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Design of a Safety Training Package for migrant workers in the construction industry

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Highlights

- The theoretical and practical gaps and challenges related to develop training for migrant workers in the construction industry are identified and discussed
- A new Safety Training Package for migrant workers in the construction sector is presented
- The Construction Safety Training Package (CSTP) developed is according to second and third generation training principles.

Abstract

The construction sector is known as a high-risk sector with many safety challenges. It is also characterised by a large number of migrant workers and these workers report higher accident rates than native workers. This paper presents the design of the CSTP (Construction Safety Training Programme). The CSTP is a theory-based training program aimed at improving safety behaviours in construction sites acknowledging the particular challenges migrant workers face. Based on second and third generational models of training, we developed a training program that addresses the challenges faced by migrant workers in the construction industry, namely language and cultural barriers, times pressures, difficult living conditions and separation between native and migrant workers, all of which may have a detrimental impact on a shared safety culture and joint understanding of the importance of safety performance.

The CSTP consists of five modules, both face-to-face and online teaching to facilitative sensemaking and social learning. A crucial underlying element of the CSTP is the importance of not only technical skills, but non-technical skills such as communication, teamwork, decision making, situational awareness and management of stress and fatigue. We propose that the strong theoretical learning principles embedded in the training program are likely to increase transfer of training that could help the construction sector develop safe working cultures.

Keywords: safety, training, migrant workers, construction workers, non-technical skills, safety training

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1. Introduction

Safety at work represents a topic of strong interest for policy makers and academics alike (Vignoli et al. 2014). Despite this, there are still 374 million nonfatal work-related accidents or illnesses worldwide every year and more than 2.78 million workplace fatalities (International Labour Organization [ILO], 2018). In particular, the construction sector has been identified as being at high risk for accidents and injuries. In fact, as reported by the Eurostat (2019a), 1 in 5 (20.6%) fatal accidents at work in the EU-28 in 2017 took place within this sector. Moreover, the construction sector relies heavily on migrant workforce, placing challenges in terms of language barriers and different safety cultures.

In response to alarming accidents and illness rates, the European Commission developed a new strategic framework on safety and health at work to address safety issues in the workplace (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on an EU Strategic Framework on Health and Safety at Work 2014-2020, 2014). The framework urges member states to promote OHS actions including training. Indeed, safety training is acknowledged as an effective way of reducing occupational injuries and enhancing workers' health, as it represents important preventive measures (Freitas & Silva, 2017) and it is considered one of the key safety management processes aimed at reducing accidents (Zhou et al., 2015).

Addressing safety training in the construction sector is highly relevant as this industry is complex and facing continuous changes (Peiró et al., 2020), due to a lack of stable employment practices (Brunette, 2005), frequent changes of construction sites, and the heavy reliance on subcontractors which differ in size, values, rules, regulations and practices (Choudry & Fang, 2008). Moreover, migrant workers face a number of important challenges

as they often do not master the language of the country, may not comply with legal immigration rules. Migrant workers may also be exposed to the riskiest conditions and they may feel pressured to accept risks because of urgency or fear of losing their jobs. Migrant workers represent a group that could be vulnerable due to cultural differences, language barriers and difficulties in social relations across cultures (Donaghy, 2009). Migrant workers can also be influenced by the Matthew effect (Merton, 1969), which suggests that those who have lower level of education and in need for more training are the ones least receptive. In order to counteract the Matthew effect, action is required to promote training motivation and participation. It is important to consider the conditions of migrant workers to ensure learning of knowledge and skills, attitudes and behaviours relevant to enhance individual safe behaviours and interactions with others. In fact, several characteristics have been pointed out as related to training transfer such as cognitive abilities, conscientiousness, neuroticism, self-efficacy learning goal orientation and motivation (Blume et al., 2010). As reported by Peiró et al (2020), individual trainee characteristics may play an important role in migrant workers' learning and transfer of safety training. Limited language abilities may mean migrant workers do not learn from training (Donaghy, 2009). Furthermore, not prioritizing safety at work may also prevent migrant workers from being motivated to engage with safety training or transfer to the workplace (Chan et al., 2017a; Menzel & Gutierrez, 2010). Finally, the lack of relations and integration with the national co-workers may increase and the cultural differences and clashes may hamper safety. These conditions highlight the importance of developing high level safety skills for migrant workers that they could use in every construction site and in every organisation they work for. In line with this, the aim of this study is to develop an effective safety training package, grounded in the cognitive and socio-constructivist theoretical models, suitable for migrant workers in the construction sector,

which could overcome the challenges related to safety paying attention to the main characteristics of this population.

