

Plumbing, sustainability and training

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About the research

Plumbing, sustainability and training

Sian Halliday-Wynes and John Stanwick, NCVET

There is currently widespread interest in sustainable environmental solutions, including ‘greening’. In light of this, it is timely to look at how skills in occupations are evolving and responding to this trend. This paper examines the situation in one occupation – domestic plumbing. What is meant by sustainability and greening and what the appropriate response to skills development should be are the two areas of interest addressed in this paper.

Key messages

- The concept of environmental sustainability is slippery. In the context of domestic plumbing, reference to ‘sustainability’ encompasses concerns about water usage and energy consumption.
- The major drivers to changes in plumbing are regulation and new products, mediated by consumer demand, which is primarily driven by price.
- Modern plumbing – for large companies and sole traders alike – demands that workers have both technical and soft or generic skills, such as the ability to communicate and adapt, a finding that resonates with work on so-called innovation skills (Curtin, Stanwick & Beddie [eds] 2011).
- Plumbers need to understand the relevant legislation and regulation (and government incentives), to be aware of product design, and to be able to negotiate with customers and vendors. The training needs to reflect this.
- Entry-level training undertaken in TAFE institutes needs to emphasise the basic principles of plumbing, since even with the greater focus on environmental sustainability, the fundamentals of plumbing remain the same. This training also needs to establish the foundation for continuing professional development.

That leaves the challenge of upskilling qualified plumbers, many of whom may resist further training. One option is vendor training, although the ‘selling’ aspect needs to be recognised; another might be greater regulatory requirement for continuous professional development as exists in New Zealand.

Tom Karmel
Managing Director, NCVET

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Introduction

Greening and sustainability loom large. The issue we wish to investigate is whether training is changing to meet developments in these areas. In our case study we consider how the nature of domestic plumbing is evolving in response to greening, and what the current skilling and training needs are, with a view to identifying what is missing from current training approaches.

The Council of Australian Governments' *Green Skills Agreement* (2009, p.1) defines green skills, also referred to as skills for sustainability, as:

the technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community.

The breadth of this definition means that it is not particularly helpful to our research, and as our investigation progressed it also became apparent that it is impossible to precisely define 'green plumbing'. And while we acknowledge the point made by the National Plumbing Regulators Forum (NPRF), that the plumbing industry has long been aware of the need to minimise the impact of installations and systems on the environment, the rise in palpable community interest in saving water and energy is what we see as the new angle to domestic plumbing. The basis of this study was interviews with plumbers, trainers, apprentices and industry representatives (table 1).

Table 1 Respondents to interviews

Organisation type	Number
SA Water	3
SA Health	1
Industry body	3
Self-employed plumbers	3
Private companies	4 (including one apprentice)
TAFE SA	2
Group training company	2 (including one apprentice)
Plumbing industry representative	1
Total	19

In addition to these interviews, we had informal talks with five apprentices at TAFE SA. The interviews were supplemented by reference to the literature, legislative material and other pertinent documents.

We first describe some of the developments that have been occurring in domestic plumbing. This section concludes that the major drivers for change are amendments to legislation and regulation (often reflecting the emphasis governments are putting on environmental issues) and new products. These drivers are mediated by consumer demand, which is primarily driven by cost considerations.

We then investigate the implications of these changes for training. What emerges is that fundamental skills are becoming even more important, and that soft skills, particularly the ability to understand legislation and communicate with customers, are increasing in importance but are being neglected. An interesting development is that increasing specialisation is driving a wedge between the large companies and sole traders, with the latter missing out on some of the new branches in plumbing.

We end with some observations which emphasise that new technologies will continue to emerge and that industry needs to address the issue of ongoing as well as initial training. This in itself implies that initial training must establish a solid educational foundation for a plumbing career.

