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Driving ESD potential within professional curricula: Built Environment Sustainability Training and training development for professionals in Wales

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Abstract

The Built Environment sector is responsible for 47% of all CO_2 emissions, 90% of all surface mineral extraction and over 25% of all waste sent to landfill. In Wales, 30% of the carbon footprint comes from the built environment sector, a fact exacerbated also by having the highest proportion of pre-1919 building stock in the UK. None of these problems can be dealt with without having an appropriately skilled workforce, able to consider new technologies, applications and processes to deal with the problems of a rapidly changing built environment sector.

This paper describes the work carried out by the Built Environment Sustainability Training (BEST) Programme in Wales, designed to develop and deliver sustainability focussed training to Built Environment professionals, using an evidence based approach. This involved the development of Skills needs analyses which outlined training needs within the sector for the short, medium and long term. Development of the courses considered the best methods of delivery to attract the sector, including blended learning approaches. Underpinning course delivery is consideration of the Education for Sustainable Development agenda, enabling recommendations for modification of existing courses offered by training delivery partners. Short term results of the BEST Programme include the delivery of new training courses that assist driving sustainability within the sector; whilst longer term results are anticipated as a culture shift in the practices used by the sector. The benefits to Wales are discussed in terms of achievement of policy measures, and recommendations are made for wider use of the methodology.

Keywords

Built environment, Education for Sustainable Development, training, development, sustainability literacy

Introduction

The Built Environment (BE) sector is an economically important sector for the United Kingdom, employing over 2.3 million people (over 8% of the workforce) (ConstructionSkills, 2009). It provides the infrastructure and foundation for all other economic activity (STEM Choices, 2011). It is also responsible for a number of key environmental impacts, with buildings being responsible for 45% of total carbon emissions and 32% of all waste sent to landfill is related to their construction and demolition. Households account for 58% of all public water consumption (Sexton, 2011). HM Government predicts a growth of "*22.8% in green and sustainable building construction up to 2017*" (HM Government, 2013).

In Wales, the sector accounts for 15% of the workforce (UKCES, 2012). In terms of environmental performance, the sector is responsible for 45% of carbon emissions, 80% of all mineral extraction and 25% of waste sent to landfill (Build Up Skills, 2012). The rate of building stock replacement is only 0.6% in Wales, compared to 1% in the UK (Welsh Government, 2010). From a policy aspect, Wales has set a number of ambitious sustainability targets directly related to the built environment sector. These

include an annual 3% reduction in greenhouse gas emissions from 2011 in areas of devolved competence (Welsh Government, 2010a); the recycling of 70% waste by 2025 (Welsh Government, 2010b); and generating more renewable energy than is currently consumed by 2025 from a mix of sources (Welsh Government, 2012).

A key issue in relation to meeting these ambitious targets is training of the existing workforce, highlighted by the fact that the majority of people who will be in employment in 2020 are already in the workplace (HM Treasury, 2006). As Leitch outlines in his report "*without increased skills, we could condemn ourselves to a lingering decline in competitiveness, diminishing economic growth and a bleaker future for all*" (HM Treasury, 2006, p1). In Wales, there is the recognition that the development of higher level skills will be required to enable competition and growth (Welsh Government, 2014).

Workforce training can either be provided via vocational qualifications (VQs) or Continuing Professional Development (CPD). VQs enable people to do specific jobs, and CPD enables progression within a career, with some professions stipulating minimum requirements (e.g. the Royal Institute of British Architects stipulates a minimum of 35 hours of CPD per year (RIBA, 2014)). Literature suggests that professional learning is best served when delivered in authentic environments relating to the individuals daily role (Felsted *et al*, 2010). Other important factors relating to professional learning relate to the individuals themselves (their motivation and attitude) as well as organisational factors (the workplace, its requirements and the learning settings provided) (Metso and Kianto, 2014). The techniques of learning are also important – different people learn in different ways, and thus a range of techniques such as coaching, mentoring, role-modelling and simulation will be required to respond to the variety of learning styles within a professional cohort (Cheetham and Chivers, 2001).

