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Is the Construction Induction Training scheme in the housing and civil construction Industries of Western Australia effective in improving safety culture?

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Abstract

This paper presents the findings of a 2011 study that evaluated the effectiveness of the Construction Induction Training (CIT) scheme (White Card) in the housing and civil construction sectors. This mixed method study collected data in three phases through: the segregated statistics of the Lost Time Injuries and Diseases (LTI/Ds), a broad industry questionnaire, and 82 interviews with managers and construction workers working in metropolitan and regional areas. The main findings indicate that there is broad acceptance of the benefits of the training across all stakeholder groups. The statistics show that there was a slight rise in LTI/Ds in the civil and housing sectors in 2009. However, the percentage rise in LTI/Ds is lower than the rise in workforce numbers.

Keywords: safety culture, mandatory training, safety training, construction industry, work-related injury.

Introduction

After encouraging construction workers from the mid-1990s to complete safety awareness training, in 2009 Western Australia implemented *mandatory* national CIT , colloquially know as the “White Card”. The training is based upon national competencies that form part of a training package within the Australian Qualification Training Framework (AQTF) and provides a Statement of Attainment that grants life long competency to participants. The CIT was developed by the Construction and Property Services Industry Skills Council[1] for the National Skills Council and is a legislative requirement of WorkSafe WA.

The aim of the training is to ensure that all workers in the construction industry (commercial, housing and civil) complete a safety awareness course before working on a construction site. This paper reports on the results of a mixed method study evaluating the CIT in the housing and civil construction sectors in 2011. The results of this study are presented after this paper has provided a brief review of safety training and mandatory training literature that underpinned the development of this study.

Benefits of safety training

Training interventions have led to an improvement in organisational safety culture and a reduction of work-related injuries.[2] [3] [4] [5] This is supported by the recent work of Burke, Salvador, Smith-Crowe, Chan-Serafin, Smith and Sonesh[6] who noted that safety-related problems in organisations are often training-related or training relevant. Their study investigated the impact of safety training and workplace hazards on safety knowledge and safety performance. They found that it was not just the content of training but also the method of safety training delivery that had an effect. They argue training is more effective when it is engaging and results in "greater knowledge acquisition, a higher level of safety performance, and a greater reduction in accidents and injuries".[6] Goldstein and Ford[7] extend this perspective by arguing that the importance of a positive transfer of training to the job is critical and leads to relevant changes in work performance that are often sustained over time. However, while there is evidence that safety training has an established pattern of success in supporting safer workplaces, there remain no clear guidelines on how such interventions should be implemented and managed.

A paucity of research and safety training program evaluations is evident in Australia; however, some studies have been conducted in the US. In 1997, the United States Occupational Safety and Health Administration developed a Union-based ten-hour hazard-awareness training program (Smart Mark) for the construction sector. This program is the most widely used construction safety and health awareness training course in the US[8] and is frequently incorporated into apprenticeship training courses. The program delivery includes active interaction, questions/answers, and mock-up construction settings within 13 modules selected on the basis of relevance to each particular construction trade. Sokas, et al[8] evaluated Smart Mark to assess the strengths and weaknesses of the training materials, to determine the most commonly encountered hazards and the impact the training may have had, and to determine whether interactive instruction and the inclusion of supervisors impacted the training. They found that little over half of the work sites improved safety practices by either changing their safety policies or work practices. In addition, Kinn, et al[2] conducted a study with plumbers and pipe fitters in Ohio and found that workers who had received a site specific safety induction[1] had fewer injuries, although the impact of the safety awareness training could not be determined. In 2010, Shaikh[9] completed a PhD study into the impacts of safety training on Newfoundland fishermen's knowledge and attitudes toward safety and found that the group moved from a general aversion to support for continual training in safety. Although the fishing industry in this research is very different from construction, it is an example of how those who are resistant to training can move to recognising the benefit particularly in terms of workplace health and safety. There is, therefore, evidence that well targeted training interventions not only have an impact upon worker practices but also have an impact upon attitudes to safety or the safety culture within organisations.

Inductions carried out at individual work places to address specific hazards such as safe handling of machinery.

