Article: Let’s train local practitioners better

World Water Academy: an innovative approach for sustainable capacity building

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Abstract

Water has proven to be a knowledge intense sector. Water professionals, practitioners have to stay up to date with their knowledge, knowhow and skills. Life-long learning describes the learning history of a professional during his working life. The length of the life-long learning exceeds three times the duration of the initial education. This length added to the fast changing technologies and ICT underline the importance of life time development.

Worldwide a scream for well-educated and/or well-trained water practitioners can be heard, especially for technical matters. Water training centres focus on the applied knowledge in the water sector and mainly on a vocational level. Wateropleidingen /
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World Water Academy has developed an innovative and sustainable method of training practitioners: The concept ‘for and by professionals’.

Passionate experienced water professionals share their know how, knowledge and skills to train and to inspire their peers. Key issue is the combination of water content and didactics. A good professional is not a good trainer per se. A water professional needs didactical skills and tools to become a professional trainer, who trains and shares his knowledge and experiences to his colleagues adequately. Thus the local capacity can be strengthening by the local practitioners themselves.

Key words: didactics, training of practitioners, work-based training, life-long learning, local capacity development, water training centre

**Introduction**

Worldwide a scream for well-educated and/or well-trained water practitioners can be heard, especially for technical matters. The awareness of the problems of capacity building on executive level and middle-management in the water sector is still growing. In northern countries as the Netherlands, water professionals on a academic level like managers and engineers are educated and trained well. Especially compared with the lower vocational level and middle-management. High-skilled workers are needed to innovate and to act entrepreneurially to unlock new growth opportunities, whereas the low-skilled workers have to ensure productivity and international competitiveness. Any
shortage in in the quality or availability of both high- or low-skilled workers undermines productivity and competitiveness (Whitebook EU, 2012). Looking at the organisations’ pyramids, the majority of the persons working in the water sector (as utilities and (regional) water authorities) work at these levels.

The Whitebook on EU Trade and Investment in South Africa (2012) states the low availability of skills as a critical concern. The quality and availability of appropriately qualified and experienced workers is more and more seen as a necessary condition to sustain economic growth. The honourable Ms Edna Molewa, the Minister of Water and Environmental Affairs in South Africa, addressed the urgency of training in the water sector on multiple occasions. Amongst a wide range of needs, she mentioned specifically that the water sector urgently needs 4000 artisans/technicians to overcome the crippling challenges of poor operation and maintenance of infrastructure, needed to achieve the MDG’s in 2015 (speech 12 Oct 2012).

Study objective

How can individual professionals increase the capacity of the water sector, focusing on the vocational level?

Background: the water sector

Dutch water sector
Shortages of both qualified and quantified personnel are expected on all levels in the water sector in the Netherlands in the future as well. In the Dutch water sector approximately 40,000 new professionals are necessary to meet the outflow and the growth of the sector (NWP 2011). The water sector is considered to exist of two parts: water technology and delta technology. Water technology deals with drinking water, industrial water, sanitation, wastewater treatment and sensing and delta technology is covering flood management, water resource management and water shortage. Water management and governance are important topics in both parts. In the ambition to promote the Dutch water sector internationally, the Dutch government established the so-called Top Sector Water. The Top Sector Water also considers the maritime cluster (executive water construction) as part of the water sector.

The Dutch water sector is a relative small sector. In the Netherlands the statistics differs of the amount of employees working in the sector. The figures show a range between 60,000 to 80,000 employees. The Top Sector Water (2011) estimates a total number of 80,000 employees in both the water and delta technology and the maritime cluster. The sector’s added value for the Dutch economy in 2008 is almost 7 billion euros and the export value around 9 billion euros. This amount is just 1,85% of the total export volume of the Netherlands. Concluded, the water sector is a relatively small sector in The Netherlands. The Dutch Water sector, as a Top Sector is seen as a sector with a huge capability to export the Dutch Water knowledge.
Pathway in (professional) life

The (professional) life of an individual person can be divided in successive periods in life, see Figure 1. Depending of the kind and level of education the age of pupils are to approximately 16-18 years. The following period is the student period, which can be set to 20 years (finish of vocational school) and to 26 years (graduation at university). After leaving school/university a person start working as a young professional. After several years of working experiences the young professional gains expertise and becomes a professional, see Box 1. The exact moment is vague, see the example in the box. Looking at the length, the working life as (young) water professional is approximately three times longer than the learning life at school. At the end of the working life, the professional becomes retired. More and more this is not the end of the working life, for instance he can stay active and shares his expertise.