Delivery methods are also important in terms of engagement of professionals in learning. Blended learning where delivery is through a mix of 'traditional' instructor-led approach that is then supplemented using technology (e.g. an online approach) (Bersin, 2004, cited in Onguko *et al*, 2013), is gathering in popularity for professionals, as it enables a greater degree of flexibility for engagement. Within the built environment sector, literature suggests that blended learning is used widely and is able to provide "*simulated learning experiences*" to its participants (Poon, 2012; Poon, 2013). Although care must be taken; there are certain topics for which blended learning would not be suitable; and for certain trades, there is no substitution for face-to-face and practical learning approaches.

Education and training are key in terms of driving change and achieving sustainable development (Mochizuki and Fedeeva, 2010). Indeed, in the proposed Future Generations Bill for Wales, the current omission of education and skills has proven to be an issue that has been discussed at length. In terms of professional development, it is recognised that there needs to be the ability to deal with sustainability challenges in order to enable progression (Mochizuki and Fedeeva, 2010). There is a note of caution in this: no matter how good the education received is, there is always likely to be a gap between what an individual learns and how it motivates behaviour change to solve the problem, especially related to sustainability issues (Kopnina and Meijers, 2014).

Education for Sustainable Development (ESD) enables people to consider the longer-term implications of their decisions (UNESCO, 2013), and as such, assists within professional development for sustainability challenges. It is intended to be considered by every educational sector, as outlined in Chapter 36 of Agenda 21 (United Nations, 1992), and its importance was stressed in the resulting report from the World Summit on Sustainable Development, especially related to 'workplace-based' programmes (United Nations, 2002).   Further importance was placed on ESD when the United Nations adopted a resolution to develop a Decade of Education for Sustainable Development (DESD), spanning from 2005-2014. The DESD has set objectives and milestones and is aimed to be implemented across the World (UNESCO, 2005).

Much work has since progressed within formal education (primary, secondary and tertiary level).   The UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training has undertaken considerable work to assist UNESCO members to improve technical and vocational education training (that based around the world of work) to encompass sustainable development (UNESCO, 2009). There is certainly ESD progression for certain professions such as teachers. However it is noted that those people with science, technology, engineering and mathematics (STEM) backgrounds are most likely to work in roles which can contribute the most to sustainability and also have more influence on public and policy debates (Hopkinson and James, 2010).

However ESD is utilised within professional training and development, it is important that it is not seen as an 'add-on' agenda (Lu and Zhang, 2014).   It needs to be considered as 'core' to all education for all disciplines, enabling a differing way of seeking solutions (Jucker, 2002).   The issues surrounding content are important, but equally so are the methods used with individual teaching practice (Holdsworth *et al*, 2008).   This is also equally important when considering how to deliver CPD or other relevant professional training; adults have different learning requirements and these need to be taken into account when training is designed and delivered (Riding and Rayner, 1998; Adey *et al*, 1999; Cassidy, 2004; Coffield *et al*, 2004).   Literature terms this '*andragogy*', and is defined as the science and art of adult learning (Knowles, 1984).

When related to career-based learning, it has been shown that problem-solving methods work best, especially for work based concerns. This concept also helps to outline that the learners need to be motivated to understand why the learning is of importance so that they will allocate time to embed this new knowledge in practice (Hill, 2001).   This therefore highlights the need to ensure that CPD or other professional learning takes into account how the knowledge will be acquired and applied (in the context of the professional setting) (Stevenson and Gwilliam, 2014).

Professional learning is related to specific competencies, learnt formally or informally (Cheetham and Chivers, 2001).   The '*continuous renewing*' of professional competencies can be seen as critical in terms of successes for both individual employees and the organisation (Slotte and Herbert, 2006). In a similar vein, ESD helps learners to fulfil a set of competencies related to sustainability. Many of these can be considered as transferable skills for example critical thinking, systemic thinking, inter-trans-disciplinarity, values and ethics (Segalàs *et al*, 2012). Being able to think

more widely and consider 'global citizenship' issues is also important (Zinser, 2012) and encouraged within ESD.