Mandatory training

Work-related injury is something that both managers and workers wish to avoid due to the personal consequences and the impact on production. In order to reduce work-related injuries from occurring, both the industry and researchers ask: what form of learning is most likely to improve and sustain safety behaviour in an increasingly complex construction workplace environment? The focus upon current best practice conflicts with the complex world of learning theory with more than a century of discipline history. Much of our social learning is carried out as a voluntary activity with all the inherent advantages of personal motivation. However, issues of health and safety cannot be left to individual choice and the vagaries of personal motivation and they are therefore in the vanguard of learning issues that are most often positioned as mandatory learning.[10] The inherently dangerous environments of construction sites, despite safety regulations confront employees with complex and multiple challenges that are very different from their social life outside. Society insists that compliance with safety regulation should be positioned as an imperative and given the highest priority. Mandatory programs rather than voluntary learning appear to offer a more appropriate course for safety training.[11] In addition, mandatory learning and regulatory certification is often

positioned *before* a worker is allowed onto a construction workplace as a regulatory gateway to improve safety cultures and reduce incidents. However, we are aware that mandatory programs often provide an illusion of complete and continued compliance[12] especially if workers and managers subvert the system and achieve certification through dubious assessment practices without internalising the required learning.

Mandatory approaches to learning discard the long history of individual learning research that stresses the imperative of personal motivation and contextual relevance in achieving changes of personal knowing and subsequent actions.[13] , [14] , [15] , [16] In mandatory approaches to learning, learning design often does privilege institutional control of the selection of learners, the content of learning, the goals of learning, the methods and location of learning, and the subsequent certification processes. Such learning patterns position the learner more as the passive recipient rather than an active participant. So in terms of introducing mandatory pre-site safety training for the construction industry, there are several academic questions that remain about such a process and practice: is a regulated, often de-contextualised, certificated learning process, with its inherent pedagogic limitations justifiable in terms of safety training? If we can justify a mandatory approach in this context, can the processes be orchestrated to provide learners with ownership, an active role in the process, relevance for the learners, and produce a learning interaction that guides and embeds learning that will endure during subsequent work practices? In short, is mandatory learning for compliance compatible with effective learning and subsequent improvement in latter site performance?[16]

While the statistics and questionnaires associated with this study indicate the broad level of acceptance and impact of the CIT, it is the subsequent interview stage that indicates what forms of learning have developed within the mandatory training structure. The challenge for the industry is on the one hand to enforce the pre-site training and yet design learning experiences that are relevant and useful, and not all about compliance. The ultimate goal is not the certification but enduring safety behaviour on site leading to a reduction in work-related injuries. Given that the training is compulsory, how can the interaction be designed to be contextually relevant and meet individual needs? Learning compulsion so often privileges content acquisition and marginalises individual needs. This study investigated whether the CIT begins the process of embedding valuable long-term behaviour patterns rather than just return short-term administrative goals.

Methodology

The study was designed as a mixed method case study of the CIT scheme within the housing and civil sectors of the industry. Data was collected in 3 phases: (1) Segregated statistics of the LTI/Ds from the records of Worksafe WA, (2) A broad questionnaire distributed throughout the key stakeholders in the industry, and (3) Eighty-two interviews with managers and construction workers working in metropolitan Perth and/or in regional WA. The rationale for providing WA LTI/Ds statistics was to provide a snapshot of the environment in WA to support the study's investigation of the training. Each phase gathered evidence that was used to inform the construction and focus of the subsequent stage in an iterative fashion. The study progressed by using an action learning approach[17] where the collaboration between the researchers and industry leaders through an active reference group continually shaped and reshaped the study direction and simultaneously influenced the perceptions and subsequent action of the reference group members in their respective industry roles. Members of the reference group were made up of representatives of WorkSafe WA, the Construction Training Fund (CTF), the Master Builders Association (MBA), the Housing Industry Association (HIA), the Civil Contractors Federation (CCF), the Australian Workers Union, the Construction Forestry Mining and Energy Union (CFMEU) and Edith Cowan University. Each phase of the study from the scoping of the proposal to the drafting of the final report served to inform subsequent phases of the study and form the basis of recommendations to streamline current practices within the CIT system as the industry representatives were regulators, promoters, users and deliverers of the scheme. The researchers led the study, the CTF provided access to a large network of companies and WorkSafe WA provided legitimate state authority incident and fatality statistics for the housing and civil construction sectors. The survey was developed together with the reference group and trialled with this group to screen for confusing questions and errors. The survey was distributed to the MBA, the HIAs, and the CCF memberships in Western Australia. In terms of informed consent, this was assumed by participant involvement. The storage of the

completed questionnaires was according to university ethics protocols on password-protected computers in locked offices.