Figure 1: pathway from pupil to retired professional

Box 1: The Young Water Professional

The definition of a Young Water Professional (YWP) differs per organisation. It is a combination of age and years of working experiences. The IWA Young Water Professionals programme is aimed at “water sector students and professionals under the
age of 35, to become the leaders of the future” (source: IWAhq.org). The Royal Netherlands Water Network also postpones the age of 35 years (source: waternetwerk.nl). In South Africa also the years of experiences is taken into account, because many students graduate on higher age. YWPs at executive levels start when finishing the vocational schools on an age of around 20 years. At 35 years you cannot speak about ‘young’. For this group the years of working experience is more of importance. Using a fingerprint they can be called YWP till they have reached a period of five to seven years of working.

The terms inflow, flow & outflow are used to mention the different phases of employment in a sector. These terms are used to calculate the (future) changes of employment within the sector, but also the attractiveness of a sector. The inflow is the amount of new professionals that enter the sector. The inflow consists of students that finished school/university or (young) professionals who have worked in another sector. The flow is more considered as the development of the professionals during their working life in the sector. Outflow is the amount of employees who leave the sector due to retirement or career switch to another sector.

**Education**

Education is aimed at the improvement of competences to do a task or manage a role adequately. Competences can be divided into *knowledge, skills & attitude*. Knowledge is the cognitive ability of knowing facts and figures about a certain topic. Skills is the ability
of using the gained knowledge in practice. Attitude has to do with the ability of acting by itself without being influenced by the environment.

A pupil starts to learn the basic knowledge. The basic knowledge is necessary to take a step further in the education to learn a proper job. A large part of the initial education is (especially in the beginning) is based on the teaching of the basics, including literacy, maths, but also the basics of history, chemistry and science. UNESCO (2013) called this set of basic knowledge, skills and attitudes that are necessary to take a place in the society and being able to have a paid job ‘foundation skills’. Foundation skills could be considered smaller than the basic knowledge to get a job in the water sector. The foundation skills focus on the elementary part of education; literacy and some very basic knowledge.

The initial education consists of different phases, see Figure 2. A pupil starts at the primary school to learn the foundation skills. After that, at approximately 12 years old, the pupil will attend the secondary school. Based on the level, this will take to 16 to 20 years, before going to the next phase or even go to work. The next step in the school system could be vocational school or university. In Figure 2 this phase is called ‘upper secondary’.
Based on the basic knowledge, the pupil becomes student and can choose for a more practical or a more scientific or science-based job, based on his/her interests, learning characteristics and personality. The practical education is educated at the lower and middle vocational education institutes and the scientific education at universities. Note: In the Netherlands, a student can also choose for a mixture between these kinds of education, the so-called applied sciences.

**Applied versus scientific knowledge**

UNESCO (2012) distinguishes technical & vocational skills versus transferrable skills. The technical & vocational skills are specific know-how and experiences, which are demanded...
by the execution of the job. This can be compared with the applied knowledge. The applied knowledge is the tool and working methods which are necessary for the daily tasks and operation & maintenance of working procedures. It is more based on transfer of expertise and know-how: the working environment, rules & regulations, specific behaviour & manners. Transferable knowledge is more general knowledge and skills, which can be adapted in different working environments. In the scientific education the publications of researches are of more importance than in the vocational education. It is more based on pure individual knowledge, analysis / synthesis of the knowledge and aimed to create highly-levelled innovations.

**Water education**

Water education is a complicated branch of the overall education. The initial education is funded by the amount students that participates in a year. When a sector is small, the inflow of students to that sector is low. This might lead to a decrease of interests of students to do a water-related study. The small number of students leads to a situation that specific water education becomes relatively expensive. And when the a study is developed for water it mainly is too general, because this leads to a higher inflow of students.

The water sector is a more technical (or beta) sector although there are also more alpha courses. Working activities mainly requests technical knowledge and skills in order to do the job. The basics of chemistry and maths, sustainability theory, ecosystem knowledge,
practical fitting skills are just a few examples of the wide landscape of topics in these clusters. The dislike of the beta-oriented studies in de Netherlands is comparable to the other parts of the world and leads to a scarcity.