Developments in domestic plumbing

The contribution that plumbing already makes to the community through water conservation and environmental sustainability as well as to public health is well recognised. In the twenty-first century, domestic plumbing has become more complex as a consequence of customer demand for better design and more environmentally sound solutions, and for many plumbers, their role has diversified. No longer is it simply a matter of installing a new toilet or bath; plumbers are required to have product knowledge and a full understanding of regulations. This suggests that the skills a modern-day plumber needs are wide-ranging. Plumbers are increasingly expected to think conceptually about different ways of working to comply with consumer demand and emerging technologies and to meet the challenges of environmental sustainability.

From 2004 the Australian Government began to increase the regulation of water sustainability practices and introduced new plumbing requirements for Australian commercial, industrial and residential projects. In 2006, the national Water Efficiency Labelling and Standards Scheme (WELS) was introduced, mandating labelling of all water-using devices and the phasing-in of water-efficient shower heads, taps, washing machines, toilets and urinals. It was estimated by Chong, Kazaglis and Giurco (2008) that, over the period 2005–06 to 2020–21, the implementation of this scheme would save 800 gegalitres of water, or approximately one-and-a-half times the volume of water in Sydney Harbour.

The Water Efficiency Labelling and Standards Scheme serves as an example of the types of policies impacting on the Australian plumbing industry. The 2005 *Water Efficiency Labelling and Standards Act* represented national legislation, and each Australian state and territory parliament enacted complementary legislation to ensure a localised effect. Other implementation issues, such as compliance and subsidies for new investment, have remained with the states and territories; these jurisdictions generally also maintain ownership (in most cases) of the infrastructure of water catchment, processing, distribution and waste treatment.

New technologies and green skills

In many respects, innovations and new product designs have required minimal new skills on the part of the plumbing workforce. The processes of the plumbing role typically draw upon skills required in coupling elements to one another – whether they are copper pipe, fittings or tapware. Innovations in the products themselves tend to have only a limited impact on the plumbing role.

There is, however, a need for plumbers to have knowledge of new innovations and regulations to ensure that they make the appropriate choices for various applications. A greater variety of products, suited to diverse situations and uses, requires the effective diffusion of regulatory and technological knowledge within an industry, particularly its domestic arm.

The integration of traditional plumbing with gas, electricity and heating technologies has made the industry more complex, with the skills associated with these various industries deployed within the wider construction sector. For example, in Australia, plumbers often hold dual licences to enable them to work with natural gas in homes and in commercial premises.

Concomitantly, there has been a trend towards specialisation within the industry – domestic, industrial and commercial work, roof plumbing, air-conditioning systems, fire-prevention systems, water-main drilling and tapping, gas work, drainage and design. The increasing focus on environmental sustainability, the capture and recycling of water (including the use of grey water in domestic settings) and the now-common installation of solar hot-water systems have meant that plumbing has had to respond to substantial industry and community demands.

Respondents to the interviews discussed the implications, both positive and negative, arising from technological advances in plumbing that lead to sustainability – or in more pragmatic terms, water saving. On the negative side, it was noted that the now-prevalent highly customised devices were expensive and difficult to repair. A few respondents were sceptical about whether being green was really new, in the sense that plumbers have always been concerned about water saving. One noted that ‘it’s about energy and power – what I call cutting the cost at the source’.

Regulatory/legislative drivers

While there have been regulations in place for some time in the plumbing industry, the concepts of green skills and sustainability discussed above have led to accompanying changes in legislation. One respondent noted that ‘it’s regulation and licensing that will drive change’ (Plumber, SA Water).

The introduction of the Plumbing Code of Australia has begun to address many of the changes that the industry faces and more generally the concerns of the wider community; for example, the need for resource and energy conservation, as well as the introduction and maintenance of sustainable plumbing methods.

Australia is also moving towards the introduction of a National Construction Code (NCC), which will incorporate plumbing. The code, an initiative of the Council of Australian Governments, is being written with water conservation and environmental sustainability in mind. Amendments take account of grey-water systems, solar hot-water systems and cold-water piping, and it is widely hoped that this legislation will bring all the states and territories into alignment, leading eventually, to a national plumbing system. The states and territories are also working towards developing a National Licensing Board. It is anticipated that, with its inclusion in the National Construction Code, the plumbing industry will develop a more coherent approach to both the upskilling of tradespeople and consumer education.

