Rural Water Supply in Developing Countries

Proceedings of a workshop on held in Zomba, Malawi, August 1980
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Proceedings of a workshop on training held in Zomba, Malawi, 5–12 August 1980

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Role of Operation and Maintenance in Training

S.K. Ichung'wa

It is the policy of the Kenyan government to provide piped water to every household by the year 2000. The government is trying to achieve this goal in two ways: through the construction of national water projects for domestic use and livestock development and through the construction of small water supplies through implementation of the national motto “harambee” (self-help).

The Ministry of Water Development (MWD) has decentralized services and every provincial headquarters has full maintenance facilities. The system goes down to the district level. The district headquarters also has full maintenance facilities. This is where operational work is generally carried out.

At the moment, Kenyan engineers, in collaboration with Canadian engineers, are undertaking the training of operational staff in western Kenya. Most of the training is on-the-job in nature. This is a quick method of transferring technology from one country to another. The main purpose, however, is to strengthen operational and maintenance capabilities.

Training of Operation and Maintenance Staff, Ministry of Water Development

The current practice for the selection of candidates for training as inspectors requires that the individual should have passed the East African Certificate of Education (EACE) examination (“O” level) division III or above. The candidate should also have indicated an interest in working with the MWD. Applicants meeting the minimum requirements are invited for interview by the Public Service Commission.

Having passed the interview, they are selected to undergo a training program at the MWD training school, Nairobi. The candidate is enrolled in the preselection course that commences in July of each year. This course provides exposure to many facets of the MWD operation curriculum and syllabus, which comprises the following subjects: administration, accounting, purchasing, stores, hydraulics, hydrology, drilling, water law, water treatment, construction, sewerage, mechanical work, drawing, and pipe work.

On the basis of the student’s performance in these subjects, as well as in the individual’s course assignments to various sections of the MWD, a person is selected for further training.

During field training, the trainee inspector gains experience in all areas of the work of the provincial MWD organization, but is permitted or encouraged to specialize in one discipline, either construction or operation and maintenance.

Training Programs

Water Supply Inspectors

After the 6 month preselection course at
the training school, those chosen for training as water supply inspector trainees undergo a 2 year training period in the field. This is on-the-job training consisting of different activities such as supervision of construction, administration, and water treatment in different districts within the province to which the person is posted. During this period, the trainee's capability is assessed and confidential forms are completed by his direct supervisor and sent to the principal of the training school.

After this period in the field, the trainees return to the training school in Nairobi for a final 3 month revision course and thereafter take their final examinations. Success in these examinations leads to a final posting as inspectors of water supply in the provinces as well as in the districts.

**Engineering Assistants**

Candidates wishing to train as engineering assistants are also selected after the 6 month preselection course at the MWD training school. They must have done well in the preselection examination held after the 6 month training period. While the inspector trainees are being sent out to receive on-the-job training in various districts, the selected engineering assistant trainees are sponsored for further training at the Kenya Polytechnic for eight terms of 3 months each.

Before commencing the course at the Kenya Polytechnic, the chosen candidates are first posted to various sections within the province, for 4 months, to familiarize themselves with the many facets of the MWD organization. During this period, the trainee is under the direct supervision of a qualified person who has been in the field for many years.

At the end of 4 months of on-the-job training in the field, the trainees then start their first term at the Kenya Polytechnic. The first stage consists of three consecutive terms of classroom instruction, which comprises the theoretical and practical aspects of mathematics, surveying, elementary quantities, civil engineering construction, hydrology, hydraulics, soil mechanics, and services. The students then take an intermediate examination and thereafter they are again posted for 4 months of on-the-job field training at various locations within the provinces. Upon completion of the on-the-job training, the successful candidates return to Kenya Polytechnic for three consecutive terms, after which they take the final ordinary diploma examinations and are then posted to provinces and various sections at the ministry's headquarters as water engineering assistants. The entire course lasts for 2.5 years, six terms at the college and two terms of on-the-job training.