Actually the education offer on vocational level in the Netherlands is mainly based on general studies, like techniques, catering industry, trade, care, education, agriculture, combined with a specialisation in a specific sector. On academic (university and university of Applied Sciences) a student is able to choose for a more water-related study, however these studies mainly cover water management in general. The more specialised studies on wastewater treatment and drinking water have troubles to recruit enough students. So, it is hard to sustain water education studies that totally focus on the various specialisations within the water sector.

Life-long learning in the water sector

Water sector: knowledge intense

Water has proven to be a knowledge intense sector. The knowledge intensity is found in the width of the water sector: water technology, delta technology and the maritime cluster, with each its own technical specialisations. This knowledge intensity leads to the fact that the water sector might mainly be an experienced-oriented sector. The specific water knowledge is so diverse, that organisations prefer that their personnel have a good basic knowledge in a specific topic, so that they ‘teach their personnel the added water..."
component’. The other way around, the training of generalists to do more technical jobs, is considered to be harder.

**Life-long learning**

Life-long learning is the increase of competences of an individual person during his professional life: from pupil to the retired-people. Lifelong learning is the ‘ongoing, voluntary, and self-motivated’ pursuit of knowledge for either personal or professional reasons. Therefore, it enhances not only social inclusion, active citizenship and personal development, but also competitiveness and employability. The term recognizes that learning is not confined to childhood or the classroom but takes place throughout life and in a range of situations. During the last fifty years, constant scientific and technological innovation and change has had a profound effect on learning needs and styles. Learning can no longer be divided into a place and time to acquire knowledge (school) and a place and time to apply the knowledge acquired (the workplace). Instead, learning can be seen as something that takes place on an on-going basis from our daily interactions with others and with the world around us (source: wikipedia).

Life-long development is a term, which is often unclear, but the life-long learning has two main components: *initial education* & *life-long development*. Figure 3 shows the coupling of the life-long learning and the concerning phases of the pathway from pupil to retired professional, based on Figure 1. **Initial education** is the period of learning when the pupil/student is focussed on learning. 100% of the time is spend on gaining of
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Life-long development stands for the situation when the student/professional is more focussed on working activities in order to earn money for living. The gaining of extra competences is not the main focus anymore. It should happen besides the working activities. Note: there are structures that are partly initial education and partly life-long development, like work-learning trajectories, but these are not taken into account.

![Life-long Learning](image)

**Figure 3:** Life-long learning coupled to the pathway from pupil to retired professional

Looking at the ‘pathways to skills’ of UNESCO (2012) the distinction also can be made between initial education versus life-long development and applied versus scientific knowledge, see Figure 4. Figure 4 stresses the skills of young professionals phase. It does not take into account the changes and adaptations during the years of being a professional. The young professional reaches the top, however no matter what the pathway is, a professional will try to raise the top during his working life.

The left side is about the initial education and the right part about the life-long development. The interaction between initial education and life-long development is
addressed well. The top of necessary skills’ can be reached without finishing initial education by work-based training.

**Pathways to Skills**

In Figure 5, life-long learning is schematized with some key words that represents the differences between initial education versus life-long development and the different types of knowledge.
Work-based training

Work-based training is training for professionals that already work. The training is provided in working time or in spare time in the evening or weekend. The main focus of the professional is on the working activities, not on education. On the other hand, the training is necessary to be informed by the latest updates, improving competences for executing the job, etc. So it is essential for a good output.

Employers demand employees to perform well, to keep updated; They often want to support the development of the employee providing money and/or time. But, it should give results. These results can be either an improved output or new skills and so on. The work-based training is much more relevant and tailored to the daily working activities.
than the initial education, which is more general. Quality is essential. The course participant and/or the paying employer demand results and thus quality.

There is a distinction between scientific and vocational training as well as between scientific and vocational education. Academic training is for scientist, engineers and higher management, the top of the pyramid. Topics cover innovative solutions, integrated management, etc. Vocational training is more focussed on grass root and middle management level; the base of the pyramid. Most of the persons work at that level, so there is a huge amount of potential participants. The topics are more based on the daily working: regulations & procedures, working environments, practical knowledge, etc.

**World Water Academy concept**

The World Water Academy offers (under the name of Wateropleidingen) training programmes for professionals in the Dutch water sector. The World Water Academy developed it working concept and build up a wide experience in capacity building and training in order to improve the quality of the employees in the Dutch water sector with specific, practical knowledge on water issues. The main target group is the vocational level at the utilities and water authorities. The practical and technical trainings have a wide range of water related issues.