2. The need for training

Safety training is important as it can modify workers' behaviours, which account for the 80% of the accidents in the workplaces (HSE, 2002). The relevance of training in improving health and safety for construction workers has not only been recognised by organisations, but also by workers. By surveying construction workers, Dingsdag et al. (2008) found that they perceived training and education to be the most important factor in making the workplace safer. As reported by Peiró and colleagues (2020), limited attention has been paid to develop and implement tailored training to the particular challenges and vulnerabilities faced by migrant construction workers.

Designing and implementing effective safety training programs for migrant construction workers poses complications that need to be addressed. In the present paper, we describe the design and development of an innovative safety training package for migrant workers in construction. Specifically, we address the call of Peiró et al. (2020) by advancing existing training through the consideration of both practical exercises and underlying theoretical learning principles.

2.1 Theoretical challenges

The systematic literature review by Peiró et al. (2020) revealed that current research on safety training of migrant construction workers lack sound underpinning theories of learning. In a review of the literature, Kraiger (2008) proposed three generations of learning theories, which have developed in an almost chronological order. The first category refers to first-generation instructional models, which mainly place the training learner in a passive role. Trainees are

assumed to learn through passively listening and absorbing the information and content provided by the instructor during training. These kinds of models consider the trainer the main responsible for the trainees' learning. Moreover, the trainers define the best way to perform a particular behaviour and learning is considered successful if the trainee performs the behaviour in this way. The passive role assumed by first generation models is potentially hazardous when considering safety training. For example, employees working in high risk sectors often need to make rapid decisions being aware of all the relevant circumstances of the context and assessing potentially dangerous outcomes. In these work contexts, training initiatives based on first generation models fail to provide trainees the skills to analyse the complexity of translating safety to the workplace.

Second-generation instructional models shifted the focus on the instructor to a learner-centred model of knowledge and skills relevant for the task. These models assume that the trainer is aware that participants can learn different things by attending the same training course and that the role of the trainer is to create a learning environment in which trainees can develop knowledge and skills able to allow further exploration of the domain and gain and organise the knowledge obtained in personally meaningful ways. Thus, these models posited a stronger emphasis on the activities that inspire the learner in terms of exploration and sensemaking. Second-generation instructional models are based on constructivist learning approaches, which means that trainees must learn knowledge and skills in an active way (Bruner, 1990). Accordingly, not all the trainees learn the same contents and the trainer has to provide an environment that supports trainees' sensemaking, which is considered as a process through which people try to give meaning to their experience (Weick, 1995). Weick and colleagues (2005) stated that communication is a central component of sensemaking and that sensemaking is about organizing information and meaning through communication. Taylor and Van Every suggested that communication represents "an ongoing process of making

sense of the circumstances in which people collectively find ourselves and of the events that affect them" (Taylor & Van Every 2000, p. 58).

Finally, third-generational models are based on social constructivism, implying that individual learning and development occur in a social and cultural context that is constantly changing (Palinscar, 1998). Social constructivism posits that the main aim of instruction is to provide learning environments that allow trainers and trainees to learn from each other and also trainees learn from each other through interaction. This reciprocal learning environment means that the knowledge and skills gained by the participants are socially constructed through the interactions between trainees and trainers. In other words, third-generation instructional models suggest that trainees create learning through a process of social negotiation and collective sensemaking during the training (Kraiger, 2008). These processes could be helpful for migrant workers who often belong to different safety cultural backgrounds, especially when trained with national workers (Gao et al., 2017) as they progressively may construct and negotiate new shared safety values and attitudes in the training setting that will better fit the ones in the construction site where they work. Our training package relies on a second and third generational perspective and aims to promote cognitive and social constructions useful to enhance workers' adaptive strategies to promote safety in an interactive way with the specific physical, social and organizational context in which they work.

