, chemical, biological) may be discussed. Boiling being an efficient manner to turn biological impurities harmless, the process of boiling in and of itself poses the most interesting questions. What are the bubbles in boiling water made of? Why do they only appear when the water reaches the boiling point rather than emerging gradually as the water gets warmer? Why does the water not get warmer as we continue to boil it? What happens to the water that disappears during the boiling process? Et cetera, et cetera.

Besides using water to drink it, purifying it before it is being consumed, water is also used to clean the body, to wash dishes, to wash clothes, and to extract the poisonous content from the tubers of the manioc (an important part of the Congolese diet) before they are being prepared for food. What happens when one washes something? Is it the same process when we wash our body, dishes, clothes, or manioc? Why can we wash our body in, say, 15 minutes and must take days to wash the poisonous substances out of the manioc tubers? Why does it matter whether the water is warm or cold? What is the function of soap? What is soap? Certainly, these are more questions than can be answered. But then, raising questions is more important for meaningful learning than learning the answers to questions one never asked.

Figure 14: Example of didactic material produced by teachers. A map of Luozi, showing how the territory borders on the river Congo.

The Luozi territory borders on the river Congo (Figure 14). Many children grow up seeing boats. Why do they float? What happens when they sink? Why can you not walk on water but can you swim? And, while we are at it, how does a water pump work?

Such questions, which children – as well as adults who haven't lost their innate curiosity – naturally ask, can be linked at different levels to the formal curriculum of both the primary and secondary school. Depending on the level of the child's development and expectations expressed in the curriculum, they will be responded to differently. How? That is a matter that requires teachers – as well as parents, and others who are involved with the learning of children – to make judgments when the questions arise. Making such judgments entails on the part of the teacher both keen attention to the interests of the child and having a good overview, such as expressed by the teachers who developed the conceptual road map shown in Figure 10, of what the curriculum is all about. Being at ease with the curriculum as well as being at ease with what the environment has to offer in terms of resources that respond to the curriculum is what is at stake here. The project must help teachers and other educators establish the connections between these environmental resources and the curriculum. At the same time it must develop in the teachers the skills to transform as necessary and use those resources and create a level of comfort that allows teachers to become better at facilitating inquiry-driven and problem-oriented learning.

It is important to interpret the above recommendation not as a proposal to revolutionize, in an uncontrolled manner, the DRC school system. One works with people who have their own dynamics of processing change that may be different from what is ideally desired from a project implementation point of view. Working collaboratively with teachers, parents, and the children, involving them substantially in the development and the implementation of the project, is of the

essence. Equally of the essence is to interpret the human development envisioned by the project not merely in terms of intellectual development but also, and prominently, as emotional development. We explore next, by way of example, the resources we were able to identify in the time span of a single day, during our visit to Luozi, analyzing their potential usefulness for promoting meaningful learning.[9]

3.1.3 Resources for teaching and learning[10]

We already referred to the example of the water pump, shown in Figure 13, which can obviously be brought to bear on the teaching of a variety of physical principles,

Figure 15: A local solution to water filtration.

such as the principle of the lever; the role of atmospheric pressure, which limits the depth to which one can access ground water resources to approximately 10 meters; the principle of communicating vessels as it applies to water distribution systems, bringing in perspective at the same time the role of gravity. Pumps can be studied *in situ* as well as using models, allowing the function of specific parts to be studied and experimented with. Questions of care for and maintenance of pumps will come up (for instance, pumps in Luozi are used only during certain hours of the day to ensure that they last longer), providing an opportunity to link the issue to that of each individual's social and communal responsibility to care for shared resources and infrastructure. The issue of purity of water, its connection with the transmission of diseases, and its importance for health and hygiene were already mentioned in the previous section, as were the different sources of contamination. Processes to purify water, such as by filtration (Figure 15) or distillation, or to turn impurity harmless, such as through boiling or chemical treatment, are important opportunities to develop deep understanding of the complex connections between water and life. The role of water in preparing food is yet another connection in this regard (see for instance Figure 16).

Figure 16: An example of the life sustaining uses of water. The tubers of the manioc plant must be treated with water for three to four days before they can be used for human consumption.

Elisabeth Matongo is the director of the Ntoto-Ndombe 2 primary school in Luozi. Every day, when the school starts, she plays the drum and sings, creating a pleasant atmosphere and making the children feel comfortable. The instrument she uses (Figure 17), and many other musical instruments and sound producing devices that are present in the local culture, could be used for more than the immediate purpose for which they were invented. Sound surrounds us everywhere we go. It is among the most vital means through which humans communicate. It is thus important to understand how sound is made (e.g. the function of the stretched membrane that covers the drum), how sound propagates, how it can be amplified so that more people can hear it

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[9] As we present the ideas below, we also wish to draw attention to available sources that can serve to further inspire the proposed project. We particularly refer in this connection to the New UNESCO Source Book for Science Teaching at http://unesdoc.unesco.org/images/0000/000056/005641e.pdf and the listing of resources specified on the Exploratorium Web site at http://www.exploratorium.edu/ti/resources/.

