INTRODUCING CONFINED MASONRY IN A FRAGILE STATE: THE CASE OF HAITI AFTER THE 2010 EARTHQUAKE

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Abstract

A majority of common low-rise buildings in the big cities of poor countries is built by small-scale contractors without the involvement of civil engineers. Earthquake risk reduction can only be achieved if these builders and their workers are trained properly and if the society in general is made aware that safer construction is possible and affordable.

The present paper will show how SDC's Competence Centre for Reconstruction (CCR), created in the aftermath of the 2010 quake, helped to introduce confined masonry in the country, in collaboration with the Ministry for Public Works and the National Institute of Professional Training.

We will show the process of introducing and promoting the technique over the last five and a half years, focusing on the development and adaptation of the training and communication material in relation to the various target publics. The paper will demonstrate that possessing the right technical knowhow is but a first step of a long process. The main effort goes into the knowledge transfer process: i.e. how to identify the right target public and the right means to reach that public, how to make sure that the knowledge remains with the target public and finally, how to ensure that the knowledge is requested by the market (i.e. working on the demand side).

The paper will conclude with a number of lessons learnt. These are useful for any organisation interested in introducing a new construction technique in a country, whether it's confined masonry or not.

Keywords: Training; developing country; confined masonry; communication; knowledge transfer

1 Introduction

Over the last decades, many praiseworthy efforts have gone into the training of engineers in earthquake-resistant construction techniques, in both rich and poor countries. Contractors and workers on the other hand, particularly in poor nations, are left on their own to seek training where they can, mostly within their families or neighbourhoods, very rarely in professional training schools. Yet, it is them who build the low-rise residential areas of the cities and they do it generally with little or no involvement of engineers.

Now, if engineers are not involved in the construction process, and contractors and workers don't know about earthquake-resistant building techniques, how can the vulnerability of the common urban building stock ever be reduced? Awareness building among the general public and the building professionals, as well as the training of workers and small-scale contractors are key issues to be addressed.

The strategy of the Competence Centre for Reconstruction (CCR) for introducing Confined Masonry to Haiti is defined by four key elements: ***1. Knowledge availability:*** Possessing the appropriate and solid technical know-how; ***2. Knowledge transfer:*** Identifying the right target public and develop the right means to address it; ***3. Knowledge retention:*** Ensuring that the knowledge is well anchored in the society and country; ***4. Knowledge request:*** Working on the demand side to make sure that the know-how is requested by the market forces.

2 The Haitian context

The earthquake of 12 January 2010 caused 1.5 million people to loose their homes. The quake (M 7.0, depth 13 km) has revealed an important lack of seismic construction know-how of all actors involved in the construction process. It has shown the importance and urgency of building up a seismic culture by educating the persons involved in the construction process at all levels, from engineers to contractors, from architects to authorities, but most of all by training those who do the physical job of building, the workers.

Most of Port-au-Prince is made of low-rise one and two storey buildings, either self-constructed or built by small-scale contractors without any involvement of engineers. Until the quake little or no effort had been made to tackle the lack of technical education of these persons responsible for 80% of Port-au-Prince's built environment. By consequence the quality of most of the common urban building stock, hence its resistance, is very low [4].

The extent of the damage caused by the earthquake and the amount of houses to be rebuilt prompted the national authorities to review building standards and codes in Haiti. However, introducing official construction standards is of little value if they are not implemented and properly enforced by the authorities. In a country with extremely weak state structures, with little power to enforce rules, the only way to promote better building practices is through widespread training and information campaigns. The main challenge in such an endeavour is bringing basic engineering know-how to the workers and the public in a language that they can understand, and working at bridging the communication gap between engineers and masons.

2.1 Choice of an appropriate construction technique

Although there are many ways to improve earthquake resistance, most of the methods are beyond the financial and technical capacities of a poor country like Haiti, particularly when it comes to low-rise housing for ordinary people. The choice of the most appropriate technique depends on a variety of factors: the availability and cost of construction materials, the know-how of local builders and last but not least government approval.