There is also the expectation that all governments (state, territory and federal) will pay more attention to the benefits of publicising more sustainable product initiatives to the public. This would include the advantages of installing the grey-water or black-water systems, a greater emphasis on solar hot-water and power systems and environmental credits, called Renewable Energy Certificates.¹

In addition to the plumbing code, other national regulations also affect plumbers. For example, as mentioned earlier, there is the Water Efficiency Labelling² legislation, which provides for mandatory water efficiency labelling for appliances, as well as the Building Code of Australia (BCA),³ which contains technical provisions for the design and construction of buildings and also includes some

¹ Environmental credits called Renewable Energy Certificates or RECs for short. These credits are a commodity and tradable like shares on the Australian Stock Exchange. Like other commodities, the price of RECs is not fixed and varies with supply and demand. 1 REC is equal to 1MWh of generation from a renewable source and is part of the Mandatory Renewable Energy Target, which is an industry development mechanism created by the federal government in 2001.

² See <<http://www.waterrating.gov.au/compliance.html>>.

³ See <<http://www.abcb.gov.au/index.cfm?objectId=959C6DF0-9A12-11DF-A133001143D4D594>>.

energy-efficient benchmarks. Each state may also have its own regulations; for example, in South Australia, most new homes require a rainwater tank plumbed to the house.

Customer demand for green skills and costs

Several respondents noted that a factor that affects the level of customer demand for green products is the cost. It was generally considered that green solutions were presently too expensive, especially when retro-fitting was involved (apart from standard water-saving initiatives). One respondent stated that, ‘ultimately the market is driven by the customer’ (Private company). Another said: ‘When it comes down to it, it’s all about the dollars. If the customers can’t afford it, it won’t make that big an impact on the market’ (Plumbing Industry Association). The sentiment was summed up by:

Going green is not easy nor is it cheap. For the average household going green is a really, really long-term investment. Being really green, really ecologically sound has a long way to go.

(Sole trader)

Many of the interview respondents expressed concern about the sustainability of various government greening incentives and initiatives:

Eco plumbing is an excellent idea but it will never be really effective at a state or national level if it isn’t enforced. We have the SA Water regulation and we have the rebates; but I don’t think that they are enough, and I don’t think there is enough publicity given to the green options.

(Sole trader)

Moreover, sole traders can make a steady living working with proven applications; consequently, they have little interest in the upskilling required for the installation and maintenance of specialist plumbing equipment designed for green applications.

Ultimately, the market is driven by the customer and they aren’t really educated to think about water conservation because the industry is reticent about promoting all water-saving devices because plumbers are worried about losing business if they have to raise prices. There is a greater push from big companies but not sole traders, so the more costly installations, and those are usually green skills, are left to big companies. Sole traders are still maintaining electric hot-water units even though they are not supposed to do so because they are protecting their customers (not everyone can afford solar, even with the rebate) and then they don’t want to be seen to do a ‘hard sell’.

(Private company)

Furthermore, green solutions are seen as too costly for sole traders. The majority of sole traders who took part in the interviews commented that the biggest barrier they face is customer reluctance to turn to expensive green solutions. By comparison with large companies, they are unable to compete on the basis of cost.

If they [the customer] want a new hot-water system, well that has to be compliant with the new regulations and I’d tell them to go to Solahart or Modern Solar – it’s just not competitive for me to quote.

(Sole trader)

To sum up, we have seen that there are two main drivers for skills for the modern plumber – technological and legislative. These are mediated through customer demand, which is sensitive to cost and the availability of government subsidies.