[10] Part of these ideas were developed dialogically during a conversation between Jan Visser and Meta Mobula.

(the function of the wooden sound chamber, the encased column of air underneath the membrane), how our own bodies relate to the sounds we produce when we speak or sing, how different sounds combine to create sensations that interact with our emotions, and how our ear is designed to allow us to perceive and appreciate sounds over a broad spectrum of frequencies and ranging from very soft to very loud. This is an area where children and adolescents, as well as adults, can experiment and play at liberty, finding things out, both for themselves and collaboratively, not only in terms of how things such as musical instruments work and how nature (including our body) works, but also how it all relates to our sense of beauty and harmony and to our ability to express ourselves through music and dance.

Something as simple as walking on a bridge (Figure 18) can be an exciting opportunity to increase one's understanding – understanding with the entire body, not just the brain – how forces balance each other out and how, while we walk, we constantly adjust the position of our bodies and of different body parts, making minor adjustments to the center of gravity of the body, using the railings on each side of the bridge as an aid to stabilize ourselves. Again, a great opportunity for experimentation and observation, for recording of observations through verbal description and by making drawings, discussing them and advancing one's knowledge under the guidance of teachers who are themselves conversant with their environment. An opportunity also for

Figure 17: Elisabeth Matongo plays the drum at the start of each school day.

Figure 18: Equilibrating forces while walking over a bridge.

experimenting with different designs, finding out what works better among different alternatives and why this is so, i.e. what principles are at stake that explain, or could even predict, why a particular design for a bridge is better than another one.

Agricultural practices (Figure 19), with different degrees of development and sophistication, can be found in the vicinity of almost all rural schools in the DRC and children are often familiar with these practices also from home. Their presence in the local environment constitutes an excellent opportunity to explore and develop important biological concepts, to discuss issues of nutrition, of agricultural science and technology, and of the different uses of plants and their different parts. The manioc grown on the field depicted in Figure 19 is of a variety that has enhanced resistance to the mosaic virus. The crop is visibly richer than what can be seen on fields where other varieties are grown. Plant selection is thus among one of many issues that can be discussed during a field visit. So are the mechanisms through which infection

Figure 19: Crop growing (manioc)

can be carried from one field to another and thus of measures to be taken to avoid the spread of plant diseases. The distinct nutritional value of the manioc leaves, which are rich in protein, and the tubers, which are rich in carbohydrates, of the plant is another issue of interest as is the occurrence of cyanogenic glycosides in the tubers of the manioc, usually present in high concentration in manioc that grows on the poorer soils so as to protect the plants from insects, but highly toxic to humans, whence the need for rigorous practices to detoxicate the tubers before use. Agronomic practices such as crop rotation, crop sequencing, and mixing crops are also to be explored. Yet another link can be made with different aspects of commercialization of raw or processed agricultural products.

Figure 20: Manioc (left) and sugar cane (right)

Other plants, such as sugar cane, offer different opportunities for exploration. Figure 21 shows diverse technologies involved in the process of transforming sugar

Figure 21: Transforming sugar cane into alcohol, using local technologies.

cane into alcohol. A press (yet another use of the principle of the lever) is used to extract the sap from the cane and fermentation is allowed to happen over time at a temperature held constant by burying the container in which the fermentation takes place under a cover of dried leaves. The different uses of alcohol can be discussed in connection with this exploration, including its abuse, thus also providing scope for the discussion of the ethical aspects surrounding the commercialization of a product that can be used for socially acceptable and useful purposes as well as abused. Another possible sideline is to look at the different degrees that a product like alcohol can affect the human body, depending on its volumetric size and not its linear size, whence the much greater impact of alcohol on children as compared to adults.

Palm oil is used in many local dishes.[11] It can be extracted from the fruits of the oil palm tree (Figure 22) through relatively large scale industrial processes[12] as well as through village-level manually operated processes. The latter involve the use of a so-called "*malaxeur*" (Figure 23), a piece of locally fabricated machinery that requires the force of more than one person to drive the rotation of the central axle, pushing both extremities of the large handle at the top. This

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[11] http://www.congocookbook.com/ documents many of them.
[12] http://www.congo-pages.org/BANDUNDU/PALM_OIL.htm documents photographically the various stages of the process and the (sometimes old) machinery involved.

is a perfect example for the study of how work can be performed by distributing the force required for it differently. The exploratory study of the construction of such a machine and its workings is therefore a most interesting instance of case based learning. It could be enhanced posing questions such as how the construction could possibly be improved or what other means might be devised to extract oil from the palm nuts.

