

A Review on the Effectiveness of Safety Training Methods for Malaysia Construction Industry

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Article history

Received :1 November 2014

Received in revised form :

31 March 2015

Accepted :30 April 2015

Abstract

Safety issues have become a vital issue in the management of facilities in the construction industry, as the labour-intensive construction industry is particularly regarded as one of the most unsafe industrial sectors worldwide. To increase workplace safety, Occupational Safety and Health (OSH) training has been introduced and pursued. Based on previous research, training methods range from less to more engaging. This paper has reviewed the research from 2006 to present done on effectiveness of different training methods as the first investigation research was carried out in 2006. The literatures were searched through multiple electronic databases for published peer-reviewed articles. Findings have suggested that both training methods were able to impart safety knowledge and safety awareness to the workers; however, more engaging training methods would be more effective on training outcomes. Nevertheless, it was noted that those research projects did not take into consideration on the multiculturalism issue where language communication problem exist. Hence, this research proposes a mix mode of less and more engaging training methods to be applied in a multi-cultural workplace to enhance the effectiveness of training outcomes. This review may provide information on effective safety training methods to be applied in the multi-cultural construction industry.

Keywords: Safety training; safety training methods; less engaging training method; more engaging training method; multi-culturalism

Abstrak

Isu keselamatan kini telah menjadi tumpuan dalam pengurusan kemudahan dalam industri pembinaan di mana industri pembinaan yang berintensifkan buruh dianggap sebagai satu sektor industri yang paling merbahaya di seluruh dunia. Untuk meningkatkan keselamatan di tempat kerja, latihan Occupational Safety and Health (OSH) telah diperkenalkan dan dijalankan, dan berdasarkan kajian terdahulu, kaedah latihan boleh dikategorikan dari kaedah yang kurang penglibatan kepada lebih penglibatan. Kajian ini mengkaji kajian terdahulu dari tahun 2006 hingga sekarang tentang keberkesanan kaedah latihan sebab kajian penilaian yang pertama adalah dijalankan pada tahun 2006. Kajian literatur dijalankan melalui pelbagai pangkalan data elektronik yang menerbitkan artikel berwasit. Hasil kajian mencadangkan bahawa kedua-dua kaedah latihan dapat memberikan pengetahuan dan kesedaran keselamatan kepada pekerja, namun kaedah latihan yang lebih penglibatan akan lebih berkesan kepada hasil latihan. Walau demikian, adalah ketara bahawa penyelidikan-penyelidikan tersebut tidak mengambil kira isu "multi-culturalism" yang menyebabkan wujudnya masalah komunikasi bahasa. Oleh itu, kajian ini mencadangkan satu kaedah latihan mod campuran di antara kaedah kurang penglibatan dengan kaedah lebih penglibatan untuk digunakan di tempat kerja yang "multi-culturalism" untuk meningkatkan keberkesanan hasil latihan. Kajian ini boleh memberikan maklumat mengenai kaedah latihan keselamatan yang berkesan untuk diaplikasikan dalam industri pembinaan yang "multi-culturalism".

Kata kunci: Latihan keselamatan; kaedah latihan keselamatan; kaedah latihan kurang penglibatan; kaedah latihan lebih penglibatan; "multi-culturalism"

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1.0 INTRODUCTION

Facility management can be defined as the integrated management of the workplace to enhance the performance of the organization. They also include some issues surrounding in the workplace such as quality, allocation, content, safety and health.¹ Construction is a workplace and therefore improving the safety of the construction site is imperative. Safety is one of the most important elements in the workplace due to the sky-high fatality status around the globe and it has also become the concerned area in the management of facilities in workplace when safety issue is in the rising trend. Today, labour-intensive construction industry is regarded as one of the most unsafe industrial sectors worldwide. According ILO, at least 60,000 people are fatally injured in construction industry each year and many hundreds of thousands suffer serious injuries and ill-health. In fact, these numbers have been conservative. In many countries, less than 20 per cent of construction injuries are reported.² Any loss of life as a result of an industrial accident is retrogressive in terms of human development and is therefore unacceptable, setting aside the cost for the accident. The increase in safety issues may in fact be controlled if the employees could behave safely with the provided safe and healthy workplace. However, failure to do so may lead to injury, loss of business, prosecution and insurance claims; later, the confidence of customers and investors in the business may also be affected.

