

EVALUATING THE ROLE AND EFFECTIVENESS OF TRAINING INTERVENTIONS IN IMPROVING THE OCCUPATIONAL HEALTH AND SAFETY OF YOUNGER CONSTRUCTION WORKERS: A LITERATURE REVIEW

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Younger construction workers (age 15-24) suffer occupational injury at a much higher rate than older workers, raising concern over the effectiveness of widespread health and safety (H&S) interventions, particularly the quality of education and training provided to young workers about workplace H&S. Based on a review of relevant literature, this paper examines H&S training interventions in the UK and discusses their potential effectiveness in improving the occupational H&S of younger construction workers. The literature review reveals that H&S initiatives for young workers have rarely been examined and evaluated. Without this knowledge and understanding, the development of sound intervention efforts particularly within the complex construction industry context is greatly impaired. Furthermore, education and training programmes may be insufficiently preparing young workers for hazardous work conditions. The paper notes that the traditional 'control-based' approaches, while well intentioned, are limited in their ability to improve H&S for younger workers. To be more effective, such interventions must do more than simply provide young workers with information and must recognise the diversity of development among young learners and the significance of learning within organisations as a social process. More participatory approaches must be adopted, in which younger workers are engaged and involved.

Keywords: health and safety, interventions, learning, training, younger construction workers.

INTRODUCTION

Many people suffer harm as a result of their engagement within the construction industry worldwide. This harm can take many forms, including death and serious injury, long term chronic health effects and deleterious impacts upon general wellbeing. For example, in 2009/2010, there were 42 fatal injuries in UK construction, a rate of 2.2 deaths per 100 000 workers (HSE 2011). In terms of ill health, the Labour Force Survey estimated that in 2010/2011, 79 000 people whose current or most recent job in the previous year was in construction, suffered from an illness (longstanding and new cases) which was caused or made worse by this job (HSE

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2011). In addition, HSE have published figures that show that the industry significantly exceeds the all-industry incidence rates with respect to musculoskeletal disorders, occupational dermatitis, work related hearing loss, mesothelioma and asbestosis (HSE 2009).

Furthermore, changes in demographics and in education and training arrangements, which are resulting in greater numbers of younger workers (age 15-24) entering work (For example, the Young Apprentice Programme in the UK provides a construction qualification for 14-16 year old learners, and includes up to 40 days of work experience over the two year period), present significant H&S challenges to the construction industry. The work injury rates of younger workers have been reported to be significantly higher than those of older workers (Mowlam *et al.* 2010, Screenivasan 2001, Salminen 2004, Schulte *et al.* 2005). In addition, the physical nature of some trade sectors of construction work can result in an earlier age transition from trades to other roles within the industry, which impacts upon the supply of labour in those trades. It is therefore imperative that the occupational H&S of younger workers is taken seriously and managed carefully. Protecting the health of younger workers is critical to the future of an ageing workforce and also of great importance for young people themselves, for their overall management of life, health and well-being.

Research Aim and Objectives

Despite a plethora of different H&S initiatives over the past decades for improving occupational H&S performance within construction (such as, legislation, behaviour based interventions including, goal setting, feedback, training and reward schemes), ill health, injuries and fatal accidents rates remain unacceptably high and continue to be costly to the individuals, employers and whole society. H&S initiatives specifically for young workers have rarely been examined and evaluated. Without this knowledge and understanding, the development of sound intervention efforts particularly within the complex construction industry context is greatly impaired.

Therefore, the aim of this paper is to examine training interventions for younger workers and discuss their potential effectiveness in enhancing young workers' occupational H&S. In order to achieve the research aim, the specific objectives are as follows:

1. To review existing literature about the characteristics and learning preferences of younger workers
2. To explore and understand the context and underlying structures of the construction industry that impact upon H&S training initiatives
3. To examine the current H&S training methods for younger workers
4. To explore how messages about H&S are communicated in practice
5. To discuss the effectiveness of current H&S training interventions in communicating the message and enhancing younger workers' H&S

The research will address the following key questions:

- Why are younger workers at greater risk?
- What barriers, obstacles or challenges to training intervention success exist within the industry?
- Are the current training programmes appropriate, adequate or sufficiently preparing young workers for hazardous work conditions?
- What improvements/changes need to be made to training interventions?