There is also the issue of 'sustainability literacy'; as the 2005 UK Sustainable Development Strategy outlined, there is the "*need to make sustainability literacy a core competency for professional graduates*" (HM Government, 2005, p39). Literature outlines that a 'sustainability literate' built environment professional would display a number of attributes, including sustainability knowledge and skills related to their discipline; generic sustainability knowledge and skills; along with sustainability relevant values (Murray and Cotgrave, 2007).

This paper will outline the BEST Programme and how it aims to improve delivery of sustainability training to professionals in Wales. It will also outline how consideration of ESD will be of benefit for both delivery partners and professionals from a theoretical viewpoint, by challenging how ESD has the potential to raise competency levels for professionals. The paper will present the BEST Programme, its approach used to develop the evidence base from which training needs have been identified, and the process used to achieve training project delivery. It will then provide a theoretical viewpoint as to how ESD can be used to strengthen the sustainability literacy of the professionals trained. It will also provide recommendations for further work in the area.

The BEST Programme

BEST is a Cardiff University-led European Social Funded Programme which began in April 2012. Its main aim is to develop and deliver sustainability-focussed training for built environment professionals. As sustainability is such a broad topic, the Programme is split across 4 themes: construction (covering on-site and off-site), energy, waste and water, and considers the contexts of new and existing build.
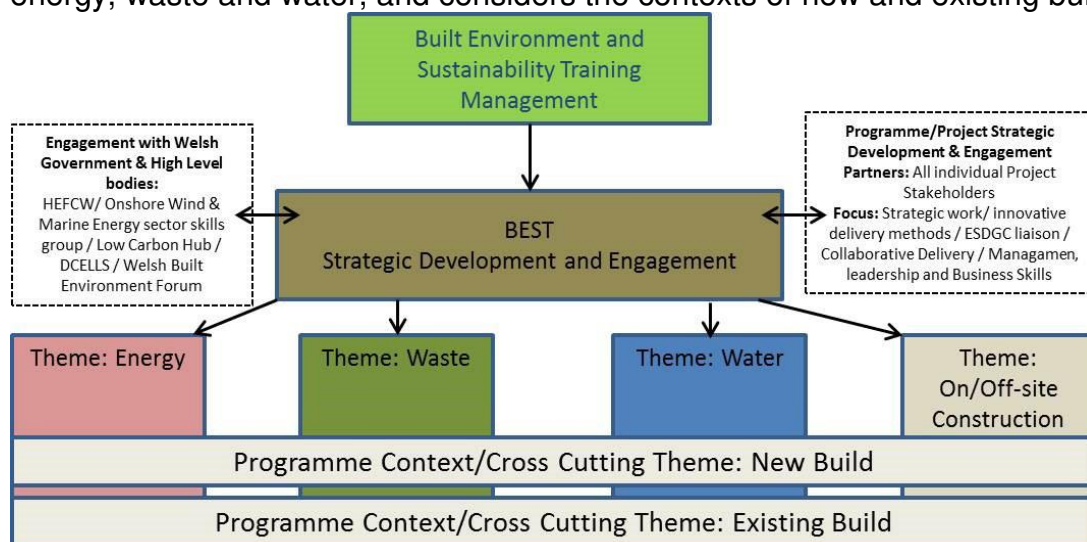
Figure 1: Structure of BEST themes. (Developed by JA Gwilliam, 2010)

BEST is a collaborative Programme, working with Constructing Excellence in Wales, CITB-ConstructionSkills, the Energy Savings Trust, the Building Futures Group, Proskills and Summit Skills. The Programme also unites a wide range of stakeholders who are responsible for skills in the energy, waste, water and built environment sectors. BEST is funded to provide support for individuals and businesses within the 'Convergence' areas of Wales (covering 15 local authority areas within West Wales

and the Valley); deemed suitable for support as the region's average Gross Domestic Product (GDP) per head was below the 75% European GDP average (Welsh European Funding Office, 2009, p1).