Identification of causes and effects of the accident is an important prevention strategy to reduce the growing number of injuries and fatalities among workers. In order to improve the safety outcomes (fatality, accident and injury rate) of the construction industry, various research have been carry out to identify the factors affecting safety performance of the industry.³⁻⁴

Some research findings reveal that the human factor is one of the main contributor to poor safety performance.⁵⁻⁷ The human factor is related to the workers themselves and is connected to worker competency, behaviour, and awareness. According to Sawacha *et al.*⁴, accident incidents tend to be related to the lack of competency skills and knowledge of the workers to perform safety act in the workplace. Whereas some researchers argue that unsafe worker behaviour is frequently leads to unsafe acts on the workplace which causes accident.⁷⁻¹⁰ The competence safety knowledge and safety awareness of the workers could determine the behavioural of the workers because without the safety knowledge and awareness, they are unable to determine the proper behaviour to act in the workplace. When comes to decision making, the workers always unable to evaluate the risks for the actions taken and therefore, increase the risks of accident.

In order to increase workplace safety, Occupational Safety and Health (OSH) training has been introduced and pursued vigorously. The purpose of Health and Safety training is to impart safety knowledge and skill to the worker while shaping their safe work behaviours to reduce the workplace accident rate. Tam and Ivan¹¹ had identified safety training as one of the four most effective components of a safety programme. Following a survey of design and construction firms in Pennsylvania with 105 responses, Toole and Acse¹² identified a lack of training as one of eight root causes of construction accidents. A similar analysis of 70 Thai construction projects found that safety inductions were effective in reducing unsafe conditions.¹³ By reviewing to the important status of safety training in reducing construction safety issues, high priority should be focused to ensure the effectiveness of the OSH training to raise the safety awareness level of the workers and shaping their safe work behaviour.

Several reviews have concluded that most training interventions have led to positive effects on safety knowledge, adoption of safe work behaviours and practices, and safety and health outcomes.¹⁴ Despite the fact that these safety training

programs contribute to the safety level in the construction industry, research tends to enhance the outcome of the training through studies on the effectiveness of the safety training. Further study has focused to study the effectiveness of different safety and health training methods in imparting safety related knowledge and modelling safety behaviour.¹⁵⁻¹⁸ In response to answer the question, researchers have looked into the effectiveness of safety training between less engaging training method and more engaging training method in OSH training. However, to date, there is insufficient research to show the effectiveness of different safety and health training method. Hence the purpose of this paper is to review the studies on effectiveness of the safety training method to be applied in Malaysia OSH training.

The paper has been organized in the following ways: Section 2 shows the methodology of literature collection for the research. Section 3 reviews on the effectiveness of different safety training method. Section 4 shows the analysis of findings on safety training literature. Section 5 proposes an effective OSH training method to be applied in Malaysia construction industry. Section 6 presents the conclusion and direction for future research.

2.0 METHOD OF LITERATURE REVIEW ON SAFETY TRAINING

A systematic search of the academic literature was conducted, including studies of any empirical research design that evaluated the methods use in safety training. The data collection phase of the literature review involved search in multiple electronic databases (Scopus, ScienceDirect, ProQuest, Web of Science and Emerald) for published peer-reviewed articles evaluating the effectiveness of safety training.

Searches were conducted using selected keywords: safety training, effective training, mode of training ('lecture'; 'video'; 'feedback'; 'demonstration'; 'active'; 'passive' and etc.), accident prevention, levels of training engagement ('least engaging'; 'moderate engaging' and 'most engaging') and occupational hazards. The selected keywords were in fact chosen from some of the keyword supplied by the authors in the same relevant studies. The focus of this review was the academic literature from 2006 to the present. The rationale behind this was because the first investigation on the effectiveness of different OSH training method was carried out in 2006, and the most latest research was necessary to took into consideration because it reflected the most current situation in today. The abstracts, methods sections, and lists of references of the resulting publications were read to identify instruments for potential inclusion in this review. Subsequent literature searches were carried out with the title of each instrument entered into the search field. The resulting instruments were screened for inclusion in this review.

3.0 REVIEW ON THE SAFETY TRAINING METHOD

Methods of safety and health training range from less engaging training method to more engaging training method.¹⁵ Less engaging training method means the training that has less involvement or inactive interaction between trainer and trainee. The examples include lectures with minimal interaction, videos, pamphlets, manuals without exercises, computer instruction with no interaction or feedback and discussion. Meanwhile, more engaging training method refers to training that involves an application of the concepts from the training content in a real or simulated environment. Examples include behavioural modelling, hands-on training (including simulated or actual work environments), or virtual reality training.

The first research on assessing the relative effectiveness of different methods of worker safety and health training was conducted by Burke *et al.*¹⁵ which included 95 studies published from 1971 to 2003. Their findings showed that both less and more engaging training methods were able to improve the behavioural performance among the trainees. However, when the training methods became more engaging, namely requiring trainees' active participation, the workers demonstrated greater knowledge acquisition and reductions were seen in accidents.