Research methodology

An extensive review of relevant literature and data was conducted to give a clear understanding of the situation regarding the occupational H&S of younger workers and particularly the training methods available to them, as well as the issues and barriers that younger workers face.

LITERATURE REVIEW

Understanding younger workers vulnerability

Previous research around the world has consistently suggested that young people are at greater risk of workplace injuries compared to older workers (HSE 2002, Mowlam *et al.* 2010, Screenivasan 2001, Salminen 2004, Schulte *et al.* 2005). In a global literature review of occupational nonfatal and fatal injuries studies, Salminen (2004) found that the majority (56%) of 63 nonfatal studies reviewed showed that young workers had a higher injury rate than older workers, whilst 29 out of 45 studies on fatal occupational injuries indicated that young workers had a lower fatality rate than older workers. European statistics confirm that young people are more likely to suffer occupational injury than older workers. According to the European Statistics on Accidents at Work (ESAW), in 2003, 4.7% of young workers aged 18-24 years had an occupational accident with more than three days lost, compared to an average of 3.3% for the working population. In the United States, the U.S. National Institute of Occupational Health (NIOSH) estimates that 200 000 workplace injuries occur each year among youth (under age 19) (Loughlin and Frone 2004).

A number of reasons why young people are more at risk have been suggested. These include inexperience, physical and psychological immaturity and employers' lack of provision of appropriate training, supervision and safeguards (Screenivasan 2001, Mowlam *et al.* 2010). Wegman and Davis (1999) point out that unlike most adult workers, young people frequently move in and out of the labour market, changing jobs and work schedules as they respond to changes in labour market conditions, employers' needs and their own personal circumstances. This might mean that young people may not be at the same work place long enough to be fully trained, or the employer may not be interested in training them as they expect them to leave entry-level jobs.

Studies such as those by Breslin *et al.* (2003) and Chin *et al.* (2010) have identified that a large proportion of young workers do not receive occupational H&S training. Moreover, H&S training may be insufficiently preparing young people to identify risks and to advocate for safety in the workplace, contributing to higher accident rates (Chin *et al.* 2010). The study conducted by Zakocs *et al.* (1998) found that even when youth were provided with safety training, workers felt that the training was ineffective in preparing them for hazardous conditions. Runyan and Zakocs (2000) argue that the problem of worker injury among young workers requires attention to the diversity of development within the age group. The researchers note the need to structure training interventions to take account of cognitive differences among young workers as well as between young and adult workers.

In addition, the ability to engage in consultation with employers in relation to occupational H&S is likely to be particularly difficult among vulnerable worker groups, which include the younger, older, migrant and temporary construction workers. HSE (2009) define a vulnerable worker as "someone working in an environment where the risk of being denied employment rights is high and who does

not have the capacity or means to protect themselves from that abuse. As new and inexperienced workers who are often employed in low paid or part-time jobs on a temporary, casual or informal basis, young workers may not know their legal rights, or be lacking in self-confidence, communication or social skills to express H&S concerns (Loughlin and Frone 2004). The young workers in Zakocs *et al.*'s (1998) study reported that they felt intimidated about voicing their concerns to managers, partly because they believed their managers saw them as expendable. As well, these young workers perceived that their managers were not concerned about their safety and often failed to provide safety training and basic protective equipment (Zakocs *et al.* 1998). Breslin *et al.* (2007) also report reluctance to voice safety complaints or concerns particularly among young male workers in industries including construction. The young workers were reported to accept workplace injury "as part of the job", to which Breslin *et al.* (2007) suggest is related to the youths' subordinate status in the workplace and their perceived lack of control to improve or alter the conditions of their work.

Training within the construction industry

Whilst the provision of training by employers is an explicit requirement of the UK's H&S legislation and there is widespread acknowledgement by various authors of the benefits of safety training (Dufficy 2001, Loosemore *et al.* 2003). Loosemore *et al.* (2003) note that the construction industry does not have a good record of investing in training its employees, investing less in training its employees than many other industries. A study undertaken in the UK by the Training Agency (1989) also reveals that the construction industry provides less training to its employees than any other industry sector, including comparable industries in which casual employment is common, such as retail or catering.