2.2 Practical challenges

Multicultural construction workforces are particularly prominent in Europe (Eurostat, 2019b), while in the U.S., the majority of construction migrant workers are Hispanic (Brunette, 2004). Multi-cultural working populations pose a range of challenges in the development of an effective training package. For example, cultural differences can impact training effectiveness

and consequently safety outcomes (e.g., Burke et al., 2008). Different cultures could also mean that workers in the same organisation or in the same construction site speak different languages and bring different cultures and this constitutes a challenge both in terms of communication between the members of a team and in terms of understanding the safety training initiatives they have to attend. Social relations present a challenge for migrant workers (Peirò et al., 2020) who often have poor relationships with supervisors and experience language or prejudice barriers (Donaghy, 2009). Furthermore, migrant workers usually work with people from the same culture and this hinders the learning of the safety norms, values, regulations, and language of the host country (Al-Bayati et al., 2017; Hallowell & Yugar-Arias, 2016). In this scenario, it is important to develop a participatory safety training package dedicated to migrant workers able to address and overcome these challenges by going beyond the mere inclusion of technical contents and promoting interaction with trainer and other trainees to revise and reconstruct their original safety beliefs, values and practices in "dialogue" with the ones of the country in which they are working.

3. Development of a training package for migrant workers in the construction sector

In order to address the theoretical and practical challenges outlined above, we developed a safety training package (CSTP – Construction Safety Training Package). The development of this training package constituted a part of a European project aimed to address the challenges of safety training for migrant workers in three European countries (UK, Spain and Italy).
We developed the CSTP based on five main sources. First, we conducted a systematic literature review of the safety training of migrant workers in construction including only peer-reviewed papers in scientific journals (Peiró et al., 2020). One of the main findings concerning safety training was the focus on technical skills with less attention paid to the

training of non-technical skills, which has been defined as "cognitive, social and personal resource skills that complement technical skills, and contribute to safe and efficient task performance" (Flin et al., 2008, p.1). Second, we reviewed the grey literature and relevant training resources, intervention programs, identifying the ones oriented towards the training of migrant workers. Third, we conducted focus groups and semi-structured interviews with relevant stakeholders such as safety trainers, occupational health and safety professional in the construction industry, site managers and supervisors, and native and migrant workers in the construction industry in Spain, Italy and the UK (Author a). Fourth, we reviewed the wider literature on safety in construction (e.g. Aksorn & Hadukusum, 2008). Finally, we reviewed the legislations concerning safety training in the three countries (United Kingdom, Italy and Spain) that participated in the project. Together, these sources helped to identify the learning principles and the content that drove the design of the CSTP.

3.1 Targeted groups of the training

The CSTP developed is designed for classes of approximatively 15-20 members composed by migrant and native workers together, using the language of the country they work in. As reported by Brunette (2004), migrant workers may have different values and attitudes on safety than those dominant in the host country as migrant workers are influenced by the culture, values and practices of their countries of origin. Thus, it is important to develop training activities that promote the interaction of both migrant and native workers in order to enhance the social construction that may ensure effective safety practices. Composing mixed classes (constituted by both native and migrant workers) could help to construct and reinforce new shared safety values and attitudes going beyond what has been learned in the different home countries.

Previous research has found that translating materials is not perceived as the most efficient way to communicate health and safety (Bust et al., 2008) and we wanted to break down the barriers between different migrant groups and native workers (Bust et al., 2008). Cultural differences will lead workers from differences cultures to interpret audio-visual material differently (Bust et al., 2008). Furthermore, migrant workers, compared to native peers, report poorer levels of cultural dimensions, such as organisational safety climate (e.g. Chan et al., 2017b). Through the inclusion of migrant workers from different cultures and native workers, we sought to engage workers across different cultures to develop shared meanings of safety issues in order to support trainees' sensemaking. One important issue here is to assess the trainability of the migrant workers under these conditions. It implies to check they have the necessary language skills of the host country.