Other similar research was conducted by Robson *et al.*¹⁶ as a follow-up on a study on the effectiveness of safety training and reviews the research that was previously conducted by Burke *et al.*¹⁵. Robson's research indicated that it is indeed true that safety training is effective in altering worker behaviour. However, as mentioned in his review to the previous study, there is potential for being bias for self-selecting the data in the process of their study. His finding has shown contradiction with previous research¹⁵ on the effectiveness of the mode of training towards knowledge, attitude and health.¹⁶ He pinpointed there is insufficient evidence showing that high engagement of training is more effective than medium/low engagement training on the training outcomes. It is also shown in his research that, in a single session of training, there is insufficient evidence to see the difference in term of training effect between the high engagement training and low/medium engagement training.

Burke *et al.*¹⁷ expanded their study by covering 113 studies, confirming their previous results and then retesting the findings of Robson *et al.*¹⁶. As mentioned earlier, the conclusions reached in Burke *et al.*¹⁵ were brought into question by Robson *et al.*¹⁶, where they concluded that their review team found insufficient evidence of high engagement training having a greater impact on occupational safety and health-related behaviours compared to low/medium engagement training. However, Burke *et al.*¹⁷ found that the relative effectiveness of less versus highly engaging forms of safety training were stronger and more robust than the respective uncorrected study effects reported in Robson *et al.*¹⁶. These findings were in the contrary with the finding of Robson *et al.*¹⁶ and according to Burke *et al.*¹⁷ these differences in findings were due to the highly selective sampling of studies and second-order sampling error introduced in Robson *et al.*¹⁶. Furthermore, the findings of Burke *et al.*¹⁷ also showed that highly engaging training was considerably more effective than less engaging training when hazardous event/exposure severity was high, whereas highly and less engaging training had comparable levels of effectiveness when hazardous event/exposure severity was low.

The research of Burke *et al.*¹⁷ was then followed by a most recent research carried out by Brahm and Singer¹⁸ in this relevant field. According to Brahm and Singer¹⁸, although Burke *et al.*¹⁷ has expanded their sample of study to show their corollary on greater engaging methods of training will always be more effective than non-engaging training approaches. Yet the result is still questionable as the additional studies do not assure that the new study properly addresses the question of methodology posed by Robson *et al.*¹⁶ in the earlier research. He further commented the previous researches on the effectiveness on the mode of study could be contested on methodological ground. Instead of solely deciding on a single training method, Brahm and Singer¹⁸ proposed the selection of training methods by firms may be contingent on their stage of OSH capabilities and commitment. They stressed that no single training method should be superior to any other. They further elaborated that training should progress by stage of first using rationalistic and less engaging methods to transfer declarative knowledge and then shifting to more engaging methods to transfer procedural knowledge.¹⁸

■4.0 ANALYSIS OF SAFETY TRAINING LITERATURE

Commonly, OSH training has been delivered using low engaging method (lectures and notes) in Malaysia construction industry. However, results has shown low engaging training which is common in construction, has consistently been shown to be minimally effective when compared with more engaging forms of instruction.^{15-16,19-20} Burke *et al.*¹⁷ has carry further depth review on the previous researches by considering the level occupational hazards. The result supports the findings from previous researches, particularly when the severity level of hazardous event/ exposure is high.¹⁷ When hazardous event/exposure severity is low, less engaging training approaches appear to be as effective as those that are highly engaging.¹⁶

Nevertheless, it is notably that these researches did not appear to show the indicator of multi-cultural in related to the effectiveness of the training module towards the workers on safety awareness and behavioural modelling. Multi-culturalism is becoming a common scenario in construction field for most of the countries as their labour workforce is depending heavily on the foreign workers. Those previous findings may not necessary suitable to be applied on multi-cultural workplace.

Multi-culturalism is an increasingly prominent feature of the construction industry. Multicultural teams are used because they are perceived to out-perform monoculture teams.²¹ The shift towards multi-cultural is a trend for those international construction companies that tend to enhance their working performance and going global development. Besides, there is also another factor that promotes multi-cultural in construction industry. In certain countries (Australia, Malaysia, Singapore and Kuwait), foreign workers have become the main stream of workforce in construction industry as the profession were not favourable by locals.²²⁻²⁴ It should be notably that language issue has been identified as the greatest barrier to the smooth integration of migrants into a workforce.²⁵ The consequences of mis-managing cultural diversity are serious and it would increase stress among the workforce, confusion, frustration and conflict which translates into lower morale, productivity, quality problems and higher accident rates.²⁶⁻²⁸ Trajkovski and Loosemore²⁵ further pointed out the difficulties of foreign workers (Non-English Speaking Background, NESB migrant) in understanding the content of the mandatory government safety accreditation courses/training due to language barrier.