Figure 22: Palm nuts.

As the process in the *malaxeur* is executed by adding water to the palm nuts while they are being crushed, the product that emerges from it contains water as well as oil. The oil is subsequently separated by heating it so as to let the water evaporate. This brings into perspective of the learning process the phenomenon of evaporation as distinct from boiling. Also, one sees how different liquids – oil and water in this case – behave differently at the same temperature.

More complex levels of exploration are possible as the palm nut has different parts that serve to produce different qualities of oil, *huile de palme* and *huile palmiste*. Besides, palm oil, in addition to its use as cooking oil, can be further transformed into soap. By-products of the process of oil extraction described above can be used to feed animals and to serve as fuel.

Figure 23: Two views of the "malaxeur."

Figure 24: By-products of the production of palm oil

The whole area of activity referred to above can lead to further discussion of processes of income generation, the use of micro-credits for the development of village-level industry (with important connections to developing arithmetic competency), and the study of processes of commercialization and marketing (with great opportunities for simulation and role playing and attractive connections with the development of communication competency).

One of the principal needs mentioned by teachers and educational administrators during our visit was the lack of "didactic materials." There is indeed a clear lack of the kind of learning support materials one would find in any minimally equipped school in wealthier parts of the world. We would be the last to claim that it is unreasonable on the part of our interlocutors that they should desire

Figure 25: Boats on the river Congo: An important means of transport as well as an opportunity to learn about what keeps them afloat and the application of the principle "action = reaction" in pushing them forward.

Figure 26: Even something as simple as a bench to sit on can be turned into an object to explore the basic principles of construction; equilibria between forces; and the effects of gravity.

such resources. However, we have also seen – and hope to have made clear above – that at least a number of the problems resulting from the absence of traditional learning support materials can be overcome through the use of resources immediately available in the environment in which the schools function, whence the alternative instructional strategies proposed in this report.

Clearly, there is significant variation across different environments. In no way would it therefore be possible to devise a standard package of solutions for the instructional problems encountered by teachers and the learning problems faced by their students. Instead of developing such a standard package of solutions, the proposed project strategies should focus on creating something more useful, namely the development of competency to identify relevant resources and skills as well as creative imagination to transform such resources into workable opportunities for teaching and learning. Such a formative effort, while naturally targeting the teachers, should equally focus on the development of similar abilities in children and parents, considering that everyone learns and everyone who loves, takes on responsibilities for the learning of others.

3.1.4 Life skills

The UNICEF project "*Éducation aux compétences psychosociales*" has resulted in the development of print-based materials that include teachers' guides; training modules for teachers; guides to use for meetings with parents; a collection of children's games; a generic methodological guide; and a synthesis document, describing the background of the project, its philosophy, how it developed, what its objectives are, what different people have said about it, and what its future perspectives are.

The project focuses specifically on the development of 11 competencies, namely the capacities to:
- Communicate.
- Think critically and to translate such thinking into action.
- Identify and resolve problems.
- Clarify values.

- Be creative and take initiative.
- Adopt a life-style conducive to overall well-being.
- Express and manage one's emotions.
- Recognize and manage stress.
- Entertain quality interpersonal relationships.
- Be self-confident.
- Respect the environment and the common good.

There is a clear emphasis in these competencies on social behavior and self-management, capacities that nicely merge with and complement those implicit in the project activities discussed previously.

Prof. Orner Kutumisa Kyota, Minister of National Education, says in an introductory statement about the approach taken by this project, "Elle a la particularité de stimuler la capacité de l'enfant à apprendre par lui-même, à découvrir ses aptitudes et ses limites et à chercher des solutions adaptées à chaque situation." This same approach underlies the proposals advanced earlier in this report. It is therefore logical to consider the *Projet "Éducation aux compétences psychosociales"* part and parcel of the complementary instructional strategies to be piloted. In this case one does not have to start from scratch, nor does one have to reinvent the wheel. Here is an opportunity to build on the significant work already undertaken by others, particularly the national specialists involved in the UNICEF-facilitated effort by the Ministry of National Education. Doing so can only strengthen the viability of integration of the earlier described proposals within overall national policies and strategies.

So much work already having been done, the pilot project should focus in the life skills area on enhancement of the effectiveness of the materials produced, using multiple technologies in a multichannel learning perspective, working closely with those involved in the original project, ensuring complementarity and synergy.