Key features of the construction industry may have implications for the provision of occupational H&S training. For example, the fact that construction is a project-based industry is an important contextual issue. Bresnan *et al.* (2004) note that project-based organisations pose particular challenges for attempts to diffuse and embed new knowledge and learning within the firm due to their decentralised nature and time-constrained ways of working. As projects are often one-off, self-contained, temporary worksites consisting of a complex mix of different trades and activities, they do not fit into routine organisational processes (Bresnan *et al.* 2004). The regular secondment and movement of staff between projects is common, given the phasing of project activity across and within the design and construction stages and the transient and time-pressured nature of project activity (Bresnan *et al.* 2004). In such an environment, training activities are often assumed to be expensive in terms of both the cost and time (Loosemore *et al.* 2003). The situation is further exacerbated by the system of competitive tendering, as well as the practice of awarding contracts to the lowest bidder (Lingard and Rowlinson 1994). There is also a widely held view that the majority of formal training activities require key project-based staff to be removed temporarily from their operational responsibilities, causing additional pressure for already overstretched teams (Loosemore *et al.* 2003).

In addition, much of the industry's work is subcontracted out and workers are employed on short-term, fixed contracts and then released at the end of a project. Moreover, construction is sensitive to weather, resulting in seasonal fluctuations in employment. Such employment arrangements may erode the incentive for training investment. Loosemore *et al.* (2003) note that the small subcontractors which employ

the vast majority of the construction workforce, confuse training responsibilities and are so highly geared that long-term investments in training have been difficult. Even in major organisations, training and development activities are often squeezed in the face of programme pressures and small profit margins, and there is little sense of paternalism towards the subcontractors they employ (Loosemore *et al.* 2003).

Furthermore, the construction industry is a highly predatory and transitory industry with a strong culture of nomadism. Loosemore *et al.* (2003) state that it is highly likely, in the common absence of retention strategies that trained employees will take their skills elsewhere. Conversely, it is possible to attract trained employees from other companies through the use of remunerative incentives, negating the need for one's own training strategy (Loosemore *et al.* 2003).

All of these issues have implications for the provision of occupational H&S training. Nevertheless, training is still a fundamental requirement for improving occupational H&S performance. Moreover, many modern construction clients are increasingly demanding that construction firms demonstrate the competence of their project teams through their training and development activities. Thus, as Loosemore *et al.* (2003) argue, innovative training delivery methods must be considered, which provide employees with the opportunity to develop the learning skills and attitudes that will allow them to function in a more efficient and effective manner.

Learning styles of younger workers

Pritchard (2005) defined learning style as “An individual's preferred means of acquiring knowledge and skills”, for example, using pictures instead of text or working in groups as opposed to working alone. Becta (2005) notes that the term “learning styles” is often used loosely and interchangeably with terms such as learning modalities, thinking styles and cognitive styles. In relation to learning modalities, the theory is that all learners have a preference for receiving and storing information through one or more sensory modalities: visual, auditory or kinaesthetic (tactile). Visual learners learn best from pictures or written text, auditory learners prefer the spoken word, whilst kinaesthetic learners think in terms of actions and bodily movement (Becta 2005).

The logic and appeal of learning styles is that training can be matched to the learning style preferences of particular learners, enabling them to learn better (Mowlam *et al.* 2010). As such, the role of trainers is to tailor their teaching style to suit the requirements of individual trainees (Wilkins 2011). However, as Becta (2005) note, learning styles “are at best one of a range of factors determining how learners react to learning opportunities, with factors such as environment, culture and teaching methods all having an influence. In addition, learning styles are not fixed traits that an individual will always display. Mowlam *et al.* (2010) argued that there is a danger of labelling learners as particular types of learners in all circumstances. Constantinidou and Baker (2002) found that pictorial presentation helped all learners taking an item recall test, with this being even more so for learners with a strong preference for verbal processing, rather than imagers as might be expected.

