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QualiBuild Train the Trainer Lessons Learned from the Development of a Program for Training Trainers of Construction

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QualiBuild Train the Trainer

Lessons Learned from the Development of a Program for Training Trainers of Construction

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Abstract

In response to recent directives to promote quality energy efficient buildings throughout Europe, the EU funded Build UP Skills Ireland (BUSI) project launched a national skills gap analysis of the construction sector in 2011. Generally, the gap that was identified was one of knowledge rather than skills. However, this knowledge is fundamental for the successful implementation of low energy buildings. The BUSI analysis also found that the majority of trainers of construction related crafts lacked the experience and knowledge on the implementation of energy efficient buildings. Consequently, the follow on Build UP Skills QualiBuild project focussed on the development and delivery of a Train the Trainer programme which would address this. The QualiBuild Train the Trainer pilot was designed with a focus on active learning, incorporating a flipped learning model for the delivery of a blended learning programme. This was facilitated by the development of learner manuals for each of the programme modules which presented the course content to the learners ahead of face-to-face workshop events. Group learning activities were then employed as a means for achieving one of the key learning outcomes identified in the programme development, a need for attitudinal change. This paper will offer a rationale for the design, structure and delivery methods adopted for the programme. It will also present and discuss the successes and failures of the pilot along with recommendations for future offerings of similar type programmes.

Keywords: construction workers, QualiBuild, flipped learning, group learning, peer assessment, trainers, energy efficiency, attitudinal change

QualiBuild Train the Trainer

Lessons Learned from the Development of a Program for Training Trainers of Construction Workers in Ireland

Introduction

In 2011, an EU funded project entitled Build UP Skills Ireland (BUSI) was tasked with establishing the extent of skills gaps in the construction sector towards achievement of 2020 energy saving targets for buildings and producing a National Roadmap of actions to address the issue. The follow-on Build UP Skills QualiBuild project (2013 – 2016), has sought to instigate a number of key training actions identified in the BUSI Roadmap. These include the development and piloting of a new “Foundation Energy Skills” (FES) programme intended for all workers involved in building construction. Additionally, to accommodate a potential national roll-out of this training, it was proposed to introduce a Train the Trainer programme in order to up-skill trainers of construction skills.

This paper recounts the experience of the development team at Institute of Technology Blanchardstown (ITB) tasked with designing and delivering this Train the Trainer programme as a national pilot. It begins with the background and context of the drive towards nearly zero energy buildings and the origin of the BUSI and QualiBuild projects. An overview of the design and structure of the Train the Trainer programme follows, including a detailed overview of the learning theories that informed the delivery methods and course materials. The paper concludes with reflections on the lessons learned by the team over the course of the development and delivery of the programme.

Background and Context

Energy use in buildings accounts for 38% of total final energy demand in Ireland (SEAI, 2014). At a national policy level, Ireland has committed to reducing its total energy consumption by 20% by the year 2020 (DCMNR, 2007). As a pathway to meeting this target,

Building Regulations and standards have been amended significantly since 2002, establishing a new approach to construction and renovation to prescribed energy performance standards. These standards will continue to evolve toward a near zero energy framework for buildings by 2020 (European Union, 2010).

In 2011, the European Commission introduced a call for proposals for national projects to investigate the capacity of construction workforces in member states to achieve 2020 energy saving targets. The Build UP Skills Ireland project was one of the first funded, commencing in November 2011 (see: <http://ireland.buildupskills.eu/en/about-page>). The broad training provision for construction workers in Ireland was considered in light of the significant changes to building standards and the technologies currently being adopted onsite for energy performance. This included a comprehensive review of curricula for construction related apprenticeship and existing training provision in the field of low energy buildings available to construction workers.

BUSI combined this desk analysis of construction skills with a series of surveys, interviews and regional workshops to provide for a national consultation with key stakeholders. This considered the issues and barriers to achievement of energy targets for buildings at an institutional, structural and financial level. The increasing fragmentation of the industry, with a proliferation of projects employing multiple subcontractors focused on individual goals, was seen as a particular problem with a perceived lack of focus in the industry on quality and compliance with building standards.

The BUSI project ultimately concluded that the pace of change in building construction and renovation standards had not been matched by availability of compatible training provision for the construction workforce. Generally, the gap that was identified is one of knowledge rather than skills. As importantly, the analysis also highlighted a need to address the attitudes of construction workers to quality and standards.

