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## Appropriate training for water technicians

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Appropriate Training for technicians follows quite naturally from the concept of adopting Appropriate Technology for solutions to problems. However we have to be clear in our minds as to the level of training we wish to provide and the client group we wish to provide it to. It has been said elsewhere that in relation to rural development in Africa training is required at three levels. There is a need to reach the rural people themselves - Lele, as long ago as 1975 talked of sensitising the rural people in 'Design of Rural Development - Lessons from Africa'. The field staff and administrators have to be trained in their roles and finally the high fliers - the policy makers and those responsible for its strategic implementation - must be thoroughly trained. Each category requires a different training programme but all three are essential to the success of any rural development exercise. In this paper I have selected the middle group, the technicians, as an example of how a training programme can be evolved.

It is tempting to think of Appropriate Technology as being of a low level with little or no education or training required to implement it and little or no maintenance required to sustain it. Nothing could be further from the truth. Very few items of equipment are maintenance free and even fewer are able to withstand misuse. Unless the people given the task of installing the equipment understand the principles behind its operation even comparatively simple machines will fail to function efficiently. Once installed, the operation of the machine must be in line with its design parameters or it will fail prematurely. We must not fall into the trap of thinking that Appropriate Technology is 'install and forget' Technology - it never has been and it never will be.

Accepting then that appropriate solutions often require a wide knowledge of technology if they are to be successfully adopted what guidelines can we draw from our present courses? Some questions I have been asked by students on the recent courses have been:

- what is the difference between a casting and a forging?
- are there 'different' steels?

- are there 'different' plastics?
- how does a handpump work?
- what is atmospheric pressure?
- why is quality control important?

All questions asked by students with a lot of experience behind them in water related posts, with educational qualifications and with inquiring minds. How then can they have reached such positions without having found the answers en route? Perhaps because they have only received a narrow education in basic skills and thus neglected the grounding in technology that is so important to technicians or perhaps because when they received the information the first time round they were unable to appreciate its significance. Whatever the reason the majority of our students do not possess a wide general knowledge of things technical.

There is then a problem of recruiting staff with the necessary formal educational background for this industry, but in that we are not unique, I believe the Lilongwe Land Development Programme found difficulty in recruiting staff for agricultural training. The answer therefore is to amend the training programme to suit the available resources and build into the training ALL the elements that are thought desirable and to assume no wide technical background. There is a danger that some trainees may become bored and that others will leave after they have been trained but those are problems shared by any successful programme. If the training is structured in such a way that as the trainee matures and grows in experience and confidence then the content of the training also increases in difficulty and expands in range then the training will fulfill two important criteria.

One, it will keep the trainees' interest alive and  
two, it can develop alongside the country's own technology and lead to a significant increase in the size of the technician labour market.

A restricted trained labour force from which to recruit can seriously inhibit the growth of local industry. Historically the two have grown alongside one another but where technology is 'imported' into rural areas it can fail because of a lack of staff to man

it. Similarly if technician training is given to staff who are then unable to use it or to gain experience with it, that training is also lost. Often training given as part of an 'Agency or Donor Programme' is solely geared to the requirements of that programme with no attempt made to ensure the transfer of any skills learned or knowledge gained to existing local conditions. It is easy to see why the differences between forging and casting are never explained or understood and it is easy therefore to see why so much technology is misused or abused.

Can we then identify the elements that a successful training programme must have? I believe we can.

i) There must be sufficient background information included so that the trainee can fully appreciate the importance of the decisions made in the core technology.

ii) The programme must include subjects which are normally outside 'Technology' but which have importance to 'Technology'.

iii) The core content must satisfy the immediate needs of the trainee so that confidence is acquired and familiarity with the principles grows naturally.

iv) It must satisfy the students immediate training and educational desires from both personal and professional viewpoints.

v) It must provide a basis for future development initiated both by changes in the technology in use and in the aspirations of the trainee.

The advantages of such a programme are potentially vast. A well trained and motivated technician labour force able to keep pace with the policy developments proposed by the 'high fliers'. Without such a labour force the implementation of such policy developments will be at risk.

How do existing qualifications fit into this pattern? They have enormous benefits in allowing comparisons to be made and in selecting staff for interview but I question their appropriateness in the present circumstances. They have evolved alongside technology and their present content and level mirrors present day technology. If the

technology is inappropriate it is likely that the qualification is similarly so. For example the mathematics level may be geared towards the requirements of electronic control systems whereas only mechanical systems are in use.

Computer literacy will undoubtedly be needed eventually, but not yet and so its inclusion in standard qualifications may lead to the exclusion of more important fundamental principles. If the concept of a single qualification gained at a point in time is replaced by the concept of 'continuing education and training' throughout the working life of a technician - as is beginning to be the case in many professions - it opens up the delivery of the subject. Topics can be left until they become relevant, new technology can be adopted and trained for at any time, new agency training can be grafted onto an existing national programme and the transfer of skills, experience and knowledge can be achieved more efficiently.