Implications for skills and training

Plumbing is a licensed occupation and consequently has quite stringent training requirements. The main method of entry into plumbing is through an apprenticeship. The apprenticeship involves both off-the-job and on-the-job training. The off-the-job component comprises training through a registered training organisation using the Plumbing and Services Training Package, while a considerable amount of on-the-job training is involved to get the apprentice work-ready. Upon completion of the apprenticeship and any other requirements, application can be made for an occupational licence to work as a plumber. Various specialist qualifications in plumbing can be undertaken.⁴ In addition to the Certificate III in Plumbing, there are, for example, Certificate III in Roof Plumbing, Certificate III in Gas Fitting and Certificate III in Fire Protection, and a Diploma of Hydraulics Services Design. The large variety of competencies available in the training package includes some associated with green skills, such as *Design grey water re-use systems in sewerred areas*.

There is now an expectation that green skills will be embedded in training packages and consequently they form an element of the initial training for apprentices. This is part of the Council of Australian Governments' *Green Skills Agreement*,⁵ whereby it is expected that VET practitioners will also be upskilled so that they can provide training in skills for sustainability. A cursory look at some of the units of competency in the package shows that indeed sustainability has been integrated into training packages in terms of required knowledge, in particular, that relating to water and energy efficiency. The Construction and Property Services Industry Skills Council is also undertaking further work on ensuring that sustainability is explicitly encompassed by the units of competency.⁶

There was consensus among the interviewees that green skills not only have a place in, but have been embraced by, the plumbing industry. Without exception, all interviewees were aware of green skills and considered them to be as varied as reducing energy costs, installing environmentally friendly products, using products that were fit for purpose and using technology effectively. The experienced plumbers interviewed expected that, because of the introduction of green skills into training packages, advances in green skills and the new technological applications would filter through the industry and that apprentices were being made aware of new processes.

There is, however, a certain level of scepticism and a poor understanding of what might be green skills. For instance, apprentices did not identify the installation of solar panels, rainwater tanks and rainwater connection as green – these were just part of what domestic plumbing entailed. Many interviewees noted that the basic plumbing skills remain largely the same and most of the plumbers who took part in this study were confident that they could install a grey-water system, considering it to be a modification of a standard application. Similarly, one apprentice commented that:

Plumbing in a toilet today is pretty much the same as plumbing in the toilet ten or 20 years ago. The green 'skill' is not in the application but advising the customer about the WELS rating and getting a rebate. The job has essentially remained the same. (Plumbing apprentice)

⁴ This information was derived from the former National Training Information Service, see <www.ntis.gov.au>. As of July 2011, this information can be found in <www.training.com.au>.

⁵ See <<http://www.deewr.gov.au/Skills/Programs/WorkDevelop/ClimateChangeSustainability/Documents/GSAgreement.pdf>>.

⁶ See <http://www.cpsisc.com.au/projects/Plumb_and_Ser_CI_project>.

Overall, the apprentices contacted felt that there was now greater emphasis given to green skills in new domestic building, but that it was dependent on the main builder – most included the minimum green regulation, although few builders incorporated green plumbing as a feature of development.

Then there is the issue of specific products. It was pointed out by the more experienced plumbers that, while basic plumbing skills would not change, new products meant a ‘generic fix’ was impossible. Many of the newer green products have been designed not to be repairable by generic tools; there is a variety of reasons for this, including patented design and to ensure that plumbers become brand-loyal. Plumbers noted that, although the physicality of the job had decreased with the introduction of new products, product complexity had increased, making the job more technical.

A gap exists between the larger plumbing companies, which have the time and money to invest in the training associated with the application of green products, and the sole trader, whose business is focused primarily on product maintenance, repairs and services to customers interested in less expensive or ‘low cost’ solutions.