Mowlam *et al.* (2010) investigated the best ways of communicating H&S messages to young learners in vocational education and training. The young learners in that study found written information hard to engage with and they struggled with technical language. Instead, visually engaging material, practice and experience were considered more beneficial and easier learning routes than classroom teaching or written word (Mowlam *et al.* 2010). Wilkins (2011) notes the “literacy deficit” that

exists among construction workers and argues that the demographics and diversity of the construction industry, including age, experience, culture, educational attainment and levels of literacy, have to be considered when developing safety training methods. Thus, a varied approach to training, that takes into account the diversity of learning styles as well as the different methods in which varied information needs to be communicated, is likely to achieve the required performances.

Training methods

Many methods of training exist, or can be created, to communicate information and to involve participants in training programmes. The nature of such methods varies from ones that demand little participant involvement to ones where participants become involved and highly committed to the training process. Burke *et al.* (2006) and Goldenhar *et al.* (2001) categorise training methods as:

1. Passive, information based techniques e.g. lectures, videos, pamphlets, handbooks or other types of written materials.
2. Moderately engaging, which incorporate knowledge of results e.g. feedback interventions, in which performance information is provided, allowing learners to correct their mistakes. Other examples are programmed instruction and computer-based instruction.
3. Highly engaging/Interactive approaches, which focus on the development of knowledge in stages and emphasize principles of behavioural modelling, involving observation of practice and feedback designed to modify behaviour. Examples include hands-on demonstrations and simulation based methods. In the case of behavioural simulations and hands-on training, Burke *et al.* (2006) state that interactions between trainees and trainers will frequently go beyond 1-way feedback to engage trainees in dialogue concerning knowledge acquired or actions taken. Such dialogue is important because it is posited to enhance quality of reflection with respect to actions taken (Burke *et al.* 2006).

Ample evidence in the training literature suggests that active, highly engaging methods of training are superior to less active approaches (Burke *et al.* 2006, Mowlam *et al.* 2010). Burke *et al.* (2006) examined the effectiveness of different methods of worker H&S training aimed at improving safety knowledge and performance and reducing negative outcomes (accidents, illnesses and injuries), and found that as the method of health and safety training becomes more engaging, the effect of training is greater in terms of knowledge acquisition and reductions of negative health and safety outcomes. Their findings suggest that, to the extent possible, less engaging methods such as computer based and distance learning methods should, in some manner, include active participation on the part of learners, in the form of feedback and dialogue, to enhance their knowledge acquisition. In a similar study, Mowlam *et al.* (2010) also found a preference among young learners for modern interactive and innovative ways of learning, such as internet-based activities, CD-ROMS, videos and classroom activities. Where written information was used, it was more effective when text was limited and pictures were included.

Learning and practice

According to Brown and Duguid (1991), much conventional learning theory, including that in most training courses, tends to endorse the valuation of abstract knowledge over actual practice and as a result to separate learning from working, and more significantly, learners from workers. Learning in organisations is thought of as a

form of acquisition of knowledge, related to the notion of instruction and training (Gherardi and Nicolini 2002). In addition, training is thought of as the ‘transmission of explicit, abstract knowledge from the head of someone who knows to the head of someone who does not in surroundings that specifically exclude the complexities of practice and the communities of practitioners’ (Brown and Duguid 1991).

The concepts of knowledge or information transfer have however been under increasing attack, particularly from learning theorists (Bandura 1986, Lave and Wenger 1991, Brown and Duguid 1991; 2001, Gherardi and Nicolini 2002). Social learning theory, for example, proposes that learning can occur directly through interaction with the environment or indirectly through the observation of others who act as models, and the consequences which result from these actions (Bandura 1986). According to Brown and Duguid (2001), it is the shared know-how (or tacit understanding) that develops from shared experience within communities or networks of practice that enables the sharing and circulating of explicit knowledge. Lave and Wenger (1991) also reject transfer models, which isolate knowledge from practice, and develop a view of learning as social construction, putting knowledge back into the contexts in which it has meaning. From this perspective, learners are seen as social beings that construct their understanding and learn from social interaction within specific socio-cultural settings (Lave and Wenger 1991, Gherardi and Nicolini 2002). Learning within organisations is therefore conceived as a social process, the goal of which is to discover what to do, when to do it, how to do it according to routines and using specific artefacts, and then how to give a reasonable account of why it was done (Gherardi and Nicolini 2002).