In Haiti where the earthquake had struck an urban area with a majority of buildings made of unreinforced concrete block walls or reinforced concrete frames with infill walls, any earthquake resistant reconstruction techniques would have to be based on these same materials and existing know-how. Shortly before the earthquake the Haitian Ministry of Public Works (MTPTC) had opted for the Confined Masonry technique as the most appropriate solution to increase the earthquake resistance of the common building stock [5] .

2.2 Partners

Being a government agency, the Swiss Agency for Development and Cooperation SDC decided to support the ***Ministry of Public Works*** (MTPTC) and the ***National Institute of Vocational Training*** (INFP) in their efforts to promote safe construction practices. It did so by creating a ***Reconstruction Competence Centre*** (CCR) focusing specifically on the training of workers in the confined masonry technique (through INFP) and on the promotion of this technique through information campaigns aimed at the public in general (through MTPTC).

In Haiti the training of "building technicians" (rather than masons) is done at college level in public and private institutions coordinated by the INFP. Simple masons are supposed to learn their job by working on building sites. Further education schemes for adult masons with some years of practical experience did not exist before the earthquake. Despite INFP's lack of know-how in further adult education, the CCR decided to work with this institution because of its national character, which would allow for a nationwide impact of the proposed training in confined masonry. This choice would also ensure that the diplomas distributed at the end of the training would be recognised in the whole country.

While working with INFP to define the rules and regulations for adult training (e.g. finding solutions to avoid written exams for illiterate adult masons), the CCR got in touch with ***international agencies*** (such as ILO and UN Habitat) and ***Non-Governmental Organisations*** (NGOs) involved in large scale reconstruction projects to start training of their workforce on their building sites (fig. 1).

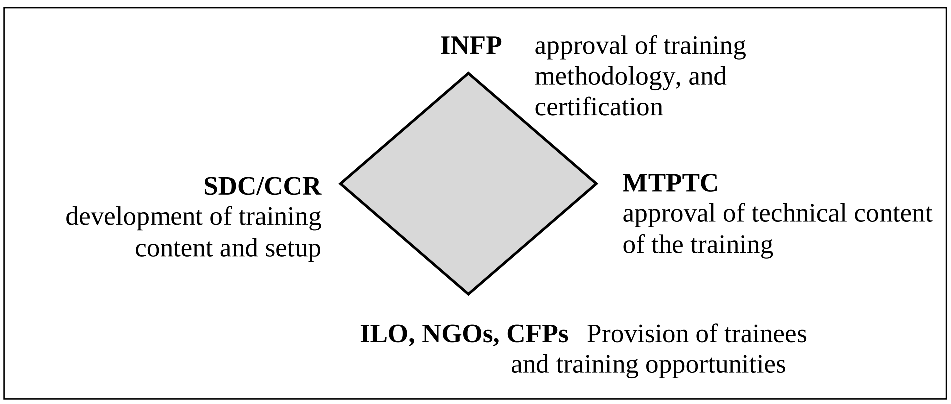

Fig. 1: Roles of each partner in the training setup

3 Training of masons

The initial training setup targeting experienced masons was based on an equal division of classroom theory and outdoor practical exercises and was given in an unused training facility belonging to INFP, in Petit Goâve two hours west of Port-au-Prince. Four engineers/building technicians (2 by INFP, 2 by CCR) were recruited, trained and familiarised with the training material. They would be the first batch of trainers and work in pairs, an engineer for theory and a technician for practice, so as to complement each other.

3.1 Training in classrooms with out-door exercises

Trainees were divided into batches of 20-25 persons. An admission test was established to ensure that only experienced masons would attend the training. A full-fletched training course would last 6 weeks or 240 hours as requested by INFP standards.

A complete confined masonry course in 16 PowerPoint lessons[1] (fig. 2a) was developed and resumed on

[1] Lessons: 1. Earthquake basics, 2. Site selection, 3. Form of building, 4. Reading drawings, 5. Confined masonry basics, 6. Tracing building outline on site, 7. Foundations, 8, Reinforcement, 9. Additional reinforcements, 10. Concrete, 11. Concrete blocks, 12. Masonry, 13. Stairs, 14. Light-weight roofs, 15. Concrete slabs, 16. Retaining walls

posters put up on the classroom walls (fig. 2b) to allow participants to discuss specific slides and issues after the lessons. Practical out-door lessons (fig. 2c) represented 50% of the training time.