As green skills become embedded in the public consciousness and become industry standard practice, new generations of apprentices will need to have their training expanded and be encouraged to think more broadly about the marketing of green options. It will become more important for them to: have the skills to negotiate with customers; be aware of new products and their design; understand and respond to state and industry regulation; negotiate with suppliers; and be aware of the legislation pertaining to green initiatives in the plumbing industry. These skills are more comprehensive than the technical skills generally recognised as being required by plumbers, which suggests that the modern plumber is increasingly expected to think conceptually about different ways of working in order to comply with the emerging technologies relating to environmental sustainability. A key issue is whether the skills required for these tasks fit into the realms of specialisation, or whether they should be part of initial training. TAFE trainers are aware there are gaps in skills acquisition, with one commenting:

We should be incorporating computer skills and communication skills as well as all the things that they learn on the job, but it’s an additional cost to training and they can do advanced diploma courses after they complete ... and upskilling is important but not accessed enough and we’re aware of that. (TAFE trainer)

Broader generic skills are seen as being very important in the context of modern plumbing. Most respondents specifically mentioned computer skills and more advanced IT skills and communication skills as crucial. Trainers said that they attempt to emphasise the need for apprentices to be aware of the broader skills they may require, especially if they intend to work for themselves, while the established plumbers admitted that these employability skills are essential for running a small business.

The TAFE trainers interviewed said that they have neither the time or the resources to cover soft skills in their training, but did agree that they could or should be covered in greater detail in post-trade qualifications or as part of licensing. Both TAFE and industry groups were cognisant of the need for plumbers to communicate effectively with their customers; for example, being able to explain to customers the advantages and disadvantages of particular installations. Plumbers admit that in some cases their customer service skills are not what they should be. Accounting is also an important component of running a small business and many plumbers are reliant on their spouses, who take care of accounts and keep up to date with legislative changes.

Another trainer who acknowledged the need for a greater focus on soft skills and the emerging trends in green skills also recognised that additional training takes time and money and both are in short supply. Most plumbers and trainers were in agreement that the ‘training is the grounding but it’s after training that you really learn’ (TAFE trainer).

TAFE teachers themselves state that they maintain their plumbing skills and are constantly in touch with the local water company (in this instance, SA Water) to keep up to date with legislative and regulatory changes. Yet plumbers, especially sole traders, argue that the training today is not as comprehensive as in the past, suggesting that more attention needs to be given to emerging practices. In contrast, some apprentices noted that some of the new applications or processes introduced at TAFE were dismissed by established plumbers, with one apprentice commenting:

When you tell them [qualified plumbers] about something new you’ve read, learned at TAFE, seen at a trade centre they often don’t want to know. It’s a personal insult that you’re telling them their job. It’s not like that; it’s just passing on what new things are out there. (Apprentice)

According to the plumbing lecturers at TAFE, many young apprentices are aware of and are keen to develop green skills and they are receptive to having green skills incorporated into their training – in contrast to established plumbers, who rarely access the green training available. But like the established older plumbers, the lecturers saw the industry as always having been aware of sustainability, even if they didn’t label it as such. For the most part, apprentices see implementing water-saving measures as both an individual and community responsibility. They also identified the necessity of providing the customer with an environmentally sound home. Trainers commented that at present ‘ecologically sound’ plumbing is a specialisation, even though certain components of green plumbing are being taught to apprentices. TAFE is unable to offer the real depth of knowledge that is needed to fully explore and teach all aspects of the green components of plumbing. They simply do not have access to the funds, and the current training is simply not broad enough to include all the latest developments in green plumbing.

Upskilling and vendor training

Without exception, all the plumbers acknowledged that upskilling was important and they saw the benefit of accessing further training for computer and communication skills, but few had accessed these courses, and fewer had any intention of doing so. The industry therefore faces a dilemma: it is aware that additional non-technical skills are vital now and will continue to be in the future, but struggles to get qualified plumbers to access these skills if they are not embedded in initial training. Plumbers have to recognise that they need to embrace training throughout their career, not just at its beginning.

