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Exploring the capacity building ladder

B. J. Reed (UK)

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Prompted by several visits providing support to universities in Africa, the author explores the challenges in delivering appropriate training to WASH professionals that is both accessible locally and sustainable in terms of time, finance, human resources and physical facilities. The paper explores the two extreme scenarios of short-term local training courses and longer-term educational programmes in training centres or universities. As educational theory (pedagogy) has a jargon that may not be understood by the WASH sector, analogies are used to compare course design with the use of the "ladder" model, in particular the design of household and centralised water treatment systems and the challenge of moving from one model to another.

Introduction

WASH projects require a variety of resources, including professional staff of sufficient quality and in adequate numbers; Numbers are easy to count but quality is harder to measure, especially as people take years to gain experience. Factual knowledge does not necessarily imply ability and professional status does not always indicate expertise in specific areas. Are there enough professional staff and do the professional staff have the right skills? Together the quantity and quality of staff available are referred to as human resource "capacity" and improving this resource is "capacity building" or "capacity strengthening". Many aspects of WASH have to address similar resource challenges of quantity and quality in a sustainable and efficient manner. In terms of quantities, some excellent small scale work may work locally, but can it be "scaled up"? Would thinking "at scale" to start with require a different approach? In terms of quality, do you apply high standards to start with (which may increase costs so limiting coverage) or go for a very basic service for all that can then be improved incrementally over time? This paper looks at some of these dilemmas in various aspects of WASH and considers how they can inform strategies for capacity building.

Centralised or dispersed water treatment: issues of scale

Increasing numbers can be tackled in two ways; starting small, with a pilot and scaling up processes that work, or addressing the larger scale directly. To explore this challenge, consider water quality. There are two extreme options: water can be treated centrally, in bulk, by experts, with good quality control and economies of scale. Alternatively water can be treated at the household level, by inexpert householders, with little quality control, problems of long supply chains and potentially poor sustainability. However Household Water Treatment (HHWT) is a valid response in some circumstances, such as:

- Areas with low population densities, remote areas or scattered communities;
- Temporary measures whilst centralised facilities are being built, extended or repaired;
- Emergencies requiring rapid response times, as filters or chemical doses can be distributed quickly;
- Specific customer requirements where targeted interventions can provide an additional barrier or higher level treatment that a centralised system does not meet; and
- Failing institutions, so empowering householders to manage their own water supply is a good option.

However, the HHWT option assumes water is present and is treatable. Local water scarcity may require bulk transfers of water so treating the water may only be a marginal additional cost compared to the distribution

costs. Chemically contaminated water is generally difficult to treat using HHWT methods, which can lead to long-term exposure problems, so centralised systems can provide higher standards. The challenge for water supply managers is deciding between these two options. There are intermediate levels, with self-supply and community managed systems, but at the extremes, the choices are clear. Cities go for centralised systems; mobile, dispersed, displaced people may require household systems. Differentiating between a short-term, immediate, flexible fix to the problem that requires a high level of user involvement with on-going operational costs and a longer-term investment that may be more sustainable and less dependent on individual actions but technically and financially more challenging can be hard, especially as the decision is coloured by non-technical issues such as budgets, budget periods, available expertise and political will. Alternative examples are the choice between on-plot sanitation and sewerage. Is hygiene behaviour altered by face to face meetings or mass communication methods? Individual, local, "bespoke" systems may seem more suitable on a micro scale, but an "off the peg" standard solution may be better on a macro scale. This is the difference between "scaling-up" from a small-scale pilot and thinking "at scale" from the outset.

The challenges of working at scale

On a visit to evaluate gravity flow schemes in Malawi, the author was shown a pipe bridge that had been washed away by recent floods. This prevented water reaching several thousand people downstream. The cost of repairs was in the tens of dollars range, with pipes and other materials being available locally, but transfer of funds and materials was proving problematic, partly because the systems normally required very little maintenance or spare parts and that the scale of the system shifted perceptions of ownership from local communities towards a wider "common good". A development NGO was working nearby and recognised that lack of water was a serious issue. Their remit was to work at community level and their expertise was not in large piped water systems, so they engaged a contractor to install a hand pump to replace the broken gravity-fed stand post. This was at the cost of hundreds of dollars and only benefited the immediate community, at a lower service level than a tap. From the local perspective this was a totally justifiable response; from a wider, longer term perspective perhaps a different action would have been preferable.