The BUSI research also found that the majority of trainers of construction related crafts lacked the experience and knowledge on the implementation of low energy building. These trainers, by virtue of the fact that they are physically removed from the industry during this significant period of change, are largely unaware of the implications for onsite implementation of new energy performance standards for buildings.

In 2013, the European Commission instigated a further call for proposals under the Build Up Skills initiative in order to instigate some of the key actions identified in the national roadmaps. In mid-November 2013, ITB established a programme development team to work on the QualiBuild Train the Trainer programme. A decision was made to engage staff who were, or had previously been, involved in the delivery of construction craft apprenticeship and/or courses relating to sustainable construction. The team selected included representation from the crafts of Carpentry & Joinery, Brick & Stone Laying, Plumbing and Electrical, i.e., a combination of backgrounds from building fabric and building services trades. The work of the team was led by the ITB Work Package coordinator with oversight and quality assurance provided by the Head of Department of Engineering.

Training for Attitudinal Change

In line with the findings of the BUSI project, the Train the Trainer development focussed on preparing trainers for a pedagogical approach that would best address the identified knowledge gaps and need for attitudinal change amongst construction workers. As the approach to training on the proposed Foundation Energy Skills (FES) programme would need to differ from the traditional models of skills training associated with construction workers, trainers would need to be prepared to adapt their pedagogical approach. Training for attitude change is challenging and requires trainers to be aware of the subtleties of facilitating discussion and group activities while maintaining a focus on learning objectives.

The following is an exploration of learning theory specific to attitude change. The practical application of these theories is then considered, including an examination of how they informed the strategy for the Train the Trainer programme.

Theories of Attitude Formation and Change

Before the possibilities for incorporating specific aspects of learning theory FES training could be explored, it was important to consider the existing models used for training construction workers. Traditionally, this training follows a typically objectivist approach to learning, i.e., that knowledge simply exists and there is no need to construct new knowledge (UCD Teaching and Learning, 2014). A number of skills are taught onsite through informal instruction and experiential learning. For formal skills training, a standards based system (SBS) of apprenticeship is currently in operation, officially introduced in 1994 to replace an existing time served model (Field & O'Dubhchair, 2001).

The off-the-job educational phases of apprenticeship training follow set curricula and assessment stages which are centrally administered by SOLAS (formerly FÁS). The delivery mode is a combination of classroom based lessons and skill-specific workshop practice. Related theories are taught in the classroom and reinforced through the completion of projects in the workshop, consistent with behaviourism.

To further examine the learning processes accommodated in traditional training models for construction workers, Bloom's (1964) widely recognised taxonomy of educational objectives was considered. Bloom divides learning objectives into three categories (Figure 1) as follows:

- **The Cognitive Domain** – concerned with mental skills and knowledge
- **The Affective Domain** – dealing with attitudes and values
- **The Psychomotor Domain** – learning of manual and physical skills

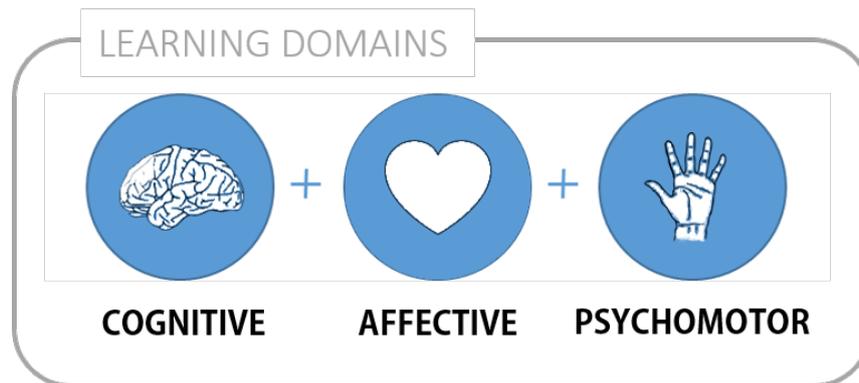


Figure 1. Bloom's Taxonomy of Learning Domains

It is apparent that existing models of training for construction workers are focussed on the psychomotor domain and, to a lesser extent, the cognitive domain. The attitudes and values of the individual learners are not specifically highlighted as important outcomes; the objective is to teach in the established “right way” to perform tasks.