3.2 Learning principles

The design of the CSTP is based on three main assumptions. First, the content of the CSTP should envisage a broader range of skills. There is the need to consider not only technical skills, but also other aspects concerning workers' abilities and understand human characteristics associated with each workers' task, i.e. Non-Technical Skills (NTS). NTS refers to a specific kind of skills, able to enhance workers' technical skills and when there is lack of them, this could result in errors' increase and consequently the occurrence of adverse events (Flin et al., 2010). Second, in order to enhance the transfer of training of the CSTP, it is essential to contextualise the activities planned during the training in class with the work activities usually done on the construction site to both enhance the training transfer and the process of sensemaking concerning safety attitudes and behaviours. Third, in line with second and third generational approaches to training, as reported by Peiró and colleagues (2020), in order to maximise learning, safety training should be designed to engage and involve migrant

workers through a participatory and interactive approach using small group methods (Ahonen et al., 2013), role-play, hands-on practice, and multimedia interactive material (Jaselskis et al., 2009). CSTP has been designed to overcome language barriers. According to the social constructivist learning theory, CSPT includes both face-to-face activities, which allow participants to learn from each other and reinforce social leaning, and on-line learning activities promoting interactive exercises, which support sensemaking at the individual level. We rely on second and third generational training principles in that we developed training also based on games to played on-line which could help the trainees to strengthen the process of shared sensemaking by reinforcing the knowledge gained during the face-to-face training and making sense of what they learned through feedback. A recent systematic review and meta-analysis on the effectiveness of occupational health and safety training also suggests that the self-learning by e-learning method could be perceived by trainees as potentially appropriate for their training objectives (Ricci, Chiesi, Bisio, Panari, & Pelosi, 2016). Moreover, according to the third-generational models and social constructivism we developed a CSTP which through the use of games and group activities in class allows participants to learn from each other and to develop a shared socially constructed knowledge. The CSTP has been developed as an initial training. Anyway, these learning principles could be applied also to update training, which is mandatory in some countries of the EU.

3.3 Training design

By using a second and third-generation instructional models as our theoretical framework, the safety training emphasises individual cognitive and affective processes and social interaction between the members in order to enhance the awareness of the participants about the safety issues, making sense of trained knowledge providing trainees with higher level of safety communication skills, which are important non-technical skills (Flin et al., 2008). Moreover,

the design of the CSTP has been developed with the aim to favour and to reinforce the sensemaking process among participants, both with the in-class and the on-line activities. There have been developments to use virtual reality methods in safety training, however, research has found that although such methods are related to an enhanced learning experience and improved hazard identification, general site safety did not improve (Sacks et al., 2013). A challenge to safety training in construction are the values of workers. Although workers demonstrate they know how to work safely in training sessions, they may have "a tough guy" attitude at the construction site (Choudhry & Fang, 2008). Training should therefore not only focus on teaching technical skills, but also changing values and developing non-technical skills (Choudhry & Fang, 2008). In the present study, we developed a combined face-to-face and on-line training with a high level of engagement through interactive exercises.

The CSTP aims to teach not only the usual technical skills such as for example how to safely assemble and dismantle a scaffolding in a construction site, but proposes to teach these contents promoting and using non-technical skills. Specifically, we focused on five non-technical skills taken from the taxonomy developed by Flin and colleagues (2008): situational awareness, communication, teamworking, decision making and stress and fatigue management.

Situational awareness. Situational awareness refers to when an employee is aware of what is happening in the workplace and constantly monitors the environment by observing and detecting potential changes and threats or hazards (Flin et al., 2008).

Decision making. Decision making is directly related to behaviours and refers to the process of reaching a judgement or choosing an option. In operational work settings such as the construction environment, there is a continuous cycle of monitoring and evaluating the task environment, and based on these evaluations, employees have to take appropriate action.

Communication. Communication is an important NTS related to safety and underlying others NTS (Mariani et al., 2019). Communication is crucial in work environment where people with different languages work together such as in the construction sector.

Teamwork. Teamwork and cooperation with other workers is a relevant NTS as usually workers from different companies work together in the same construction site. Moreover, construction projects and construction sites are becoming more nationally diverse posing also challenges about the language barriers (Oswald et al., 2019).

Stress and fatigue management. Originally, Flin and colleagues (2008) identified both "coping with fatigue" and "managing stress" as two different NTS. As these two skills showed some overlapping (see Mariani et al. 2019), we collapsed these two skills and defined them as the ability to manage both fatigue and stress and stressful situations in the workplace. Managing fatigue is especially important in the construction industry as work in this sector is generally considered physically demanding (Lunde et al., 2016). Employees could experience not only high levels of physical demands, but also psychological demands. As reported by Mariani and colleagues (2019) it has been quite established how job demands in general are related to emotional exhaustion and consequently safety outcomes such as safety compliance (Li et al., 2013). Moreover, migrant workers could have poorer living conditions (e.g. Xiao et al., 2018), which might directly or indirectly affect mental health (Guite et al., 2006).