The Programme is split into two phases. Phase one is the research phase (which ran from July 2012 – June 2013), and saw the joint programme sponsors develop Skills and Training Needs Analyses which defined the skills gaps within each theme, and has directly influenced the training to be procured. A further output from this phase includes the development of a 10-year strategy and a training roadmap, designed to be used by key stakeholders to influence future training development as well as future funding. Phase two is the development and delivery phase, and involves tendering (in line with funding requirements) for projects which meet the identified training needs from Phase one. These projects will be monitored and evaluated against set criteria to ensure the overall Programme targets are being achieved. Due to the nature of the funding, the training cost for beneficiaries is fully subsidised.

The legacy of BEST will be the training developed and the strategy where it is anticipated that the delivery partners will continue with the training courses after the funding has ceased, turning these from fully subsidised courses into income-generating courses as required. The strategy will be available to policy makers, Sector Skills Councils and other relevant stakeholders to ensure its appropriate use. It will also be used to inform future funding proposals intended to continue the work of the Programme.

The BEST programme has some limitations, the first of which relates to a defined funding timeframe without guarantee of further funding. The nature of the funding requires challenging targets to be met with a limited team of staff. As with other projects of this nature, there is the possibility that all work achieved could cease once funding has ceased. However, the model applied aims to show that this programme will achieve its targets whilst providing a legacy for the sector past the core funding received.

Development of Skills Needs Analyses and training needs identified
Each joint programme sponsor (with the exception of ProSkills) was responsible for leading the development of a Skills and Training Needs Analysis in the area of their expertise. The rationale for this was clear – many of the joint programme sponsors were Sector Skills Councils (this has changed due to removal of core Government funding in 2012), therefore highly experienced in the development of such work, with appropriate footprints for each theme within the sector. BEST took a collaborative approach, encouraging joint programme sponsors to work together where overlap of expertise and sector footprint enabled this.

Each theme lead was provided with a brief on what the Skills and Training Needs Analysis needed to achieve – the key aim being to identify current training gaps and perceived needs (for the short, medium and long terms) through consultation with industry. Where feasible, existing skills and other relevant reports were analysed as part of this process. Discussions were held between joint programme sponsors on the questions to ask as part of this process; with the differing sub-sectors to cover and historical approaches used within Sector Skills Councils, it was agreed that there could

not be a 'one size fits all' questionnaire approach. However, commonalities were identified to make the work comparable for the purpose of developing the strategy.

Key issues under consideration included the types of training required (clearly focused on sustainability issues for the sector); appropriate delivery methods (critical when engaging with the existing workforce); whether the training needs to be accredited or recognised by professional bodies; the level of training required (linking to the Credit and Qualification Framework for Wales, to enable recognition of the training undertaken and its comparison against other types of training (including professional development) (Welsh Government, nd)); the location of the training (especially as Wales has a number of industry 'clusters' in designated 'Enterprise Zones'); and the timescale of requirement. At this stage, questions around ESD were not included, which could have been beneficial given that discussions were held with professional bodies.

BEST has developed a total of 5 Skills and Training Needs Analyses; executive summaries of which will be available in summer 2014. Importantly, the work identified significant training needs for all themes, resulting in a total of 28 proposed training projects to date. For the purpose of clarity, the full list is not being provided in this paper; the proposed training can be grouped into the following categories:
- Water technologies and applications
- Sustainability for Architects
- Building Information Modelling (BIM)
- Traditional buildings issues

In addition, there are a number of stand-alone specialist courses related to one or more of the themes. Due to the nature of the funding, procurement activities are taking place in order to secure delivery partners for the proposed training, in line with public procurement requirements. It is anticipated that delivery partners will be a mixture of Further Education Colleges, private training providers or Higher Education Institutions (dependent upon the level of training required), and that consortia would bid for projects to enable delivery across the geography of Wales, as required by the STNA data.