As the purpose of the study was to seek multiple perceptions of the scheme and to report its industry impact and how it could be improved, data was collected about industry perceptions of the value and effectiveness of the *certification system*, the associated relevance of the *training activity* and the subsequent *workplace impact*. The data collection included:

- Gathering data about how stakeholders "value" the CIT and certification
- Exploring perceptions and evidence of the congruence of the training activity and industry workplace needs
- Exploring perceptions and evidence of the effectiveness and diversity of the training and specifically the transition into workplace practice, and
- Collecting stakeholder perceptions about the relative merits of the CIT.

Three key research questions drove the study, specifically in the interview phase, and they were:

Having experienced the Construction Induction Training system in the construction industry during the past 3 years in WA

1. How effective has the Construction Induction Training certification system been for the industry?
2. How effective have the Construction Induction Training practices been for the industry?
3. How has the Construction Induction Training system impacted upon organisations and safety in the industry?

Each research question investigated the *issues, benefits and barriers* associated with the CIT and gathered data on the perceptions of a range of stakeholders about the value they placed on the training. Table 1 indicates the sample purposefully selected to explore the research questions.

Table 1: The sample

Instrument	Sample frame
Incident statistics	Tabulation and segmentation of the housing and civil construction sectors records from WorkSafe WA for the previous six years — before and during the CIT scheme.
Questionnaire	Online distribution to HIA and CCF memberships — approximately 820 CEOs and supervisors — six completed. Mailed survey to HIA and CCF memberships — approximately 820 CEOs and supervisors — 45 returned completed.
Semi-structured interviews	Eighty-two interviews with clusters of supervisors, managers, OHS managers, HR managers and CIT trained tradespeople and employees in both the civil and housing sectors. Fifty-three were conducted as telephone interviews and 29 face-to-face. Thirty-three worked in the Perth metropolitan area and 49 worked in regional WA. All participants were asked the same questions. One telephone interview with a representative from the peak/key bodies: CTF, WorkSafe WA, CCF, the CCF Board, MBA, HIA, CFMEU, and a Registered Training Organisation, combined with the seven interviews conducted and analysed in 2010.

Twenty-nine housing companies and 19 civil construction companies were sampled for the interviews. The interviews conducted within the housing sector were made up of 21 with managers and 27 interviews with tradesmen, representing 13 different trades. Trades included: plasterer, plumber, concreter, painter, labourer, tiler, bricklayer (including two apprentices), roof tiler, telephone services technician, brick cleaner,

carpenter, refrigeration mechanic and electrician. The interviews conducted with the civil sector participants were made up of 20 managers and 13 civil employee operators representing nine different operator roles. The civil roles included: digger operator, loader operator, excavator operator, drainer, drainer's labourer, storeman, labourer, trades assistant and mechanical fitter.

Findings

The findings in general produced both a strong congruence between each phase of the data collection. The findings are presented in sequence to first establish the changes in incident statistics and employee growth during the period of the study. Then the survey results provide an overview of industry perceptions of the scheme from multiple stakeholders. We acknowledge that the response rate of the survey was indeed low; however, the use of a mixed methodology and three phases of data collection have assisted in providing evidence to answer our research questions. Finally, the interviews with managers in the industry provide an insight into the rationale underlying the perspectives that have been outlined in the survey.

LTI/Ds for housing and civil construction

The context for this construction industry study is that WA is in a period of growth with a large number of construction and resource projects underway.[18] This has resulted in a rise in the numbers of entrants into the construction sector of about 20,000 per year since 2007[19] to a total of almost 984,100 employees across the industry in 2009.[20] The CTF reports that as at December 2011 they had achieved an almost 100% coverage of the sector in terms of the CIT. Table 2 compares the number of one or more days lost due to work-related injury in the civil construction sector to that of the residential building construction sector. In both sectors there was a rising trend in 2008/09 compared to the previous year and these figures are incomplete. However, the numbers for 2007/08 and 2008/09 are lower than the 2006/07 when injuries peaked. There were no fatalities recorded for the industry in this period.