Fig. 2: a) PowerPoint lessons, b) posters presenting all PowerPoint slides and c) practical exercises

Trainees had to pass ongoing assessments carried out by the CCR trainers throughout the training, a condition sine qua non to attend the final exams which were carried out by INFP and which lasted for a whole week. The evaluation process followed the same approach as the course and was tailored to adults with a variety of schooling background. Both theoretical and practical knowledge were tested, the first by answering questions asked by the examiners and by commenting pictures (fig. 3a) and the second by building a small test piece (fig. 3b).

The fact that simple masons did have the opportunity to receive a nationally recognised diploma was a major outcome of the training programme. CCR insisted on organizing a formal graduation ceremony for each batch, which was hugely appreciated by the masons who for once felt officially considered (see dress code on fig. 3c)!

Fig.3: a) Oral exams, b) practical exams and c) award ceremony

3.1.1 Three-dimensional teaching aids

Because the training was intended for adults with no or very little formal education it was essential to make it interactive with as many practical demonstrations as possible. A wide range of three dimensional demonstration objects (fig. 4), practical exercises and group games were developed to explain technical and scientific concepts in a simple way. A similar mix of educational tools was a novelty for many students as well as teachers, all used to traditional but not very effective front teaching.

Two types of demonstration objects were developed: those showing the final result to be achieved (fig. 4c+d), and those showing the process (fig. 4a). Over time we found that only the teaching aids showing the final result were used by the trainers. Explaining mechanisms or structural behaviours required too much three dimensional and dynamic imagination, even for the trainers.

Fig. 4: 3D demo objects for classroom training: a) Role of ring beam, b) how to read cross sections, c) full scale model of reinforcement (oprepared by BuildChange), d) 1:10 scale model of reinforcement)

3.1.2 Printed material: posters and manual

It soon became evident that the theory part in the classroom had to be reduced drastically. Learning by doing is much more effective than looking at PowerPoint slides, even if well presented. By consequence, the PowerPoint lessons were transformed into simple A3 sized plastic coated posters with little text (in Creole), which could be used directly on building sites (fig. 5a). These posters were then assembled in a pocket manual [8] (fig. 5b) and distributed to all trainees. The same messages were also condensed in 12 big posters (fig. 5c), which could be used as well on building sites as in classrooms. The original PowerPoint lessons were later used for the training of trainers only.

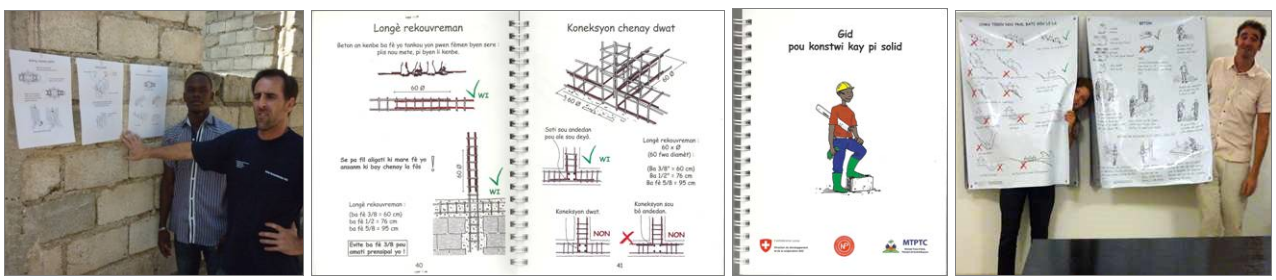

Fig. 5: a) A3-sized theory posters for building sites, b) masons' pocket guide and c) 3'x4' posters

3.1.3 Full-scale demo objects: the Monument

The practical part of the training was done in the schoolyard, through the construction of full-scale partial building models. The U-structure (fig. 6a) allowed for the training on masonry and the placement of the steel reinforcements and was demolished after each course. The Monument (fig. 6b, c, d) on the other hand was to remain (hence its name) as a permanent reminder of typical confined masonry details. Parts of reinforcement were left bare so that people could see how things looked like beneath the surface of the concrete.