Education for Sustainable Development – the theoretical benefits for professional training
As already identified from literature, there is a need to develop 'sustainability literacy' for professionals in order to facilitate the transition towards sustainability, such an activity being a highly complex goal to achieve (Stephens et al, 2008; Payne, 2010). Such literacy enables understanding on the need for change, having the knowledge and skills to make the change and recognise and reward others for doing likewise, and is considered as a 'basic' skill by those who are forward thinking (Parkin et al, 2004). It also enables professionals to gain a wider perspective – that their actions are interconnected on a global scale, and relates to their "*ethical responsibility*" (Payne, 2010, p1).

The UK developed a Sustainable Development Education Panel in 1998, the remit of which was to advise all educational streams on issues relating to ESD including education in work (Sustainable Development Education Panel, 1998). One key proposal from the panel was to encourage professional bodies to "*embed sustainable*

development" within their course accreditation criteria (Perdan et al, 2000). This panel ended in 2003 due to lack of funding; however the policy commitment to increase sustainability literacy has not diminished since.

The BEST programme aims to directly redress the balance of sustainability literacy for professionals through the development of the courses identified through the Skills and Training Needs Analysis process, as well as encouraging differing pedagogical approaches that ESD can bring to the development of the competencies required. In terms of pedagogical approaches, literature suggests that there are a wide range of techniques that are beneficial to learners, including:

- Problem based learning
- Role play
- Discussion
- Stimulus activities
- Reflexive accounts (Segalàs *et al*, 2012; Murray *et al*, 2014)

BEST will be able to support tutors in how to use these techniques, considering the course to be delivered. In addition, the programme is developing a fully online course aimed at outlining what sustainability is and why it is important for built environment professionals. Current literature on online approaches to ESD based learning is limited, although there is suggestion from Tomkinson and Hutt (2012) that a blended approach to problem-based learning is feasible with some associated difficulties (including group work difficulties). Indeed, current uptake on this course is limited, but it is anticipated that this becomes a 'legacy' of BEST, being available after the core funding has ceased. It is also worthy to note that UNESCO (2005) outline distance learning as an '*opportunity for the widespread dissemination of ESD in ways that offer options of individual pace, assignments and assistance from an instructor*'.

Part of the benefit of BEST is the speed at which the programme can help to bring new courses to market – in traditional terms, changing educational practice is a slow process, including for CPD (Strachan, 2009). BEST is directly responding to evidenced short-term skills needs, enabling courses (once procured) to come through development and validation to piloting in a matter of months.

During development, tutors will be encouraged to consider the educational structures, curriculum and campus needed to drive change, perhaps using the "*seven Cs of the curriculum and campus*"; constructive alignment, curriculum content, conscience, citizenship, culture, campus and community (Haigh, 2009). The use of this may well identify a lack of understanding on what to include, how to teach it along with a lack of confidence – in many cases, sustainability considerations are often complex to both understand and bring across (Payne, 2010). There often needs to be a review of current understanding and associated developmental activity of the tutor (Hopkinson and James, 2010). Here, BEST will anticipate such issues through the development of 'train the trainer' type activities – the aim of these is to both upskill the existing tutors with technological developments for the sector as well as provide guidance on curriculum developments from an ESD viewpoint (something that is perhaps not considered the 'norm' when considering the current working remits of such staff, the crowded curricula and meeting the requirements of accreditation bodies). This work is yet to be started, but potential problems are anticipated: unwillingness to upskill or the tutor refusing to see a wider benefit for further training development, a lack of time

to deliver within the funding of BEST and the difficulty in developing a coherent model to apply across all training providers. The latter will be mitigated through discussions with a local FE college who has undertaken similar work recently; using lessons learnt to avoid some of the perceived problems.