For the proposed FES training, the objective was to address both knowledge gaps and where necessary, the requisite attitudinal changes that are currently not captured by the current training approaches. Therefore, the FES training needed to focus on the cognitive and affective domains of learning. It is reasonable to assume that a didactic or behaviourist approach to this training would not change the attitudes of workers who believe that they already know the ‘right way’ to do their jobs. Therefore, a close consideration of the affective domain was required if attitudinal change was realistically to be achieved.

Role of Constructivism in Effecting Attitudinal Change

Constructivism is a philosophy of learning based on the belief that learners construct meaning individually rather than having it “delivered” to them. Bruner (1996), one of the most recognised proponents of constructivist theory, argues that, learning is an active process in which the learner constructs new ideas and beliefs based on past experience or knowledge.

Therefore, the learner's past experiences are the pool from which they attach meaning and relevance to new learning.

Bruner's theory of instruction is based on four key principles:

1. Instruction should establish the relevance of the material to the learners so that they are willing and able to learn (readiness);
2. Learning content should be structured in a way that is most readily interpreted by the learner;
3. The sequence that content is presented in should be progressive and effective;
4. The instruction should encourage the learner to go further than just the information given.

This approach would appear to have merit in training to support attitude change. The willingness of a learner to be open to new information would seem significant if long held beliefs are to be challenged in the learning process. The principle of structuring content to suit the target learner is logical. It would also be beneficial to have learners accepting some responsibility for their learning. In taking ownership, learners are more likely to identify what is meaningful for them.

It is noteworthy that Bruner's theories are closely linked to child development research. However, the target cohort for the Train the Trainer programme was adult learners, for which specific learning theories have been developed. Indeed, Malcolm Knowles (1980) has identified "andragogy" as an entirely separate field which he defines as "the art and science of helping adults to learn."

Merriam (2001) describes five assumptions underpinning andragogy, defining the adult learner as someone who:

1. has an independent self-concept and who can direct his or her own learning
2. has accumulated a reservoir of life experiences that is a rich resource for learning
3. has learning needs closely related to changing social roles
4. is problem-centred and interested in immediate application of knowledge
5. is motivated to learn by internal rather than external factors (p. 5)

The development of the Train the Trainer programme was closely aligned with these assumptions. As a blended learning programme, adopting a flipped classroom approach (Johnson, Adams Becker, Estrada, & Freeman, 2014). The programme structure acknowledged the capacity of trainers as independent learners. Many of the in-workshop

activities adopted included elements of Problem Based Learning. Indeed, group activities were emphasised in order to leverage the cumulative “reservoir of life experiences” which was enhanced by the diversity of backgrounds of participants.

Transformative Learning

The emphasis in andragogy on attaching meaning to learning makes it “learner centred” and aligned with constructivism. Another theory of learning that is prominent in adult learning, and is constructivist in approach, is transformative learning. This type of learning requires a change in learners meaning schemes, including attitudes and beliefs.

Originally developed by Jack Mezirow (2000), transformative learning theory is divided into two types of approaches to learning, namely; *Instrumental learning*, which focuses on problem solving tasks and the cause and effect, and; *Communicative learning*, where individuals communicate their feelings, emotions and desires. Problem based learning (PBL) is rooted in the constructivist approach of learning, i.e., “*learning is promoted when learners are engaged in solving real-world problems.*” (Merrill, 2002, p. 43) Transformative theory also emphasises that reflection is similar to problem-solving in that we “*reflect on the content of the problem, the process of problem-solving, or the premise of the problem.*” (Mezirow, 1991, p. 44)

Implications for the QualiBuild Train the Trainer Programme

It is apparent that in adopting a learner-centred approach, consideration of the affective domain and group problem-based learning are all relevant to training for attitudinal change. However, as previously noted, self-directed and group learning are still uncommon in the training of construction workers. Mezirow (2000) acknowledges that effective participation in discourse requires a level of emotional maturity.