Moreover, the CSTP heavily relies on engaging activities in class (e.g. role playing, group activities, action planning activities) underpinning the third-generation instructional model (Kruger, 2008). According to the APA dictionary of Psychology, the role play is "a technique used in human relations training and psychotherapy in which participants act out various social roles in dramatic situations". The role play activity developed for the CSTP provides different characters (the young digger driver, the construction foreman, an expert colleague, a young colleague, the developer, a passer-by) each one with clear indications about past

history and attitudes and a storyline, in which an incident happens. Through these exercises, trainees co-create situations closer to the ones taking place in work places and show their behaviors and responses to them. The trainer (the gamemaster) has to assist as a non-participant actor and manage the role play whether some issues rise and most important, facilitates awareness and reflexivity about the important learning experiences that are produced.

Concerning the type of activities, the CSTP comprises both in-class and online activities (see figure 1), specifically:

- 5 in-class training units (defined as "learning walls") of 4 hours each for a total of 20 hours. Different learning walls have been created to allow trainees to practice learnt knowledge and skills between each wall. This will allow the trainees to try first attempts of new safety behaviours and identify challenges in doing so. First transfer attempts have been recently identified as a key variable in the transfer of training process (e.g. Blume et al., 2019). In case this happens, it is possible to discuss these potential barriers with the trainer and the class participants in order to identify ways to overcome them.
- E-learning activities (online training) for about 4 hours. The e-learning activities will be useful for different reasons. First, the e-learning activities will allow trainees test between the learning walls what they have learned in class in order to reinforce the knowledge gained based on sensemaking posited by second generation learning models. Indeed, the interactive platform provides all the materials used in class and more useful references, which could help the trainees to answers to doubts and enrich their knowledge on safety topics. Second, the online platform hosts learning games developed with the aim to reinforce the trainees' knowledge through a continuous feedback to the trainees based on the potential mistakes they make when playing to

the safety games. This rich and consistent virtual environment, which is common to all the trainees involved, could favour and reinforce the sensemaking concerning safety behaviours and procedures.

At the end of the CSTP, participants will have to take an exam, and if they pass it a certificate will be given to them. The certificate refers to the contents of the training. The legal validity of the certificate depends on the country regulations.

Insert figure 1 around here

3.4 The contents: Technical and non-technical skills

As presented before, safety is not only influenced by technological aspects and technical skills, but also by contextual factors, such as for example, regulatory and business pressures, job demands, and job resources (Hansez & Chmiel, 2010). Therefore, relying only on technological aspects and workers' technical skills is not fully effective in the management of safety issues, as technical skills are crucial, but not sufficient, in order to maintain high safety levels over time (Yule, 2006). The recent systematic review on safety training for migrant workers in the construction sector (Peiró et al., 2020) showed that overall the studies presented positive results in terms of learning outcomes, although these are mainly focused on learning cognitive content, that is, technical safety skills; few studies focused on non-technical skills, as for example attitudes changes and hazard awareness. One of the main characteristics of the CSTP is to integrate NTS into technical training content, using a participative and interactive teaching method. Table 1 present the technical and NTS contents that have been integrated in the CSTP.

3.5. Training tools and techniques

The CSTP consists of different kind of training tools and techniques. These methods include: a) presentations with the support of slides with audio-visual contents, b) videos to facilitate the autonomous reflection of the participants and the activation of comparison of interpretations between members in the group; c) images and newspaper articles to promote the analysis of real-life situations and their discussion within the group; and d) exercises aimed at encouraging transfer of learning to work settings.

Together with the in-class walls, the CSTP provides also 4 hours of online training (see figure 2 for the structure of the interactive platform). Despite the on-line training is voluntary, training institutes can make available computers in order to facilitate the use of the platform. Anyway, trainees can access to the online training also from home using personal computers or smartphones. Moreover, also companies could provide some working time to employees in order to access the platform during the working hours. This could result in some benefits both for the worker which will have more opportunities to increase his/her knowledge, and for the organization which will show a higher investment in safety.

According to the systematic literature review developed by Peiró and colleagues (2020), an important point of training design refers to the delivery methods, specifically, ICT (Information and Communication Technology) offer a wider array of options that can be useful for migrant workers. ICT technologies allow participants to learn at their own pace and with less use of spoken language. In line with the third learning principle, which states that it is important to overcome language barriers, we chose to use ICT technologies in order to allow us to create games based on figures and pictures and a limited use of language, which allow to increase trainees' knowledge of those participants who could have potential language barriers.