Candidates who have served for a number of years and done well at the ordinary diploma level can apply to attend a further 3 year course at the Kenya Polytechnic to obtain a higher diploma. This in-service course also consists of eight terms in a sequence similar to that of the ordinary diploma course.

**Skilled Tradesmen**

Fundamental to the needs of the MWD is a mixture of skilled tradesmen in a number of different disciplines. The skills involved may be directly related to the function of the ministry, i.e., pipe fitters, plumbers, plant mechanics, carpenters, masons, or welders.

The scheme currently being implemented by the MWD to meet its requirements for skilled personnel is the appointment of subordinate staff personnel as "apprentices."

The apprentice is assigned to and works under the supervision of a certified tradesman. The effectiveness of adequate on-the-job training is only as good as the qualified tradesman makes it, and is totally dependent on the particular jobs that the tradesman and his apprentice are called upon to deal with.

Opportunities for formal technical training are offered via apprenticeship and learning programs for persons entering the employment market with differing academic qualifications. For technical apprenticeship the student requires an EACE, form II is required for craft apprenticeship, and the Certificate of Primary Education (CPE) is required for the learning program. The
The foregoing training opportunities fall under the jurisdiction of the Ministry of Labour through the Directorate of Industrial Training.

Skill-development courses are also offered both to upgrade skills and provide short-term relief for skilled-staff shortages. At the present time, the MWD makes use of these training opportunities, but only on a limited scale, even though these opportunities represent a long-term solution to the countrywide shortage of technical personnel. A thorough analysis is required to determine the future technical manpower requirements of the ministry. These requirements could require constant annual revision in the light of current development.

Operators
The candidates are usually recruited directly from school and should hold an EACE division IV or above. These people are appointed as operator trainees grade II. Those persons holding the CPE and having completed the Kenya junior school examination (KJSE) can be appointed as operator trainees grade III.

The operator trainee is assigned to and works under the close supervision of a qualified water supply operator. During this on-the-job training, the operator trainee should be able to learn the overall operation and maintenance of pumps and engines used for supplying water. He should also be able to learn simple water treatment methods. In the office, the trainee is taught general office organization, meter reading, repair of broken pipe work, and connection and disconnection of water meters.

After some time, the trainee can be recommended for the 2 month water operator course at the MWD training school in Nairobi. At school, the operator learns about the operation and maintenance of pumps, engines, and motors used in water supply systems, and details about pipe fitting, administration, and the principles of water treatment. Following this course, the operator trainee may be assigned the duties of full operator or he may be appointed to assist another operator. Periodically, the operators are invited to attend refresher courses at the MWD training school.

Apprenticeship Training
One option in training technical personnel which the MWD has not sufficiently utilized is the apprenticeship training program offered by the Ministry of Labour at the industrial training centres in Kisumu, Nairobi, and Mombasa.

1) Technical apprenticeship: The candidates are usually recruited directly from school or from agencies such as “Employment Exchange” and the “Directorate of Industrial Training.” The minimum educational qualification for entry is the EACE, with credits in English, mathematics, and appropriate science subjects. The training of these apprentices is usually carried out at a postsecondary institution such as Kenya Polytechnic and includes practical fieldwork.

2) Craft apprenticeship: The minimum educational qualification for entry is form II secondary vocational/technical school or equivalent. Suitably qualified holders of the national trade test grade II may be considered for entry in a craft apprenticeship program at an advanced level. The director of industrial training is responsible for the operation of the scheme and the first 6 months of the training are considered to be a probationary period. The craft apprenticeship program is organized into five stages and is spread over a 1 year period. It consists of a combination of theory and practice plus on-the-job training, supervised by personnel from the training institution.

Upon completion of each craft course, the training institution submits to the employer progress reports on the performance of the apprentice. Upon successful completion of the apprenticeship course, the institution issues a nationally recognized certificate of apprenticeship.

Conclusion
These training programs are part of a well-planned master water plan developed by the Kenyan government for the entire country. As a result of these programs Kenya has a considerable operation and maintenance staff.