According to the interviewees, upskilling is seen as being ‘easier’ for employers in large companies (as opposed to sole traders). Larger companies are able to employ dedicated training managers who focus on ‘application, installation and maintenance’. It was suggested by a representative from a large employer that the training manager fulfils a dual role: firstly, educating the company’s own plumbers (solar hot-water installation, fault-finding and maintenance, the latter being an area identified as being severely deficit and a growth market); and, secondly, identifying gaps in the training market they can fill. As a respondent from a private company commented: ‘there has to be a stronger focus of upskilling because of emerging technologies’.

Although this lack of skills in emerging technologies benefits the larger companies, unwillingness on the part of plumbers outside the big companies to take part in training or to engage with new

products means that knowledge is being ‘siloes’ and sole traders thus lose out on business. According to a dominant industry manufacturer, the real gaps in knowledge become apparent when product maintenance is required; for example, where the same manufacturer commands a large share of the market in Australia and is the parent company of many smaller operations, they are able to determine not only the product line but also influence continuing or initial training and how the information is disseminated – the manufacturer being the only source of information on the product.

Remaining up to date with current practices, emerging trends and legislative changes and upgrading IT skills were all seen as essential by the industry and, although this is not disputed by any of the respondents (even those who did not access training), few of the plumbers interviewed want to undertake the training. The question that remains unanswered is how this information can be passed on to the plumbers who need it when so many do not take up the available training. An industry body suggested that training could be accessed online as well as in a face-to-face setting, but this only works if the tradespeople have adequate IT skills in the first place. A possible solution to overcoming the lack of training uptake, suggested by some respondents, would be to make some aspects of the training mandatory by linking it directly with licensing.

As it stands in South Australia, there is no mandated regulation for upskilling, so how do tradespeople keep up to date with training; only the motivated will do so. However, there are all kinds of new developments, regulation, legislation that could be covered in mandatory training spread out over the calendar year. (Industry body)

One plumbing trainer suggested that the focus of post-trade school training should not only be on the latest practical developments but on changing the mindset of the qualified plumber, who for the most part is resistant to accessing training. Linking training and licensing would force them into keeping their skills updated.

Vendor training in new products is also part of upskilling and forms a large part of this training. While there are complaints from some quarters that these sessions are as much about merchandising opportunities as training, they do offer the opportunity to get to grips with new products and are often the only contact that established plumbers have with any form of training.

One way that plumbers do get their information about new products is through the suppliers. A huge amount of money is spent on research into new products and new technologies. (Industry body)

For example, one large company presents training in an ‘informal but instructive manner’, offering refreshments and an opportunity to handle and become familiar with the products rather than adopting a ‘show and tell’ format. They admitted, however, that the training provided to plumbers was usually ad hoc and those plumbers who accessed training ‘dipped in and out’, learning about products when they needed to rather than thinking about training in a systematic manner. Representatives from some larger companies said that they would be supportive of hosting or collaborating with industry groups who provide professional development. Again, the main obstacle to this, it was noted, was actually getting plumbers to attend training.

Final comments

The introduction of green skills, in terms of products, applications and more generic skills, presents challenges for training. From a plumbing industry perspective, training needs to be current and be extended beyond general training into more highly specialised areas, areas which have not yet become mainstream. For example, technologies are emerging that focus on aerated effluence systems, subsoil irrigation and hydronic heating,⁷ to name a few.

Industry groups remain sceptical about whether the majority of trained plumbers would be able to install or would even contemplate taking on a job that incorporated these new products. Post-trade courses in these areas are not being offered at TAFE, with our research identifying that, as far as the South Australian industry body was aware, there were no plans (as yet) to set up training to bridge the skills gap. The association considered that the suppliers were filling the training space. They recognise the huge potential in the future for plumbers who are willing to take up training that enables them to come to grips with the technicalities of newer products. The representative from the association commented that many plumbers are aware that changes are occurring, but they are slow to pursue the changing market.