Fig. 6: a) temporary U-structure, b), c), d) "The monument": a full-scale demonstration and training object

The monuments proved to be cumbersome, too costly and didn't contain all the details we wanted trainees to learn about. In later trainings it was replaced by the F-structure (see 3.3.1.).

3.2 Training on building sites

With the end of the emergency phase and with big reconstruction project being launched, aid agencies were more and more in need of skilled workers. Several NGOs turned to the CCR for training offering the houses to be built for the quake victims as training sites (fig. 7). This lead to a new training setup with 85% of the course time dedicated to practice. Theory in a classroom was reduced to one day per week, later to two morning hours on the building site. The course duration was extended by one week (7 weeks including exams) to allow for the completion of all masonry work on these small one and two room houses. Working on a proper building site even allowed participants to receive a small salary, reducing the number of dropouts who couldn't complete the course because of their need to earn an income.

Figure 7: Training on building sites of small houses for the victims, provided by NGOs

3.3 Training at Professional Training Centres combined with the training on building sites

With the end of the reconstruction phase and the departure of many NGOs the possibilities to train masons on real building sites decreased rapidly. It became also apparent that the training on building sites had some disadvantages: the training on the correct execution of construction details was limited to the details available on that site (usually small houses with light-weight roofs and no concrete slabs or stairs) and the time and financial pressure on a real site did not allow for the correction or demolition of badly executed details. Furthermore, it was necessary to think about the survival of the training in the long term and to find a player able to ensure the continuity of the programme.

The CCR training programme went back to INFP's *Professional Training Centres* where it had started, with the aim of 'bringing the building site into the classroom' for both the training of young technicians and for the advanced training of seasoned informal masons. In order to respond to the limited financial resources of the Training Centres, a standardized training structure (a so-called F-Structure, see below) was developed to allow for low cost trainings with mostly re-usable material. CCR paid for the initial construction material and the Centre would then use the course fees to pay for material that has to be replaced.

After an initial 3-week training on the F-structures, the trainees would go on a construction site for another 3 weeks to apply and deepen their know-how in a real setting (for example by making use of SDC's school construction programme which includes a guard's house and a water tower in each school).

3.3.1 Creating the re-useable F-shaped training structure

The initial U-shaped training structure allowed only for practising L-connections and masonry with toothing. The later F-shaped training structures allowed for both L and T-connections (fig. 8). A first version consisted of a concrete plinth beam with four vertical re-bars sticking up in every corner (fig. 8b). Trainees then had to add the vertical reinforcement cages and fill in the concrete blocks for the wall panels. It soon became apparent that trainees had difficulties distributing the concrete blocks in such a way that the joints would not be larger than 1 cm and the toothing towards the vertical ties not bigger than 8 – 12 cm.

In order to provide more diversified exercises in distributing and cutting the cement blocks, the F-structure was modified by replacing the vertical connection bars imbedded in the plinth beam with holes drilled at various distances in the plinth beam (fig. 8c showing a small-scale model). This allowed for different placements of the vertical connection bars, and thus for different wall lengths. For Professional Training Centres where the F-structure had to be built indoors, a further version was developed where the concrete of the plinth beam was replaced by a sand-gravel mix contained by the timber formwork (fig. 8d). Through the use of easily removable mud-sand mortar for the masonry the F-structure had finally become a completely reusable exercise facility responding perfectly to the very limited financial resources of the training centres.

Figure 8: a) The F-structure, b) fixed vertical reinforcement with masonry and seismic bands reinforcement, c) model with holes in the plinth beam for variable wall lengths, d) re-useable material for the plinth beam.

4 Training of trainers

International organisations and NGOs involved with large-scale reconstruction projects were faced with the growing need to train the masons of their building sites. To be more effective they had to have their own trainers. Therefore, after the first two years of direct mason training SDC's *Competence Centre for Reconstruction* redirected its efforts to the training of trainers. In addition, with the Ministry of Public Works putting forward confined masonry as the official reconstruction technique for housing, existing public and private Professional Training Centres (CFP) needed to include confined masonry into their college level education curricula.

Thus, two types of trainers were needed and had to be trained: a) independent trainers in both the confined masonry technique as well as in the art of adult education so that they could train the masons on NGO building sites, and b) teachers of the Professional Training Centres in the technique of confined masonry so that they could train their usual college level students.