There was a risk that construction workers attending a relatively short training programme would be affected by a lack of confidence in this type of learning environment

and perhaps feel intimidated by peers. On this basis, it was an important element of the Train the Trainer programme to prepare trainers for group learning environments. The programme, therefore, was designed to prepare the trainers for this in two ways:

1. Specifically, in the final module of the programme on “Pedagogical Approaches”, where the theory and techniques of group learning were explored
2. Throughout the delivery of the entire Train the Trainer programme similar activities and group work were employed to illustrate the effectiveness of this teaching and learning approach and to familiarise the trainers with the associated techniques

A focus in the initial stages of the training on establishing relevance and extrinsic and intrinsic motivations was considered as important to prepare learners for engagement with group activities. An approach identified was Keller’s ARC’s model which identifies four categories of learner requirements for motivation: Attention, Relevance, Confidence and Satisfaction (ARCS Model of Motivational design, 2014).

The first requirement of Keller’s model refers to the importance of gaining learner attention through active participation and enquiry. This is consistent with an activation in instruction, where learning is promoted when knowledge from past experience is recalled as a foundation for new knowledge. This was designed into the Train the Trainer programme, specifically in the employment of Direct Attention Thinking Tools (DATT). These are a set of activities designed by Dr. Edward De Bono to help focus the mind (De Bono, 1993). They can be used in any situation to elicit thoughts and ideas from a person or group of people on any subject or topic. There are 10 tools altogether and during the delivery of the programme three were utilised. “PMI” - Pluses, Minuses and Interesting Points, “CAF” Consider All Factors and “OPV” - Other Peoples Viewpoint. For example, for the purpose of this paper, the use of the PMI activity is illustrated.

PMI Activity, Pluses, Minuses and Interesting Points

For this activity, students were given individual PMI activity sheets (see below) which included the directions related to the task *“Using numbered bullets list what you think*

are *Pluses*, *Minuses* and *Interesting points* about the assessment methods used in Modules 1, 2 & 3.”

The activity required students to focus **only** on the **Pluses** (positive aspects) for 2 minutes, then the **Minuses** (negative aspects) for 2 minutes and finally the **Interesting points** for 2 minutes. This was to allow the students to explore the topic of the lesson by focusing their thoughts specifically on the required subject matter

Direct Attention
thinking tool PMI

Learning Activity - 1
B. Assessment methods

Task
2. Using numbered points list what you think are **Pluses**, **Minuses** and **Interesting points** about the assessment methods used in Modules 1, 2 & 3.

Pluses	Minuses	Interesting Points

Figure 2. Think, Pair, Share, adapted (Lyman, 1981) Students PMI Sheets

Relevance was then maintained by focussing on language, subject matter and experience which would be familiar to these in the field of building construction. Activities were employed which provided the opportunity for encouragement through feedback leading to improved learner confidence, such as group poster activities where a reporter would outline the key conclusions of the group. For example; following the individual PMI, students were divided into groups of 4 and afforded an opportunity to discuss and share their PMI results. Each group were then provided with A2 paper and a selection of colour markers, with which they were asked to create a poster summing up the main ideas from their collective PMI sheets. Each group then presented their completed poster to the whole class with Q and A session following each presentation.

A digital photo of each poster was taken using a camera phone and placed on Moodle after the activity as a learning resource and reference for the students.



Figure 3. Group discussing their PMI

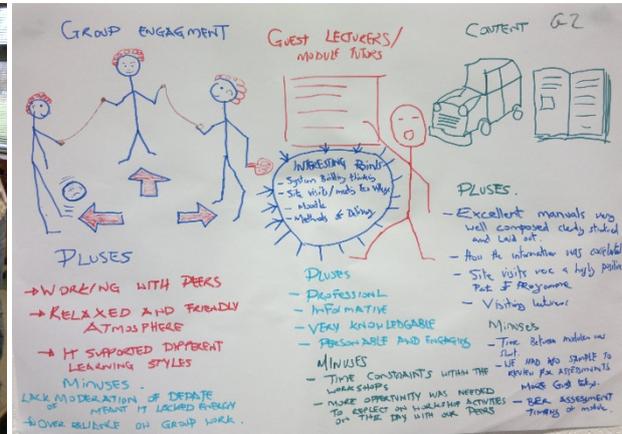


Figure 4. Group Poster for Presentation

Attending to the affective domain and incorporating peer-to-peer learning is challenging for a trainer. Research into the role of the affective domain in further education has noted some difficulty with group work. Therefore, the trainers would have a role as “relational gatekeepers in the classroom,” which requires a high level of interpersonal skills and an understanding of group development and dynamics. This was emphasized during the delivery of the Train the Trainer programme particularly during the pedagogical module where time was taken to examine the approaches to delivery and assessment through the previously 3 modules.