It is conventional wisdom that the VET sector has an ageing workforce, but despite this the TAFE trainers interviewed were neither old nor ill informed. They state that they keep up with new developments and pass these on to their students. The main obstacle in getting the information through to the established plumbers is often the plumbers' own resistance to something new. The TAFE trainers who participated in this study indicated that they were closely involved with their own family plumbing business, sat on national committees, or were involved at a high level with state legislation and professional bodies, and were acutely aware of the necessity to include new practices in training.

TAFE teachers and plumbers themselves pointed out that it is notoriously hard to change the practices and mindsets of some of the more experienced plumbers, with 'we've always done it this way' often being their mantra. As a trade group, plumbers are usually wedded to a method of working, but new legislation and practices are being fed through from apprentices, and plumbers do see the benefit of embracing new methods and technologies. Some apprentices stressed that they take new practice ideas back to the workplace and encourage their employers to consider new methods. But, as has been noted, this 'bottom up' approach to passing on information to established tradesmen is not always successful.

There are challenges for TAFE in introducing new products and applications. Several apprentices mentioned that they are aware of the gaps in the training either at TAFE or on the job and have raised this as an issue with TAFE teachers. These gaps have often been identified as a result of apprentices attending vendor training, speaking with suppliers or simply becoming aware of new products or applications, with apprentices feeling that they should be incorporated into current teaching. TAFE is aware that there needs to be a greater understanding of the emerging technology but this will change as customer awareness and demand dictate. TAFE trainers also commented that

⁷ In most hydronic systems, the water is heated in a boiler and then pumped through piping to panel radiators or convectors positioned in each room. Heat is transferred directly from these to the room air. In-slab ('floor coil') systems are also available. In these, the heated water is pumped through piping laid in a concrete slab floor during its construction. Heat is released into the slab and subsequently into the room.

there needs to be better 'case management' and greater liaison with employers to expand their understanding of what sustainability and green skills actually are.

Discussions on the challenges for upskilling plumbers addressed the notion of mandatory training for plumbers and also linking training to licensing. The plumbers, trainers and stakeholders agreed that for green skills to be integrated into mainstream training, a certified and compulsory green training scheme should be introduced.

It is worth noting that in New Zealand there is a continuous professional development requirement for plumbers. The New Zealand *Plumbers, Gasfitters and Drainlayers Act 2006*⁸ requires gasfitters to demonstrate competence annually through board-approved continuous professional development programs, and this requirement has now been extended to plumbers and drain-layers. For a plumber alone (with no gas-fitting or drain-laying), the minimum annual professional development is about 12 hours.

While there was discussion on mandatory requirements for ongoing training, it needs to be recognised that there is likely to be resistance to this. For instance, mandatory training could be particularly onerous for sole traders, who are the least able to afford it. There would also be practical difficulties in application because plumbing spans a large number of industry areas. And there is also the issue of how the training would be funded. All in all, recommending mandatory ongoing training would require courage and determination.

In conclusion, the modern plumber needs, in addition to basic plumbing skills, training in new technology and some development in the soft skills that are required to do business. The question is when should this training be delivered: as part of the initial apprenticeship or through continuing professional development? Given the rapidity of product development and the constant changes in regulation, the answer is most likely, both. In any case, there is a compelling argument for strong basic educational skills in initial training that provide a strong foundation for ongoing development.

⁸ See <<http://www.pgdb.co.nz>>.

References

- Council of Australian Governments 2009, *Green skills agreement*, viewed April 2011, <<http://www.deewr.gov.au/Skills/Programs/WorkDevelop/ClimateChangeSustainability/Pages/GreenSkillsAgreement.aspx>>.
- Chong, J, Kazaglis, A & Giurco, D 2008, *Cost effectiveness analysis of WELS – the Water Efficiency Labelling and Standards Scheme*, prepared for the Australian Government Department of the Environment, Water, Heritage and the Arts by the Institute for Sustainable Futures, University of Technology, Sydney.
- Curtin, P, Stanwick, J & Beddie, F (eds) 2011, *Fostering enterprise: the innovation and skills nexus – research readings*, NCVET, Adelaide.



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