The core elements of a course for water technicians can be easily identified. Water Technology itself, Principles of Fluids and the Science of Water are obvious candidates. Surveying, Construction Techniques, Plant, Maintenance and Management would also probably appear in many programmes. I do not intend to discuss here the detailed content of such a course. Each country, each region will have different priorities and should feel able to attend to them in their own way. I will happily continue with a more detailed discussion at a more appropriate time. What I wish to continue with at this point is to consider the wider context.

Education is not just sitting in a classroom receiving instruction.

Education is visiting a relevant works and questioning the site manager and operators,

education is visiting a manufacturer and asking why that component is cast and that one forged,

education is seeing samples taken from production runs and tested to destruction,

education is attending conferences and exhibitions to discuss problems experienced in the field with sales and technical staff,

education is sitting down with fellow technicians and discussing how problems have been solved or avoided,

education is attending training courses offered by various agencies and manufacturers and note I am using education in its widest sense.

These are the reasons why there has to be a residential element to the programme. I know that one of the outcomes of the LLDP was to favour non residential day courses over residential courses but I believe that the necessary organisation for a course including all of the above can only be done on the basis of a 'captive' course. But the residential element should be seen as only part of the whole. A time and opportunity to carry out a lot of group work to each persons own advantage. I sometimes wonder how effective it would be to summon back the members of our course for a weekend to exchange their recent experiences. They would be easy with one another and have the rapport they acquired during their stay in the UK. Far too expensive to put on in the UK but if developed here in Africa in may be the basis for a very effective problem solving network.

Consider for a few minutes the current popular symbol of AT - the handpump. In your knowledge has it changed during the last five years?

Perhaps not in concept but the handpump trials and the emphasis on maintenance at the Village Level have certainly caused manufacturers to introduce design and material changes. Materials which may be new to technicians installing them and designs that may require new installation techniques if damage is to be avoided. The photo electric cell seems to be about to break through a significant cost barrier and become a major source of energy in remote places - it will be another change in technology. I can hear you say that such cells will be bought, used and thrown away when they fail and so people will not need to know much about them. I agree. But think of their uses, they will introduce requirements that our technicians will have to be familiar with. Small electric motors, communications equipment, data logging and remote measuring equipment all become possibilities as well as other devices for which we cannot as yet see a need. So we must include in our training programme regular and formal updating sessions. A one day seminar, a training package sent to the trainee, a demonstration unit sent round the major regional centres or more conventional lectures could all form part of the continuing education of the technician cadre.

Such a programme begins to need a formal control structure but it need not be more than a small administrative unit in each authority or country. It is the will to do it that is important, the means are not excessive.

Training, to be effective, requires that three major conditions be satisfied.

1. The trainers are themselves technically competent
2. The trainers are able to make the subject relevant.
3. The trainers are able to communicate effectively.

If the training was to be done 'in house' then the first two conditions would be met. That is to say we use existing staff to pass on their experience and knowledge. We could be sure then that the subjects were relevant and our previous training ought to ensure that the trainers were competent. Not informally but as part of a long term strategy. We take the present technician and professional trainees and add onto their technical training programmes a short course in education and training itself. I have done this with a few of our trainees and gone through the key elements of the teaching process. A scaled down version of the City & Guilds Further Education Teachers Certificate so that they were familiar with instructional techniques, preparation of training materials and training programmes and some rudimentary knowledge of how to evaluate their efforts. It seems to work and could be an effective vehicle for transferring information, knowledge and experience through all the levels of the industry. Professional staff would be better able to brief their support staff and they in their turn would be better able to 'sensitise the rural population'.

I leave you with one more thought. Through the WEDC conferences you have an excellent method of exchanging ideas, sharing new methods and keeping in touch. When you return home you have to pass on that information to your associates and your support staff. I wonder whether you should not consider setting up an Association within the Developing Countries of Africa to formalise the exchange of technician information, to oversee their training and, most important, to evaluate their training. The Secretary of the Institution of Mechanical Engineers said, as recently as August 1986, that he believed that the future of the engineering profession depended on the maintenance of a sound balance within the hierarchy of engineering.

'The 'Mechanicals' should continue to support the Institution of Technician Engineers in Mechanical Engineering in its efforts to grow and develop'.

Perhaps one of the most important legacies of the Water Decade could be the establishment of an Institution of Water Technicians in the Developing Countries of Africa whose members will ensure that your proposals are carried out and that the targets of the Decade are not forgotten. Indeed those targets could be written into the constitution of such a body.