3.2 Technology use

The analysis presented in this report should have made clear that technology is rarely an end in itself. Most certainly, in deciding about how to develop the human condition technology cannot but be a means towards an end. It is thus necessary to answer one of the original questions presented in this assessment:

> [If] technology [is] the best way to facilitate/enhance the required learning, what specific technology would best do the job, and in what way(s) can it best be employed?

The ICTs that are available to support the complementary instructional strategies proposed in this assessment could include the installation of a fully fledged community learning telecenter or the launch of a traditional IRI program. However, to propose one type of intervention over the other would limit the impact of each. A community learning telecenter alone would limit capacity building from occurring outside the center and a strict IRI approach would, for example, deny teachers the tools with which to access information and produce their own materials for different media. Additionally, the infrastructure limitations in a place like Luozi are such that it is near impossible to predict what types of ICTs will take root and which will not. Thus, as already mentioned briefly in an earlier section, the authors propose that a strategic hybridization of technologies, such as between community radio, using diverse audio formats, and telecenter

models, be piloted in Luozi. Specifically, this would include the use of instructional support media and interventions such as:

- a community radio station, most likely working in the FM band, supported by WorldSpace technology
- the installation of a limited number of computers and the provision of rudimentary Internet connectivity (possible options to be considered: a high frequency packet radio link with Kinshasa and multimedia download from WorldSpace)
- production of programs in diverse audio formats
- distribution of solar powered and/or hand-cranked radios and cassette players to the schools, and
- provision of resource/tool kits to schools and community centers.

These interventions should be experimented with and the community should then decide whether to discard or add any technologies depending on which ones are best received and become effectively integrated in the local environment.

This proposed hybrid model should be explored particularly as a means to support the establishment of communities of practice among teachers. The development of such communities of practice is not exclusively dependent on the presence of ICTs though. They can start off on a face-to-face basis. The community radio station, particularly if combined with any possible level of interactive communication, could greatly enhance their functionality, allowing ideas and experience to be exchanged among teachers in geographically separated areas that may be interestingly distinct in a range of defining characteristics, thus allowing any exchange to become more meaningful and generative of creative insights. Moreover, building of Web-based resources to support one community of practice makes such resources also available to other communities. It should be noted, though, that during the initial financial period of the pilot phase only a very modest level of technological sophistication should be expected.

Finally, it is important to note that technology in the framework of the complementary instructional strategies proposed in this report is probably best seen in the context of broad needs of the DRC in terms of developing its infrastructure in general. In doing so it is wise to have in mind that tomorrow's world will be different from today's and yesterday's world, among other respects in terms of the means that will be employed to respond to the needs of human beings to learn. Increasingly, those needs are no longer solely being satisfied in the context of school-like infrastructure. Greater autonomy is expected on the part of the learners whereas teachers will more and more have to rely on their capacity to facilitate rather than to direct learning. The developments and ICTs proposed in this report take such a long-term perspective into account.

3.3 Proposed activities

Based on the findings presented in this assessment, the authors propose the following set of activities to be implemented in the Luozi territory in the area of teacher capacity building (through a train-the-trainer model) and development and dissemination of learning materials at the primary level:

- Identification and elaboration of an inventory of local problems (such as in the areas of health, nutrition, and agriculture) and locally developed technologies that can inspire problem-based learning in and outside the classroom.

- o Output: Inventory of relevant local problems and locally developed technologies, constructed such that new problems and technologies can be added as needed and appropriate.
- Selection of a limited number of these problems and technologies to inform a first pilot intervention, resulting in the development of complementary instructional strategies in support of the national curriculum.
  - o Output: Teacher resource packages (number to be determined) to support and strengthen pedagogies under the national curriculum geared towards building capacity to interact constructively with problems. Completed training of teachers (and other facilitators of learning) in the development and implementation of these instructional strategies.
- Dissemination of life skills (social behavior, self-management and problem management) modules via a mix of radio formats.
  - o Output: Modules adapted, radio programs produced and broadcast (number to be determined).
- Establishment of a community of practice for teachers supported by a community radio station and basic digital technology.
  - o Output: Self-generated initiatives to support colleagues and use the support of colleagues in developing new teaching methodologies.

Throughout the implementation of these activities a strong emphasis on gender issues and equality will be ensured. A project description with accompanying work plan will complement this needs assessment.

3.4 Phased project development

The tasks to be undertaken, based on this needs analysis, are of a formidable size and of considerable complexity. We have earlier stated that a guiding principle should be that the project be developed in a formative manner, learning from experience while one moves forward. By necessity this implies that the project should be planned and implemented in a phased manner with relatively well defined inputs and processes for the first phase and a deliberately less well-defined planning for subsequent phases, allowing the latter to be more rigorously planned only after formative evaluation data have become available regarding the implementation of the prior phases.

Eyragues, France, and Washington, DC – March 1, 2003.