*For and by water professionals*
An innovative and sustainable method of training practitioners is the concept “for and by professionals”. Passionate experienced water professionals share their know how, knowledge and skills to inspire their peers. The innovation of the World Water Academy-concept is in the didactical methods used to achieve interaction and practical impact: “learned today, applied tomorrow”. Water professionals and practitioners are consulted and involved in the design and development of the training programmes. They are didactically trained and coached to become a professional trainer. By doing this, the courses are up to date and directly related to the daily practise, applied knowledge and know-how, because the trainers are professionals from the water sector themselves.

Key issue is the combination of content and didactics. Didactics (originating from the Ancient Greek word: didáskein, meaning to teach) is the theory of teaching, and in a wider sense, a theory and practical application of teaching and learning (source: wikipedia). A good professional is not a good trainer per se. A water professional needs didactical skills and tools to become a professional trainer, who trains and exchanges his knowledge and experiences to his colleagues adequately. They get tools and confidence to help and train colleagues on-the-job. Thus the local capacity can be strengthened by the local practitioners themselves (Maenhout & Oost, 2011).

Why professionals?
Training on the job is closely related to day-to-day activities. The information given in the lessons have to be applicable in the daily practise. Especially the artisans and operators
will learn and develop if they are directly touched by the information. Their prior knowledge is the package of the initial education in school, college ad university and the working experiences. They need to know how to improve the output of their work. New experiences of colleagues and experienced professionals will feed them with very practical examples, illustrated by pictures and stories. It is about sharing and transferring practical knowledge and skills for the daily tasks.

Who can transfer these experiences better than experienced direct colleagues water professionals? They know what to do. They are used to the working environment. They know about the daily working activities. Experienced professionals are experienced on the topic and the field and they speak the same language as the participants. They know the do’s and the don’ts, they have an huge amount of practical know-how. And most important is that they speak the same language.

A professional trainer is an expert in a number of topics of the courses and is working as a professional in the local water field. He is able to translate his knowledge or skills to the participants using different interactive teaching methods. A professional trainer must be willing to invest time in his preparation. The preparation of one hour course will take about a full day to prepare en to match with colleague trainers.
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Figure 6: Who is the trainer? (answer: right person)

Regarding the goal of practical training courses, the trainer has to comply to the following qualifications:

- Being an expert on his topic (practical and a good theoretical basis);
- Being passionate about his topic/ experience
- Willing to exchange his knowledge and skills
- Able to adjust the level of his teaching to the level of the participants
- Able to use different interactive teaching methods or to be coached in using these methods
- Communicating fluidly, either in the English or local language
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Professionals are selected according to these qualifications. However, the predominantly focus will be their expertise and know how: being ‘the best in class’. Secondary is their ability to teach and present well and to transfer their passion into inspiration for the participants. Tertiary the ability to create a learning environment the to get contact with the group. Important is the adjustment to the level of knowledge of the group and the use of activating teaching methods.

Quality assurance

Quality assurance for professional trainers: example of the Netherlands.

Wateropleidingen organises practical training courses on a wide range of water topics. Every course is delivered by (a group of) professional trainers; all being water professionals and working in the field. Being a trainer is only a small part of his working activities; it is a personal choice, not part of his job. Most trainers prepare and deliver the training in their spare (holiday) time and are paid by Wateropleidingen for the hours they teach and train other professionals during the courses. They also prepare the courses in their spare time, mostly being the evening hours or in the weekend. The courses are well organised (schedule, venue, participants materials, catering etc.) in order to assist the trainers and let them fully focus on their story telling and experiences exchange.

The approach with professional trainers relies on a good logistic organisation. Furthermore the management of the course programme is very important. The contribution of the different trainers has to match. The topics of the different trainers
must be fine-tuned well to create a consistent programme that prevents any gaps or doubling. From the point of view of the participants they want to have one consistent course, fully practical and dedicated to their needs and wishes. From the point of view of the professional trainers, they want to focus on their own comfort zone, being a most experienced person that shares knowledge! The didactical experts of Wateropleidingen design a programme that meets the needs of the participants and does justice to the expertise of the different trainers.