Tutors will also be guided on how to develop a wider range of competencies within the training projects – so that these not only fall in line with professional and accreditation body requirements, but also help to meet a number of the cross-cutting ESD competencies for those taking the training. Key to this is the seamless integration of these additional competencies; enabling ESD to become part of the 'core' delivery, and encouraging the inclusion of some of the essential characteristics as outlined by UNESCO (2005, p30-31) through the incorporation of 'sustainability themes' as part of the training development (Tilbury and Ryan, 2011). One key way that BEST can help to achieve this is through the accreditation route. The Welsh School of Architecture at Cardiff University (lead partner for BEST) is an accredited centre of Agored Cymru, a Welsh awarding organisation. Therefore when defining the unit schedules for the accredited learning that will be developed, additional sustainability competencies can be embedded. In terms of professional body requirements, BEST has a good working relationship with a number of sector specific professional bodies, and will spend time identifying the potential to include sustainability competencies. One potential weakness here is the time limitation of current funding. It may be unlikely to be able to work with all the professional bodies to the same degree of detail. However, from a research perspective, working with this model helps to inform future work. It is important to note that these competencies would have to be developed to enable reflection of professional experience and learning, rather than academic learning (Watson and Howarth, 2006).

Conclusions
As outlined by Haigh (2009, p32), "*education for sustainability has a holistic vision: it aims to help individuals to realise their role in the world*". BEST has received funding to help develop and deliver training that will directly help professionals within the built environment sector to improve their practices, have a greater consideration of sustainability and therefore '*realise their role*'.

The model of BEST is a useful one to assist in driving change in training practice for the sector. It firstly helps to continue the work started by the UK Sustainable Development Educational Panel, by providing advice to a non-traditional educational stream on ESD and how its approaches can benefit professional learners. In doing this, BEST also works towards meeting the need set out in Agenda 21, whereby ESD is integrated into every education setting, as well as assisting toward the aim of the Decade of Education for Sustainable Development by shifting professional education towards sustainable development. Considering the impact the built environment has related to sustainability, this is clearly an important agenda for the whole sector.

By having an underlying theme of ESD guidance throughout its work, BEST can guide individual training projects on what to include and pedagogical approaches to achieve this. In many cases, the guidance will evolve from the existing educational structures in place, and work to make this integration 'seamless' from both the learner and developers perspectives. However there may be times when this would not be possible – in which case, BEST will provide train the trainer activities to assist the

developer to gain the understanding needed. Alternatively, specialist staff might be provided to build the staff confidence needed to make the changes to embed ESD.

The training developed through BEST can also enhance further sustainability competencies – these can be considered from the design stage to ensure they are seamlessly integrated throughout the course. Specific learning outcomes are set at unit development stage, leading to inclusion in assessment (appropriate to the level). Therefore, achievement of specific competencies can also be included within the course and still meet accreditation requirements. BEST can engage in conversation with professional bodies on the inclusion of appropriate sustainability competencies within the new courses developed, ensuring they are valued by the professional body and therefore begin to become part of the norm.

The training that will be developed will also link to achievement of policy measures. For example, courses related to traditional buildings issues will help to improve their energy efficiency, the sustainability of materials used to refurbish and minimise the amounts of wastes arising from refurbishment processes. Courses related to sustainability for architects will directly contribute to the reduction of wastes as well as reducing greenhouse gas emissions, and courses related to waste will introduce newer policy areas for Wales such as Design for Deconstruction (D4D). These are not quantifiable targets but will help the professionals of Wales to meet policy expectations through use of better practices and greater sustainability awareness.
To conclude, the potential of the BEST model to drive ESD approaches into professional training, and therefore increase professional sustainability competencies and literacy, is vast. It is not something that can be achieved immediately, but this initial phase of the Programme will help to raise the conscience of sustainability within a sector that has huge potential to play a great role in transitioning to a more sustainable world.

Recommendations for further work
The link between the benefit of ESD approaches and professional training is yet to be proven, so one key recommendation would be further research in this area. It would also be necessary to investigate built environment professional bodies views on sustainability training on a wider scale – the BEST research begins to identify this; however more can be done to undertake this in a consistent manner. Previous research was carried out on this in 2007; an update would be beneficial especially given the considerable policy context for sustainability in Wales.
In terms of the impact of the BEST Programme, a longitudinal study related to the impact of the training developed within industry practices would be recommended. It is worthy to note that training developed in this phase of BEST only answers the short-term skills needs identified; further funding will be sought to try and develop the medium and longer term skills needs identified.

Funding

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