Construction industry demand massive manpower for the workloads, labour supplies are essential, and have become the most expensive resource deployed within the industry.²⁹⁻³⁰ According to Pillai³¹, Malaysian construction sector has become the most significant reliance on foreign worker among Asian country. Foreign construction workers (unskilled and semi-skilled migrant workers) in Malaysia were from adjacent regions; Indonesia is the leading source of labour, followed by Myanmar, Pakistan, India, and the Philippines. The quality of foreign workers in term of working skill is the weakness of the list in exchange for cheaper manpower in the industry. According to Han *et al.*³², most of the foreign workers arriving in Malaysia are unskilled, which has reduced the productivity and the quality control within the construction industry. Moreover, an unskilled foreign worker will contribute to a significant amount of safety related issues, as are lack safety knowledge and safety awareness.

Therefore, it is fundamental to establish an effective training to impart necessary knowledge and skills before tasks could be assigned. However, there exists language communication problem in a multi-cultural workplace, and the statistics have shown that most of the workers have low education background, thus putting into question on the applicability of the findings in previous research on the effectiveness of different OSH training method

when language barrier in multi-cultural is an issue in the construction industry.

■5.0 PROPOSED EFFECTIVE TRAINING METHOD IN MALAYSIA CONSTRUCTION INDUSTRY

As mentioned earlier, the existing OSH training method in Malaysia is less engaging method meanwhile the previous studies suggest that more engaging method would deliver a better result for the training outcome. Both less and more engaging training methods are able to impart safety knowledge and safety awareness to the workers. However the effectiveness of both training methods would vary according to different circumstances. According to Michel *et al.*³³, educator should consider which areas of their subject matter are best suited for the active learning approach (referring to more engaging training methods), in order to supplement those areas where the passive approach (referring to less engaging training methods) works best. So, to ensure an effective OSH training, the training institution should revise the existing training method in order to enhance training objectives as each training method has its own pros and cons.

It is doubtful whether foreign workers could understand the content of safety training delivered solely using single training method, not to mention shaping their safe work behaviour through the training. The purpose of having Safety and Health training is to help people to learn about safety knowledge and skill to the worker while shaping their safe work behaviours. Thus, it would be meaningless if safety training failed to enable the workers to understand the content of the training meant to impart the safety knowledge and skill to the worker and build up safety awareness.

It is noticeably that less engaging method (e.g. lectures, notes and video) enables educator to present a large amount of material in a relatively brief amount of time. Within the lecture period, educator is able to impart a significant amount of basic knowledge to the 'freshies' to form a better foundation of learning. However, becoming solely dependent on less engaging methods may end up in ineffective safety training as foreign workers may not be able to understand what has been taught in the lectures.

The effectiveness of OSH training would further be enhanced if the more engaging training is applied after less engaging training. The declarative and basic safety knowledge are recommended to deliver by using less engaging training method followed by a more engaging training method where the trainees are required to apply the knowledge in a real or simulated environment. More engaging training may further enhance the output of safety training as workers are given chances to apply the knowledge acquired on the practices provided in the safety training with guidance from trainers. Language communication problems may cause the workers to be unable to fully understand the content delivered using less engaging training method; meanwhile, follow-up training using more engaging method would enhance their understanding as trainees would be exposed with practical and self-experiences.

Therefore, by reviewing previous research, this research proposes that mix mode of less and more engaging training methods may be more suitable for OSH training in Malaysia construction industry which consists of multi-cultural labours.

■6.0 CONCLUSIONS AND DIRECTION FOR FUTURE RESEARCH

In conclusion, both training methods are able to impart the knowledge and safety awareness to the workers, however the effectiveness of both training methods would vary according to the different circumstances. When comes to the issue of language

communication problem in Malaysia construction industry, it is important to ensure the training method delivered in OSH training enables the workers to understand the content of the training and apply in real life. A single mode of training module would not be superior to another in effectively delivering the safety knowledge and awareness to the worker while modeling safe work behaviour. Thus, this research suggests that a mix mode of less and more engaging training methods would achieve better results in terms of effectiveness of OSH training in the Malaysia construction industry. It is recommended that the future researches could carry out experimental study to further examine the effectiveness of mix mode training method in OSH training in Malaysia construction industry.

Acknowledgement

The author is thankful to Centre of Real Estate Study for the financial supports.

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