The training of trainers evolved over time. The initial 4-week basic course followed by a 3-week practice (75 hours during morning hours) proved to be insufficient, even for graduates of the centres. The program had to be extended to 12 weeks, divided into two equal parts of 6 weeks. The first part dealt with the technical aspects and ended with the construction of a complete F-structure while the second part focused exclusively on the pedagogical aspects including the key elements such as the evaluation of the trainees acquired know-how.

By spring 2016 about 70 trainers have learned to master and teach the confined masonry technique. However they were still not officially recognised by INFP. This is particularly worrisome for independent trainers who are not employed by the official training centres. The challenge ahead is now convincing INFP to set up a proper diploma for confined masonry trainers, and creating a nationally recognised pool of trainers from which companies and organisations can draw trainers when needed.

4.1 Material for classroom lessons

The 16 PowerPoint lessons with special comments for trainers were handed out to the participants, together with other tools such as posters (for when there is no electricity) (fig. 9a) and small-scale models (fig. 9b+c). An additional manual (fig. 9d+e) offering a collection of practical exercises was part of the package. However, as with the 3D teaching aids, a majority of these exercises were never picked up by the trainers. The problem probably lies with the way the manual is done: too detailed, too much text and requiring too much work from the trainers to get all the necessary material for the exercises (a difficult job in a country where specific material is hard to come by and money is always a problem).

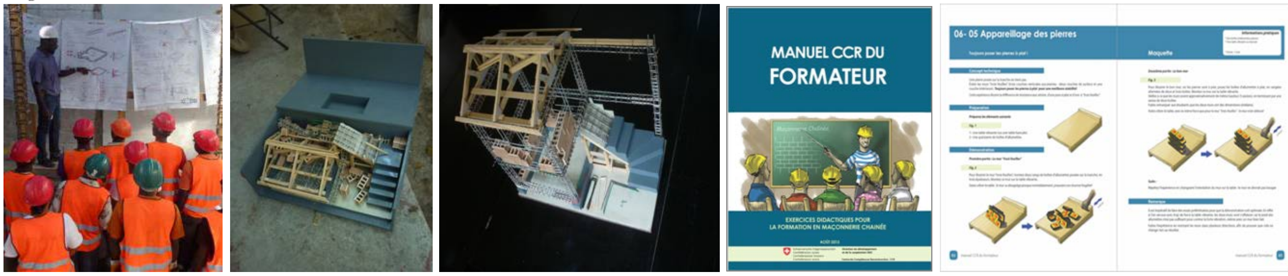

Fig. 9: a) Training with posters, b), c) models in boxes for safe transport, d), e) a collection of practical exercises,

4.2 Practical training through the construction of a complete F-structure

While the training of students or masons is done on a re-useable F-structure, the practical training of trainers offers the opportunity to build an F-structure complete with stairs (fig. 10b+c), a lightweight roof (fig. 10b), and/or a slab (fig. 10c), This new 'monument' is built outside, in the schoolyard, and serves as a reference object for future trainings. A model in a box is used for classroom lessons and public information campaigns (fig. 9b+c).

Fig. 10: a) F-Monument , b), c) with stairs, light-weight roof and concrete slab, d) critical details apparent

4.3 Follow up on Professional Training Centres (CFPs)

Despite the active participation of some of the training centres during the initial stages of introducing confined masonry into their curricula, it became apparent that the quality of the teaching decreased seriously over only a few months. Trainers tended to fall back on their old habits, forgetting much of their newly acquired skills. It was often the lack of funds that would not allow them to buy another batch of construction materials with which they could provide the agreed practical training.

Together with the development of entirely reusable F-structures for training, SDC decided to support the more active CFPs with some initial funding for tools and long lasting materials (e.g. good quality wooden planks for formwork). Most of all however, it was decided to accompany the training centres for another two years, through regular visits and refresher trainings. Trainers were assisted in organising short training sessions for external technicians (graduated students and informal masons) so as to consolidate their competences. Once more it became apparent that one-off training sessions cannot ensure lasting know-how. Cultural changes take a lot more time than donors and aid agencies like to admit.