**Quality check**

Wateropleidingen is ISO 9001 certified. The ISO 9001 system requires continuous improvement. Wateropleidingen works according the quality handbook with all the written procedures and the yearly internal and external audits. Furthermore every course is evaluated by the participants by means of a written evaluation. The courses are evaluated on numerous criteria, for instance: contents, depth and details, applicability and practicality, up-to-date, duration, quality of the course book, venue and their opinion on the best parts of the course and suggestions to improve. Also the trainers are assessed by the participants. The assessment encompasses: expertise, presentation, interaction and the final opinion. The student may use a score from 1 to 5. The meaning of the figures are given: excellent (5), good (4), neutral (3), bad (2) and very bad (1). The scores are averaged and the score is statistically evaluated for each course group. The maximum number of students in a course is 24.
Wateropleidingen’s standard for each aspect and for each course is 3.75. Every year approximately 2500 students attend one of the courses. The number of trainers varies every year –depending the number of courses delivered- and varies from 250 to 500 per year.

The overall finding (Figure 7) of the trainers evaluation is above the standard and expresses the qualifications. The figure shows a consistent quality, slightly improving as a judgement of the participants over the years.

Figure 8 expresses more specifically the judgement of the professional trainers on expertise, presentation and interaction. The highest score is on expertise, followed by interaction and presentation. The high score on expertise is evident: professionals are selected on their practical knowledge. The expertise is expected to be the highest score.
In some cases the score of expertise is below 3.75. This can be explained by a mismatch between the trainer and the target group, is the trainer is not able to touch the level of the group. In most cases the trainer is replaced by a better fitting person. This approach leads to a continuous increase of the average score of expertise.

**Figure 8: Trainer assessment divided in criteria (period 2008-2012)**

The policy of the company is a continuous improvement as expressed by the participants. If a trainer is not well assessed by the participants he will be fired in 2-3 years. The assessment is as well for expertise, as for presentation and interaction. The effort of the didactical skills shows result. In the range of 13 years the average figures show a very consistent and increasing quality. The selection of Wateropleidingen on expertise, passion and willingness seems to be a successful chose.
The didactical part, presentation and interaction can be trained and we do.

Wateropleidingen has a continuous coaching programme for the professional trainers.

The programme consists of:

- Training: didactical training skills (basic and advanced)
- On the job coaching: Coaching of trainers, using observation forms
- Didactical help desk
- Master Classes: Asking questions, activating teaching methods, writing exams, for example

Figure 9 gives the assessment of four individual trainers during a four year period. The figures represent the different type of results.

- Trainer J and R: continuously improving, made a big improvement in presentation. In 4 years the gap between expertise and presentation/interaction becomes smaller.

- Trainer M: is expressing very much expertise but the presentation and interaction lacks behind, however the distance becomes smaller. The assessment changer over the years. In fact a result that is well to explain. A trainer has to fit with the group of participants. If not, the results will be affected and decreased.

- Trainer V: is very consistent with excellent expertise and a .3 lower presentation average. However in the last year the presentation skills are lacking back. It seems that the fit between the trainer and the course group seems to get worse.
Figure 9: Assessment of four individual trainers (in period 2008-2012)

The results show that there is a correlation between the three criteria: expertise, presentation and interaction. All three criteria are necessary to become a professional trainer. At Wateropleidingen the level of the professional trainers is high, but the average results show that the trainers score the best at expertise. This is expected, because the main selection criteria is expertise. The four selected trainers show this as well, although they have different pattern of scoring of each of the criteria.

This result underlines the necessity to follow the quality of the trainers and their didactical performance. If necessary, they have to develop on didactical skills.

Conclusions
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The water sector is a relatively small sector with various fields. The offer of water education is quite expensive, because the inflow of students for specific water specialisations is quite low. This, and also the many changes during the working period, demands life-long development. Work-based trainings are one of the main important sources to improve competences (meaning knowledge, skills and attitude) during the working life as a professional. This goes for both technical and vocational training as well as scientific training.

Looking worldwide, the scientific level, meaning engineers and higher management is educated and trained quite well. They have a lot of possibilities worldwide to further develop either scientifically either on managerial skills. However, most capacity challenges are on vocational level. The artisans and operators have to operate and maintain the installations. Using local practitioners as professional trainers is a good example of coping with the challenge. They know the work field, use the same language, have the best and up to date knowledge about daily practices and have skills. Didactics is the key to become from an enthusiastic professional to a well-performing professional trainer. Quality assessments provides the necessary view on the progress in the trainer’s performance.

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