Table 2: ANZSIC 1993 edition codes 4111 House construction, 4112 Residential building construction, and 4121 Road and bridge construction: LTI/Ds 1+ days lost

Financial year	House construction	Residential building construction nec	Road & bridge construction	Total
2004/05	172	31	115	318
2005/06	166	34	152	352
2006/07	220	64	177	461
2007/08	211	51	152	414
2008/09	193	58	159	410
2009/10p	150	47	164	361
Total	**1,112**	**285**	**919**	**2,316**

Source: Worksafe WA, May 2011

Table 3 show the types of injuries as well as how workers were injured in the 2009/10 financial year for housing and civil construction workers. Housing workers sustained more joint and muscle injuries than those in working civil construction (43% compared to 28%). Thirty-seven per cent of housing workers sustained wounds and lacerations compared to 1% of civil construction workers. However, civil construction workers had a high rate of respiratory system diseases (55%) compared to none recorded for housing construction workers.

Table 3: Proportion of housing construction and civil construction LTI/Ds 1+ days lost by nature of injury/disease group 2009/10p

Nature group (TOOCS 3)	Housing	Civil
Burns	1.0%	0.9%
Digestive system diseases	2.0%	0.5%

Fractures	11.2%	7.1%
Intracranial injuries	1.0%	0.5%
Mental diseases	0.5%	0.5%
Musculoskeletal and connective tissue diseases	1.5%	1.9%
Neoplasms (Cancer)	0.0%	0.0%
Nervous system and sense organ diseases	0.0%	3.8%
Other injuries	2.5%	0.5%
Respiratory system diseases	0.0%	55.9%
Traumatic joint/ligament and muscle/ tendon injury	43.1%	28.4%
Wounds, lacerations, amputations and internal organ damage	37.1%	0.9%
Burns	1.0%	0.0%
Digestive system diseases	2.0%	0.0%

Source: Worksafe WA, May 2011

Table 4 shows that workers are mostly injured by being hit by falling and moving objects, and lifting and carrying heavy objects for both industry sectors.

Table 4: Proportion of housing construction and civil construction LTI/Ds 1+ days lost by mechanism of injury/disease group 2009/10p

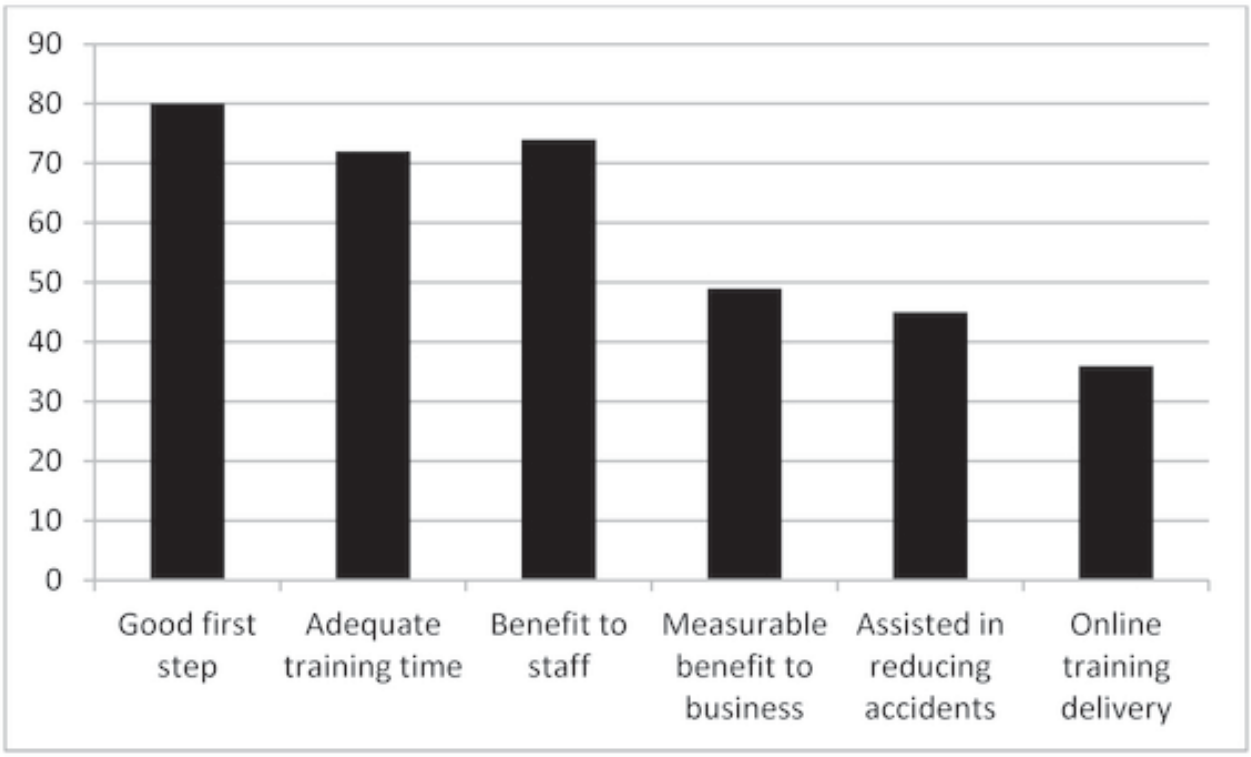
Mechanism group (TOOCS 3.1)	**Housing**	**Civil**
Being hit by falling objects	4.1%	4.7%
Being hit by moving objects	11.7%	10.4%
Being trapped between stationary and moving objects	2.5%	4.7%
Being trapped by moving machinery or equipment	1.0%	1.9%
Contact with hot objects	0.5%	0.5%
Falls from a height	15.7%	0.5%
Falls on the same level	11.7%	8.1%
Hitting moving objects	9.6%	14.7%
Hitting stationary objects	6.1%	3.3%
Insect and spider bites and stings	0.5%	3.3%
Muscular stress while handling objects other than lifting, carrying or putting down objects	16.8%	1.4%
Muscular stress while lifting, carrying or putting down objects	11.7%	19.4%
Muscular stress with no objects being handled	3.0%	12.8%
Single contact with chemical or substance	0.5%	3.3%
Stepping, kneeling or sitting on objects	1.5%	0.5%
Vehicle accident	2.5%	1.9%
Work pressure	0.5%	0.0%