It is clear that training for attitude change is challenging and requires careful consideration at the instructional design stage. Adult learners by definition have embedded beliefs and value systems so it is obvious that new ideas cannot simply be forced upon them.

Learning theories that promote the possibility of perspective transformation and value attachment for the learner were emphasised in the Train the Trainer programme along with their potential applications in the FES delivery. However, all theories have limitations in practice and there were a number of issues arising that were specific to individual learners and the scope of the proposed training.

To maximise the potential success of the training programme, incorporating constructivist and social constructivist principles to affect attitudinal change, the following principles were adopted:

- Focus on the target learner. It was important to understand the profile of the target learner and tailor the programme accordingly (pre-attendance questionnaire).
- The learners should not have their existing beliefs challenged directly; rather they should be allowed to come to their own conclusions on the need for change in their work practices. The training, therefore, presented real-life examples relevant to the learners that were clear and unambiguous (real life practical assessments).
- Social interaction with peers was facilitated and encouraged in the training. This improved the learner's sense of belonging and increased the chance of new approaches being accepted and adopted by the masses rather than individuals (PMI, group poster work).

The QualiBuild Train the Trainer Programme

The development of the QualiBuild Train the Trainer programme began in mid-November 2013, with the establishment of a programme development team to work on the Train the Trainer programme. A decision was made to engage staff who were, or had previously been, involved in the delivery of construction craft apprenticeship and/or courses relating to sustainable construction. The team selected included representation from the crafts of Carpentry & Joinery, Brick & Stone Laying, Plumbing and Electrical, i.e., a combination of competences from building fabric and building services trades. The work of the team was led by the ITB Work Package coordinator with oversight and quality assurance provided by the Head of Department of Engineering.

Delivery

The pilot of the QualiBuild Train the Trainer (TtT) programme was delivered in two separate Phases, Phase 1 during September 2014 until May 2015 with Phase 2 taking place September 2015 until May 2016. In order to measure the overall success of the pilot delivery of TtT a feedback questionnaire was utilised after the face-to-face delivery of the four modules. Following the completion of Module 4 a further detailed questionnaire was

completed by the participants. The following section outlines Phase 1 of delivery in more detail.

Phase 1 Delivery

As the main target group for the programme were trainers of construction related craft apprenticeship, the Institutes of Technology (IoTs) and Education and Training Board (ETBs) were prioritised for the recruitment of participants.

Following a “flipped classroom” approach to delivery, the focus was on learners engaging with course content via the learner manuals ahead of module workshops. To this end, online pre-workshop activities were developed requiring participants to review a section/s of the manual and post commentaries. The workshops were then primarily focussed on group work activities that promoted active participation and peer learning. To facilitate this level of activity in-classroom, and in recognition of the ‘pilot’ status of the programme, each module was facilitated jointly by two lecturers.

This “active participation” approach to the delivery led to a dynamic learning environment with rich discussions and interactions between participants from different backgrounds and areas of expertise (Figure 5). Feedback on this format was very positive and the learner manuals were particularly well received, with many from a background in formal education acknowledging the quality of the course materials.



Figure 5. Train the Trainer participants engaged in group work activities

Outcomes and Lessons Learned

While there was unanimously positive feedback on course materials and delivery philosophy, there were still a number of issues highlighted with the Phase 1 delivery. Of the 55 participants that registered initially, only 44 remained engaged for the duration of the programme. From this, 29 students submitted all assignments and were successful in achieving the award.

Responses given in feedback and evaluations indicated that early withdrawals were mainly a result of individuals being unable to acquire cover for teaching duties within their organisations. Verbal feedback was received from a smaller number that the level of workload involved exceeded their initial expectations. For participants that stayed engaged on the course but did not achieve the award, the reason recorded in all cases was non-submission of some module assignments. Many found, with only a 4-week period between module workshops that late submission of assignments was leading to an overlap and a snowball

effect on their workload. This led to some falling behind and failing to submit work for all modules.

From both formal and informal feedback received, many cited this level of overlap between modules as being very challenging. There were also a number, particularly those who travelled significant distances to attend training events, expressing a preference for workshops and site visits to be scheduled on consecutive days either side of weekends. This would allow for overnight accommodation to be secured, cutting down on travelling time and impact on work life.