Centralised or dispersed services: incremental improvements

The question is not just about numbers, but also quality as large scale interventions may not meet everybody's needs. A single level of service may be too expensive for some but unacceptably primitive to others. The concept of "ladders" is very useful in demonstrating the variation between the simple, lower capital costs but lower service level of say, a pit latrine and the more complex, higher capital costs but increased benefits from sewerage. Ladders bring issues of quality and quantity together. They show how individuals and communities can improve services in an incremental way by taking small manageable steps.

Over the last 40 years, the number of steps on the ladder has increased. Before the advent of appropriate technology, the only options considered were highly technical networked systems of water distribution or sewerage. The promotion of VIP latrines and hand pumps in the 1980s provided alternative options but these two options still left missing rungs on the ladder. CLTS and self-supply have begun to fill the gap between "no provision" and basic/ safe provision. Similarly faecal sludge management and water vending are bridging the on-site/ point source options and networked system, partly by improving a single aspect such as cost recovery or maintenance. These additional rungs make moving up the ladder easier.

However, the steps on the ladder are still not equal; the threshold between the dispersed, individual, lower capital cost (but perhaps higher operational costs) option and the centralised, higher capital cost option can be difficult to establish. Steps to upgrade a latrine can be spread over time in manageable, affordable stages. Moving to a reticulated system requires substantial investment in a short time that will only be financially viable over decades rather than a year or two. Moving too early can result in over-engineered, capital intensive systems that could fail as all the resources (human, economic, social, physical) are not yet in place, leaving people without any service; moving in too late can delay higher service levels and the benefits they bring, including economies of scale relating to total, whole life costs. Having a hybrid solution or running the two approaches in parallel may be required during the transition phase but that adds extra cost.

Centralised or dispersed training

The twin dilemmas of scale and service level, which may be familiar across many aspects of WASH, also apply to training. At one end of a spectrum is the project-based short course, tailored for a specific

organisation, meeting peoples' immediate vocational needs, which can be used to justify the cost. This is responsive, targeted and fits with annual budgets. At the other extreme there are undergraduate and post-graduate courses at colleges and universities that take years not weeks of study. These may not directly provide the particular skills to tackle a specific challenge in a certain context, but may contribute much deeper learning that can be applied across a person's whole career and adapted by the student to a variety of situations. Deeper learning addresses the "why" questions whilst a short course may focus on the shallower, more immediate "what" and "how" questions. Both aspects are needed, so one is not "better" than another, but whilst factual knowledge dominates technical training and undergraduate degrees, critical thinking is meant to dominate professional development and post-graduate degrees. There are intermediate options of annual professional development courses, conferences and repeat courses offered by Training Centres.

Awareness of depth and breadth

A student was discussing postgraduate module options with the author. She had decided she was not going to study one of the sanitation modules as she had already completed a week-long training course on sanitation with her previous employer. The author explained that the topic of sanitation was much broader and deeper than could be covered even in a WASH MSc lasting a year, so a week long course was at best only an introduction to raise awareness of the topic. You could devote a whole year just to sanitation and still not do the topic justice. The student is now working on sanitation and occasionally provides her former lecturers with examples of challenges and issues that demonstrate the need for deep expertise and wide experience. An adaptive process and critical approaches are needed not just a knowledge of "facts".

However, measuring the "quality" of courses can be challenging as short-term outputs (e.g. numbers trained, satisfaction) may not be translated into longer term outcomes and impact. This is an area of activity in the WASH sector; see Coff et al (2014) for an overview, Ngai et al (2014) from a training provider's perspective, Mvulirwenande et al (2014) for an employer's perspective and Pascual Sanz (2014) exploring the need to acknowledge the "tacit" knowledge that is hard to articulate and developed through experience or interactive conversation. She also contrasts "focussed" and "content" with "broad" and "process". Whilst knowledge of facts is easy to assess, ability for critical thinking is harder to measure.

A theme running through all of these papers presented at the same conference is the other factors outside the control of the training provider that influence outcomes and impacts (e.g. training people to use a computer depends on them having access to a computer if the training is to have an impact). Just as HHWT only works if householders use it, training only works if students can and do put their knowledge into action.

The parallels with HHWT illustrate some of the strengths and weaknesses of short, bespoke courses. Short courses can deliver immediate results; they fit well within project budgets and can be responsive to the situation. Employers and donors can see the value of what they are paying for and can "own" the process, but like any bespoke service, the one-off costs can be disproportionately high. The flexibility of short courses enables the training to be brought to the people that need it, assuming there are enough staff there to be trained. There is also a "supply chain" challenge; project-based training may deliver an initial cohort of staff, but once the project is over, staff changes or illness will reduce the number of trained staff over time. Access to training may be remote from the project area and the numbers of staff requiring training each year make repeat courses uneconomic. As people's careers develop, their role changes or the context alters, previous short-focussed courses lose their relevance.