Source: Worksafe WA, May 2011

Survey results

Even though numerous attempts were made to encourage workers in the civil and housing construction sectors to complete the survey, the response rate was low at 5.5%. The results of the survey merely give an indication of the perceptions of the value of the CIT for the industry. The interviews (*n* 83) conducted for the study provide in-depth evidence to support these preliminary perceptions. The sample indicated that the training was valued as a first step in safety awareness for the industry. Figure 1 shows that 90%

of the sample agreed that the cost of the training was minimal when CTF assistance is taken into account. In terms of training delivery, 95% of the sample agreed that trainers should have industry experience, 97% believed they should have a formal qualification and 100% valued trainers with accreditations and industry compliance. Overall 80% believed the CIT is "a good first step" to safety awareness for the industry. In terms of training duration, 72% stated there was adequate time spent by trainers delivering the course. Seventy-four per cent believed the CIT provided benefits to their staff while 49% believed that by having their staff complete the training there was a measurable benefit to their business. Nearly half (45%) stated that the training assisted their business by reducing accident rates; however, 55% of the sample disagreed with this statement. Although there were several negative comments about the online training delivery mode, 36% of the sample looked for this type of delivery when they chose a training provider.



Interview results

The interview data revealed that in general, participants were positive about the course content of the CIT. Most participants acknowledged that the course provides safety awareness training and is only the first step towards a deeper site-specific induction that does not replace the need for further training:

> "It gives people an awareness of what to expect when they get to a site and gives them an idea of some of the issues and situations they will come up against but every site and every company's safety requirements are very, very different."

The course curriculum and delivery had to be pitched so it was useful to highly skilled personnel and yet understandable by unskilled construction workers with limited English language abilities. Some participants felt that the content was delivered at too high a level; others thought the training lacked substance and should be extended. This was particularly an issue for non-English speaking participants, where understanding could be hampered by the use of technical language:

> "We still have that problem out on site when you have non-English speaking people out on site and you ask them for their cards and they will direct you to their overseer or their supervisor if you like. He will then produce about eight or eight to fifteen different cards and there's no photographic evidence on the card and there's nothing in the name."

In addition, the quality of the assessments was questioned by many who indicated that they were ineffectual, particularly in the online training mode. RTOs need to consider these issues when designing their training to not only fulfil the AQTF requirements but also deliver the content for maximum understanding. Twenty-two of the participants interviewed were unaware that the CIT is now a unit of competency. This is partly due to the recent transition from the "Blue Card" to the CIT in September 2008/09. Some participants proposed changes to the CIT content including the re-introduction of a mandatory refresher course and removal of the online delivery mode.