Once again, feedback on course materials and delivery approach was very positive. Of the 34 originally registered participants, 4 withdrew early in the delivery. Of the remaining students who continued to engage, 23 successfully submitted all course assessments and achieved the award. There were also 4 participants from Phase 1 that repeated modules to complete the programme and achieve certification.

The total number of participants who completed the survey at the end of Module 4 from both Phases was 34, with 76% of them involved directly in craft training. (46% in an IoT), with 76% having received some form of pedagogical training prior to this course. Of the 59 respondents of a post survey 94%, found taking part in the course a positive experience particularly highlighting the quality of learner manuals, group activities, and the flipped classroom delivery method used. The following common themes were stated by the participants of the TtT:

“Observing and learning from my peers was excellent”

“Group Interaction, knowledge sharing and assistance were greatly appreciated”

“Group interactions and feedback through class based workshops and discussions”

Positive Experiences

- Critical analysis of the information presented resulted in deeper levels of understanding.
- Assessment feedback from more than one source provided a significant opportunity for peer learning.
- Peer feedback was received in a timely manner and in many cases, expressed in a more meaningful way between learners.
- Utilised and developed objective critiquing skills related to judgement and fairness.
- Provided the opportunity to conduct learning activities outside of scheduled class time which could be undertaken at a time which suited learners.
- Proved to be an efficient method of assessing large volumes of work while providing specific individual feedback.

Although overall it was found to be beneficial, there were a number of issues identified during the peer assessment activity which were highlighted as potential disadvantages.

Negative Experiences

- The key to coordinating a successful workshop activity is during the set up phase and this initially took a considerable amount of time to plan and prepare as it had not been used previously.
- Learners with no previous assessment experience of this type of assessment did not feel comfortable assessing peers at this stage and would have liked more initial guidance.
- Some learners felt a little uncomfortable being asked to award marks to their peers - particularly those who were work colleagues.
- Full marks were awarded for all assessment criterion by some learners regardless of the submission responses presented.
- Some learners were of the view that if the reasoning for peer assessment was outlined more clearly, - i.e., That of a learning activity, learners would better understand their role.

Conclusions and Recommendations

While the programme was generally perceived as a success, the main negative that impacted the programme was the low numbers of trainers in both the IoT and ETB sectors that were still active or engaged in construction related training. From discussions with management in these sectors, it was clear that trainer numbers had reduced significantly through a combination of non-renewal of temporary contracts, retirements and redeployment to other duties. Informal feedback received suggests that many trainers perceive a lack of opportunity in construction related training.

The low level of interest in the programme can be directly related to a lack of formal CPD structures for vocational trainers in Ireland. This impacted on uptake for two main reasons. Firstly, without direction from management or a CPD body, trainers need to identify development needs themselves based on their own enquiry. Secondly, once an appropriate up-skilling programme is identified, staff require support from their employer to facilitate attendance, including organisation of cover for teaching hours.

It is also reasonable to conclude that the scope of the QualiBuild Train the Trainer programme was directly affected by this lack of a formal CPD system. Cognisant of the scale and pace of changes to building regulations for energy performance, the programme was developed as a sufficiently comprehensive training intervention. This resulted in a relatively intensive programme of study which may have been beyond the expectations of some participants used to more typically smaller-scale CPD type training events.

When considering any potential national scale implementation of the programme, it would be important to note the logistical difficulties of finding appropriate site visits and practical demonstration facilities for the teaching of low energy building concepts. The profile of the target cohort, and nature of the technical learning objectives of the programme, would suggest that these practical elements are essential to the learning process. For the QualiBuild project, the choice of delivery centre was notably restricted to venues with access to such facilities. The programme's success was in no small part due to the level of cooperation and support from IT Sligo and CIT.

Finally, motivation for participation at individual and organisational level would need to be addressed to improve uptake of the programme on a wider scale. Without traction for the FES training, and the added value of a meaningful QualiBuild register of qualified trainers, it would be reasonable to anticipate that demand for the programme would remain relatively low. Additionally, the time and effort required of the participants would also

suggest that their employers would be important stakeholders in supporting and encouraging staff participation, up to and including assistance with cover for teaching duties.

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