In contrast, longer term, more generic programmes in permanent training centres or colleges (undergraduate or post graduate level) offer stability, the potential for better quality control, closed feedback loops and the opportunity to develop "broad process" rather than "focused content". Longer courses are more likely to be formally assessed, giving a greater measure of outputs of the course and transferable qualifications as well as contributing to internal quality audits. Economies of scale can be dramatic but this has to be balanced with the higher cost per individual due to the increased length of the course. Bringing students together can make courses viable. The longer term cost savings are partly the result of capital investments, in facilities, in teaching materials and in the training of teaching staff. Higher quality and more sustainable inputs (hopefully) result in higher quality and more sustainable outputs. Whilst universities and colleges are the obvious venues for these activities, established training centres can offer similar sustainable options. For example the Ugandan National Water and Sewerage Corporation's Training Centre had a major

part to play in reforming the performance of the utility in the late 1990s (Kayaga 2008), providing a series of training opportunities in a planned manner.

Reflections on sustainable capacity building

The paper has been informed by two formal assessments of university provision in west and southern Africa plus working with universities in east and southern Africa on capacity building projects. This continues some of the research carried out in Uganda on the "Training for Real" project (Reed et al 2005) that looked at aligning the needs/ demands of employers with the outputs/ supply from established training providers. This contrasted the short-term project workshop with the longer term professional development of professionals. Both the assessments were designed to help universities provide graduates to meet the need of either specific employers or the wider sector on a more sustained basis than just running one or two short training courses. The following reflections raise some of the points to consider when moving from a pattern of short-term, focused, local training activities to a wider, more holistic and longer term approach.

Benefits.

The benefits of taking a longer view of capacity building are not easy to measure, as some of the impacts may not be apparent for several years. These may be difficult to define, as having the correct attitude to solving problems in a new area is hard to attribute to a specific training input. The cause and effect relationships with outcomes and impacts of higher level training may be less clear compared with more focused, vocational, project-based courses. A WASH analogy is mosquito control; bed nets protect for five years; environmental manipulation (e.g. drainage) may last for 25 years but takes a long time to demonstrate impact. Looking at employability and wages across a whole career, recognised qualifications do seem to provide more benefits than costs for the individual, although the pattern of expenditure is very capital intensive. Echoing the Delhi statement "*Some For All Rather Than More For Some",* there is an element of equity to consider. Why should money be invested that will benefit a few individuals disproportionally? This is a wider educational dilemma, as funding for professional qualifications can complete for funding with basic primary education. However, if only people with enough money to invest in longer term training can access these professional courses, then the equity issue is compounded.

Individuals will move about within the sector (and may leave the sector), so the benefits of funding such training from a specific project budget may not be justified as the investment appears to accrue to the individual. The benefits however do not just accrue to the individual. There is an element of the greater common good, where the whole of the WASH sector benefits from an improved level of capacity overall. Organisations may be unable justify investing in longer term courses from project funds, but they benefit from years of experience and previous training when they employ senior staff. Recognised qualifications allow the quality of staff to be judged and training gaps identified, in contrast to inefficiencies of staff attending similar short training course several times, as found in the "Training for Real" project.

Resources required

Whilst the benefits of longer term training are broad and long term, making quantification hard, the resources required are all too obvious. The costs of longer, broader courses may be considerably lower on a "per day" basis than intensive short courses, but the overall initial cost is high, creating a barrier. Looking at what makes up those costs, there is a lot of capital investment, with dedicated teaching space and other resources, such as laboratories. One less obvious cost is the establishment of libraries or other repositories of knowledge. These are needed by both staff and students for preparing lecture material and reading around the subject. This provides the foundation for the knowledge being taught. A good example is the comprehensive series of training manuals prepared by CAWST on household water treatment (CAWST, nd). A single workbook contains all the material needed for a short, technical course. This is small in comparison to the list of references that directly support the writing of those manuals. In the formal assessments of university courses in West and Southern Africa, access to relevant textbooks was an obvious limiting factor for both staff and students. Where books where present they were frequently out of date, not relevant, in the wrong language or poorly catalogued. Lecturing staff occasionally had personal libraries, but these did not represent a comprehensive reading list for the subject. The increasingly use of electronic resources partly fills this gap, but the quality is variable and often core texts are not available online. Access to the latest research paper assumes you already understand the basic principles of the topic.