CIT training in WA is delivered in face-to-face and online modes. Most participants believed that the face-to-face delivery mode was the preferred option as it allowed interaction between trainer and participant. However, the mandatory requirement of the CIT resulted in resistance from workers, particularly those who had been in the industry for some time. For these workers their intrinsic knowledge of the industry enabled them to pass the CIT online and receive accreditation with a minimum of engagement and little or no loss of production. For those working in remote areas in WA, the online mode provides easy access and accreditation in the absence of access to face-to-face training venues. However, even in regional and remote areas, participants indicated a strong preference for face-to-face training. Some participants questioned the quality of the online delivery and particularly the assessment which appeared to vary considerably between organisations:

> "I think that's one of the main concerns that we have is that you can put someone through a White Card who will walk away with zero knowledge of safety because the assessment tools are poor."

The civil and housing construction sectors have embraced the move to national CIT training. Some participants were vocal about the need to refresh the CIT as a means of revisiting the content, informing employees about legislative changes and checking up on continued competency. Furthermore, the construction industry is characterised by a transient workforce that would benefit from localised refresher training:

> "I think maybe have a refresher now and again perhaps just to put it back in people's minds. They tend to forget a little bit but maybe a little bit of a refresher."

The data indicated that most participants believed the mandatory CIT had made a positive impact on workplace safety and had contributed to an improved safety culture. For the most part participants held the belief that the CIT had increased their personal safety awareness and that of the industry as a whole.

Discussion

The aim of this study was to review the value and effectiveness of the *training system*, the *training activity* and the subsequent *workplace impact* of the mandatory CIT in the housing and civil construction sectors in WA.

The analysis phase examined the significant relationships within the LTI/Ds statistics. It compared the perceptions of stakeholders about the CIT, the training and cultural impact on the workplace and examined the uptake and effectiveness of the CIT across the two industry sectors. The analysis probed employee responses to uncover the strengths and weakness of the training and cited recommendations for improvement. The respondents' perceptions about the benefits and ramifications of mandatory training, local and nationally based certification and single and renewal certification processes indicated current incongruities.

The study can therefore respond with some confidence to the research questions given the quantity and congruence of the evidence with the following statements:

1. How effective has the Construction Induction Training certification system been for the industry?

The CIT has focused the industry on safety awareness training and achieved a very high level of compliance (almost universal coverage) that underpins positive change in safety culture within the industry. The fears that may have been associated with the imposition of a mandatory learning experience appear to be largely groundless.

2. How effective have the Construction Induction Training practices been for the industry?

The industry has a positive view of the face-to-face training offered by most RTOs and believe it is an effective investment by the industry. However, there are specific concerns about shorter versions of the courses that may not provide the depth of knowledge needed to train workers. Many employers are sceptical about the reliability of online training and in particular, the reliability of online assessment processes.

3. How has the Construction Induction Training impacted upon organisations and safety in the industry?

Employers and industry workers alike regard the introduction of mandatory CIT as a benefit for the industry. The statistics indicate that despite the construction "boom" in WA there has been no significant increase in LTI/Ds during this period.[21] The evidence indicates that the training has enabled employers to build on the CIT base with subsequent organisational, site- and job-specific safety training. The training has generated improved awareness of safety and provided a minimum standard of safety awareness that was absent prior to the mandated CIT thereby impacting positively on the safety culture of the industry.

Conclusion

A review of the mandatory CIT in the housing and civil construction sectors indicates that there is broad acceptance of the benefits of the training across all stakeholder groups and that it has become embedded within the safety culture in the industry. While a few employees do not recognise value of this training experience, there is considerable evidence from participants of this study that most workers in the industry do value the scheme. Concerns remain about online delivery and its adherence to quality standards as compared to face-to-face delivery, particularly with regard to the training assessment. Stakeholders acknowledge that the introduction of mandatory pre-site safety training has been a significant driver in moving the safety culture of the industry forward. The statistics show that there was a slight rise in LTI/Ds in the civil and housing sectors in 2009. However, the percentage rise in LTI/Ds is lower than the rise in workforce numbers. While there is no hard evidence that the CIT is responsible for a lessening of work-related injuries per construction worker, the authors suggest that the training has increased safety awareness across the industry with a positive impact on safety culture.

The evidence from this study suggests that a mandatory approach to training in the field of safety can both gain almost universal industry acceptance and compliance and simultaneously provide learning experiences which have a positive impact upon the subsequent organisational and industry safety culture and employee actions.

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