5 Knowledge retention: from institutional validation to a national program

During the reconstruction phase, national institutions (MTPTC and INFP) were overwhelmed by the situation and the vast array of activities of international partners. The Ministry of Public Works (MTPTC) ended up validating different contents that were not necessarily compatible between themselves and the National Institute for Professional Training (INFP) issued diplomas for trainees who had followed very different training programs. CCR set up a Coordination Platform under the lead of INFP, gathering the major actors involved in confined masonry to standardize the training contents and elaborate a new national program in confined masonry and good practices. Four documents were produced: a Training Program, a Pedagogical Guide, an Evaluation Guide and an Organizational Guide. The process was slow and took a year to complete. It resulted in a comprehensive 16 module program with a heavy focus on practice.

6 Working on the demand side

It is quite pointless training people in the use of a new technique if in the end nobody is interested in using it. From the very beginning it was clear that much work had to be done on the demand side. But it was also clear that the confined masonry technique had to be known and a trained workforce had to be available before people would be able to start to use it. There is no point in trying to sell a new product if it's not yet there.

It was decided to act at various levels: Sensitizing the general public and self-builders, introducing engineers and architects to this new technique, and convincing donors to introduce clauses into their contracts with local enterprises that a certain percentage of trained masons must be employed on the building sites they were financing.

6.1 Information campaign

The information products developed by the Reconstruction Competence Centre targeted both a general and a professional public. CCR's key product is a calendar in which the correct construction details of confined masonry are explained in a simple way, using mostly pictures and little text. It was developed and adapted to local habits over three years, with the same messages but changing graphics (fig. 11a, b, c), and was eventually transformed into pocketsize booklets used as aide-memoire for masons during training. Later versions covered related topics such as "Knowing the risks of earthquakes and cyclones" (2014) and "Recommendations for all who want to build (2015)" (fig 11d) dealing with site selection, legal matters, permits and quality control.

Figure 11: a), b), c), d) Technical calendars both for a general and a professional public,

Together with the *Ministry of Public Works* and other partners such as UN Habitat a communication platform was created in order to manage a widespread information campaign and which would reinforce the authorities' key role and lead image. A series of billboards (fig. 12a+b) were placed in strategic locations throughout the city for several months, displaying key aspects of safer construction techniques.

Figure 12: a) + b) Billboard campaign throughout the capital, c) leaflets for office and neighbourhood walls

Tabloid sized leaflets (fig 12c) in the same graphic style were placed on neighbourhood walls (just like election posters) or in NGO and administration offices. Each series focused on a particular aspect of construction that is often executed below standard. NGOs transformed them into wall paintings, anticipating the next step in the campaign (fig. 13).

Figure 13: Wall paintings done by neighbourhood organisations

Two TV spots (fig. 14a) were produced for information campaigns targeting the general public. However, as the project had been developed without prior consultation with potential TV stations, the TV spots have not yet been aired. They are nevertheless used in information campaigns organised by private or state actors. Another idea, printing the 'instruction for use' on cement bags (fig. 14b+c), has been taken up enthusiastically both by the *Ministry of Public Works* and the cement producers. Unfortunately during the printing process the mixing ratios have been perverted (a bag instead of a bucket of cement) and alerts to the Ministry and the cement producers have not yet led to the correction of this error.

Figure 14: a) TV spots, b) + c) 'instructions for use' on cement bags

6.2 Outreach activities

To sensitize the general public, awareness-raising activities have been launched through various partners. Special information days have been set up with municipalities where people can get information on administrative as well as technical issues related to construction (fig 15b). Construction fairs were other occasions where information was made available to the general public. CCR trainers are present on these occasions, distributing printed material and explaining technical issues with the aid of full-scale and reduced construction models.

The *Ministry of Public Works* has launched a "Constructobus" touring the country to raise awareness for the safer confined masonry construction technique (fig. 15a). An international cooperation agency is using a similar bus with the same aim. Both are heavily relying on the information material (printed material, models and short films) developed by the CCR.

Fig. 15: a) Ministry of Public Works' "Constructobus", b) distribution of material at info days, c) training at universities

In collaboration with an NGO risk reduction and good construction practice information days are offered in schools, with the intention that the distributed information material may reach the parents of the children.