Another hidden resource is the lecturing staff. They require two levels of expertise. One is in the topic (which they need to understand to a higher level than they are teaching) and one is how to teach, which is often gained through mentoring and experience rather than formal instruction, although this practice-based approach should be supported by pedagogical theory. The lecturing staff mediate between the student and the content contained in books, journals, case studies or on the Internet. Just reading out material or copying onto PowerPoint is not effective teaching. The need for experts is required by the wider sector, so potential lecturing staff may find more remunerative employment "doing" rather than "teaching how to do".

Content

WASH is a rather odd sector in that it is inherently multidisciplinary; there are aspects of science, technology, sociology, management, health and environment, applying them through an engineering process. Whereas education or health sectors map onto university departments, WASH does not have the same relationship. Thus WASH is more likely to be addressed from a specific technical or management background. It can be seen as a subset of Environmental Health, which is in turn a subset of Public Health. Alternatively it could be seen as a subset of Water Engineering, alongside other topics such as irrigation, river hydraulics, hydrology and power generation. Water quality and treatment can be seen as a branch of chemistry and the management aspects at both community and utility level could be part of business studies. However, each of these subsets would not give whole picture.

An integrated approach to WASH is therefore a specialised topic. The financial viability of any programme will depend on the number of students. Unless you (or your employer) are very focused on working in the sector, then a dedicated WASH course may be less attractive than a course that gives a wider range of career opportunities, within the broader Water Engineering or Environmental Heath disciplines. This may limit the number of applicants and therefore render a specialised course uneconomic. Even within the WASH sector there are subsets (e.g. urban or rural, water or sanitation) that may further constrain the content. This will be further influenced by the national or regional context. Some countries may be too small to support a permanent training centre or specialised university course.

Another content factor is again the availability of staff. Teaching a broad introduction to WASH over, say, three weeks requires a lower level of specialist knowledge than, say, spending three weeks just on on-plot sanitation and another three weeks just on household water supply. If the knowledge and experience of teaching staff are limited, then the course offered is limited by their skills rather than the needs of the sector. Specialist courses may meet the needs of employers and the sector, but are resource intensive in terms of staff and materials and may not attract enough students.

Intermediate steps

The paper has looked at the two contrasting options of one-off, project-based short courses on a single topic and repeated, open, professional development long courses offered by training centres and universities. These two extremes were used to illustrate the range of capacity development options. To re-visit the ladder analogy, are there steps apart from these two extremes? CLTS and Self-Supply are providing technical options below conventional community managed schemes. The training equivalent is self-motivated training, such as reading books and journals. This approach is becoming more feasible with the advent of ELearning, although the high level of investment required to develop on-line courses and the nature of the medium is resulting in the virtual equivalent of short courses rather than more in-depth material. Both CLTS and Self-supply are interesting models as the principle of no subsidies and private investment contrasts with "free training". Should individuals be making investments in their own future skill set? Will short-term subsidies from other actors skew the market at the expense of more sustained capacity building provision?

Again using the ladder analogy, an intermediate step was set up by UNDP and the World Bank in the 1980s, with the ITN (International Training Network for Water and Waste Management), where regional hubs in Africa and Asia provided training centres and knowledge support. The sustainability and impact of these has varied. Another intermediate option is better incorporation of WASH into existing university programmes, again dependent on student demand and staff availability.

Conclusions

Comparisons between small WASH pilots and one-off training courses or between urban utility supplied water and university courses may not be exact, but they demonstrate some of the issues that relate to making capacity building more accessible and sustainable. The use of the ladder analogy also shows that the steps from one level to the next may require significant changes in approach, from a "scaling-up" model to an "at scale" system. The challenge is deciding how and when this transition is appropriate, considering:

- At what point a small scale focus become less efficient than a large scale approach?
- Are there sufficient resources to support a longer-term approach? Some of these require capital investment (such as facilities and libraries) but some of these are not so easy to identify. The availability of teaching staff with the correct skill mix is a critical factor and not a resource that can be quickly produced.
- Is a specialised course in WASH viable? What depth can be provided and still attract sufficient students? Is this at national or regional level?
- How do the training benefits to the individual also contribute to the health of the whole sector? Can funding for capacity building be invested in the expectation of a long-term but difficult to quantify payback? Should these "deeper", long-term courses only be for those who can afford the initial fees?

This reflection does not have the answers but raises some of the questions that the WASH sector is examining in other areas. Faecal sludge management is examining the move from on-plot to municipal sanitation; innovative payment techniques are smoothing the transition from point source water supplies to higher service levels. Capacity building needs the same innovations if the sector is to be sustainable.

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Contact details

Brian Reed
Water, Engineering and Development Centre
John Pickford Building
Tel: (44) 1509 228307
Email: b.j.reed@Lboro.ac.uk
www: http://wedc.lboro.ac.uk/index.html