From this practice-based standpoint, Gherardi and Nicolini (2002) set out to explore how safety knowledge is acquired and transmitted by and to novices on a building site, in order to highlight the social and cultural character of learning. In their research, they found that in Italy, most safety training is imparted based on knowledge acquisition and the notion of instruction and training. Workers are sat down in a class room or in a classroom-like setting and are spoken to by experts with the support of slides, videos and booklets. Workers are told what is dangerous and what the national regulations prescribe them to do and not to do. However, when they return to their workplaces, these workers were found to soon forget what they have learned (Gherardi and Nicolini 2002). In contrast, Gherardi and Nicolini (2002) emphasize the importance of learning in non-instructional settings. They consider safety as a social competence that cannot be learnt, but only practised, due to the tacit nature of personal safety knowledge. Their findings also suggest that learning a practice is an eminently situated activity based on the combined use of language, action and observation. The primary sources of learning are the persons close by, those who do the same or similar job in the same workplace.

These sociocultural views of learning and knowledge effectively highlight the shortcomings of much of the training interventions that are carried out in the industry to prevent accidents. Many of these interventions occur in surroundings that specifically exclude the complexities of practice and revolve around the idea of raising individual awareness by exposing workers to evidence of what is dangerous, by providing feedback on their actions and by imposing a regime of controls and inspections. However, these measures often fail, as evidenced by the prevalence of accidents, injuries and ill health. According to Gherardi and Nicolini (2002), safety does not improve for these interventions are incapable of affecting the extant work practices of the community. Therefore, as safety knowledge is to be found in the

process of interaction, in the effort of active observation and imitation of others, and in conversations, active participation by young learners is necessary for effective learning to take place. Thus, the manner in which H&S training is delivered may need to change, particularly when aimed at young workers, to adopt modern interactive approaches and move away from the traditional didactic methods of training.

CONCLUSIONS

The H&S of younger workers is critical to the construction industry's sustainability and future economic performance as well as of great importance for young people themselves, for their overall management of life, health and well-being. Yet the industry faces difficult challenges. For example, there remains a worrying and progressive trend for injury among vulnerable younger workers. In addition, the project based nature of the construction industry poses significant challenges to the provision of occupational H&S training.

Nevertheless, training is still a fundamental requirement for improving occupational H&S performance. Current training approaches, often conducted in instructional settings, while well intentioned, are limited in their ability to improve H&S for younger workers. These control-based approaches fail to consider the importance of the social context of learning. As H&S knowledge is to be found in the process of interaction with the environment, in the effort of active observation and imitation of others and in conversations, active participation by young learners is necessary for effective learning to take place. Learning effectively takes place among others and through others.

The literature review revealed a preference among young learners for interactive and innovative ways of learning, such as, interactive packages, internet-based activities, videos and case studies including site visits. Thus, the manner in which H&S training for younger workers is delivered may need to change, to adopt modern interactive approaches. Reviewing existing training methods in light of these stated preferences could be beneficial to the industry.

Following this literature review and in light of the review findings, further empirical research will be conducted, to examine the key issues identified. The empirical research will adopt wearable devices/simulations developed by Loughborough University (Cook *et al.* 2009 and 2012) to evaluate the effectiveness of interactive training approaches, aided by visually engaging, innovative tools. The devices called SKInS (Sensory and Kinaesthetic Interactive Simulations) simulate the key occupational health conditions affecting construction workers (dermatitis, hand-arm vibration syndrome, musculoskeletal disorders, noise-induced hearing loss and respiratory disorders) and their consequential impacts on both working and home life. The rationale for using these simulations to train younger workers is that, when worn, the SKInS enable younger workers to directly experience age-related occupational ill-health conditions and encourage behavioural change. Hence, the expectation will be that the SKInS will promote learning and raise awareness in order to drive change within the industry.

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