6.3 Training of civil engineers at university level

In order to popularize confined masonry, civil engineers have to start using this technique in their buildings. However, for a humanitarian organization such as SDC with no proven record either in the teaching or in the scientific sector, convincing professionals is difficult. The *Haitian Association of Engineers and Architects* (CNIAH) has been contacted in 2011 to find a way on how to approach these professionals and how to create a system which would allow this professional association to ensure the training of the workforce on their building sites. The CNIAH would be the best institution to promote safer construction standards through their members. Progress has been slow up to now.

It was decided to approach the faculties of science of various universities to offer practical introductory courses on confined masonry to their students (fig. 15c). After some initial reluctance (civil engineers did not want to mix concrete, build walls and bend rebars) these 25hrs practical training through the CCR trainers, using the same F-structures as in Professional Training Centres, have become quite a success and some universities have integrated them in their curricula. In order to reduce the communication gap between engineers and masons, the universities insisted in using the same language that was used with masons. Visits to construction sites complete the training. In the mean time universities have started to organize visits to building sites on their own, quite a revolution in a country where professors and students are not used to look beyond the walls of their faculty.

7 Lessons learned

Teaching safer construction methods to workers and small-scale contractors as well as sensitizing the general population are important aspects of Disaster Risk Reduction programmes. Experience has shown that such efforts are cost-effective: A few training experts can have a major lasting impact at ensuring safer local construction.

Employing the right people: Introducing a new construction technique is less of a technical than of a communication issue, especially in countries with weak state structures. If authorities are not able to impose and control safer construction practices, the only way of promoting these practices is by sensitizing and convincing the population and the various professional players. Challenging old and improper ways to build is challenging the professionalism of each person involved in construction. Communication becomes a fundamental element of promoting better building techniques, more important than the technique itself. By consequence, a good technician with a solid experience (ensuring credibility among national professionals) needs to be paired with an experienced communication specialist with a fine ear for cultural differences. Creativity and out-of-the-box thinking are further qualities needed by that team to be able to find the most appropriate responses to the challenges ahead.

Ready-made training material: To be effective the training and information materials need to be prepared well in advance. The availability of proven training material [1] [2] [7], that only needs adaptation to the new context rather than re-creation from scratch, is of the utmost importance. Without an appropriate documentation from prior experience [6] it is also difficult to convince authorities of the need for training programmes and information campaigns and their feasibility.

Focus on a single technique: In order to avoid confusion in the heads of the workers and the population (and partners and authorities) training should focus on one single construction technique. In the case of Haiti this is confined masonry. Concentrating on only one system makes it possible to fine-tune the training methods and spend more time in the all-important campaign to inform the general public.

Adaptation of the training and info material: Building materials, the competence of builders, their mentality and the structure of the building trade can vary significantly from country to country. Illustrations therefore have to be adapted and documents translated into a local language. This does not only take time (including time to understand a minimum of the local context and culture) but also expertise both in construction techniques and in the handling of desktop publishing software. The produced material needs to be of a high graphic and content quality to mark a difference and to convince and seduce the target public at government, professional and general public level.

Identification of partners: Training and information activities are only effective when done in collaboration with local partners who have a stake in the programme and will ensure that the training and information reaches the target audience. Partners are needed at all levels, from the authorities which will ensure the official approval and mainstreaming of the technique, to local organisations to ensure implementation and a long term presence. Having several partners for different aspects of the programme can be an advantage in case one partner wishes to pull out of the programme.

Training methods: Masonry training should be as hands-on as possible. Theory is necessary but should be delivered in small doses, at a convenient time and in an appropriate manner. PowerPoint sessions should be limited to the training of trainers, except for short sessions illustrating the desired end result, or how things are done elsewhere.

Allocation of a correct time frame: The introduction of safer construction methods requires a cultural change, and cultural changes take time. Time rather than money is the critical factor. Time is needed to understand the local context, the reasons behind bad construction habits, the setup of a country's education system, its economic and social environment, its power and mechanisms to impose laws, and so on. Time is also needed to teach and to learn. Repetition is paramount to ensure longevity of knowledge. Rather than thinking in terms of months, in order to achieve results training projects should plan for years of active presence.

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