Insert figure 2 around here

The online CSTP training is delivered in a dedicated interactive platform where trainees can review the in-class arguments and try their new knowledge by playing games that are rather visual and avoid intensive linguistic use. The games provided in the interactive platform are the following:

- Safety Sort: participants have to rank pictures illustrating risks, from the less to the most dangerous;
- Pin the Pain: during the execution of this exercise it is showed at participants some pictures representing risks, and them have to pin, in a human body figure, in which parts of the body the risk could produce injury (an example is provided in figure 3)
- Hazard Hunt: during this exercise, participants will identify risk sources in pictures (an example is showed in figure 4). A similar game has been developed also by the Occupational Health and Safety Administration.

Insert figure 3 around here

As reported by Magner and colleagues (2014), personally relevant and easy-to-understand decorative illustrations make multimedia learning interesting. Furthermore, most of the games provide immediate feedback. This means just after each of the item of the game presented, the trainee receives immediate feedback about whether their response is correct and if not, why the answer is incorrect. This immediate feedback procedure is extremely relevant not only because it can give the trainee an idea of their safety knowledge level, but also because in case of errors he/she can understand which is the error he/she made and

which is the correct answer, thus providing the trainee with immediate new knowledge. The timing of the feedback is important as studies (e.g. Thornock, 2016) showed that providing feedback immediately after the implementation of a decision most effectively promotes learning and future performance given that this is the point at which learning costs are lowest. Moreover, at the end of each game the percentages of correct answers (figure 4) is reported, giving a personalised feedback to the trainees. These feedback inputs can help trainees to make sense of what they learned during the training (Lim et al., 2019). Moreover, trainees can download dedicated apps and useful links to safety behaviours in the construction site from the interactive platform provided also by other safety institutes (such as National Institute for Occupational Safety and Health; NIOSH).

Insert figure 4 around here

3.6 Training strategies to promote learning transfer in the construction site

Frequent post-training feedback to trainees is important due to anecdotal evidence that trainees think they will be able to transfer more than they actually do (Baldwin et al. 2017). It is thus important to continually feedback actual changes in safety behaviours to trainees in order to motivate them to seek out situations where they can apply learned behaviours. Feeding back information about attempts to implement new learned safety behaviours may provide important inputs to trainees as to how they may maximize the outcomes of training by increasing opportunities to use learning from training. Despite it not being feasible to provide feedback directly to trainees in the construction site when they are working as the CSTP provides training activities in class and on-line (not on the construction site), the CSTP include dedicated exercises in between the training/learning walls with the aim to increase

transfer of training through the actual modification of behaviours through feedback. During the second-to-last learning wall of the CSTP, participants are asked to define a list of safety behaviours they learned during the training and that they intend to apply on the job when they return in the construction site. Participants have to identify for each of the listed behaviour: 1) why they choose this behaviour; 2) to which technical skill or NTS it refers to; 3) which obstacles the learner expect to encounter in applying the new safety behaviour to the job; 4) which solutions he could find to avoid the obstacles. When attendees return to the training (last learning wall), the trainer will do a follow-up action planning activity where the trainees analyse for each behaviour whether they were able to apply it in the work activities, which were the facilitating or hindering factors as well as the potential actions to overcome them. This activity allows the trainers to provide feedback on the behaviours in the work contexts and how to successfully implement safe behaviours in real context to promote a safer performance. Moreover, as the supervisors are not attending the training, we developed the "safety cards". The safety cards are used during the training and each of them report in a concise way a content of the training with also figures and pictures. Some example cards contents are: protective personal equipment, what to do in case of fire, non-technical skills. The trainer can give each trainee two copies of these cards, one for the trainee and one for his/her supervisor. In this way, the supervisor will be more aware of the contents learned by their followers and can try to support and facilitate the transfer of what has been learned in the job as supervisors will be able to give more precise feedbacks to their followers.

4. Discussion

This paper presented the design and development of a new training package (CSTP – Construction Safety Training Package) dedicated to train migrant workers in the construction sector. Despite many decades of policy reform, safety research and safety initiatives, this

sector remains dangerous, especially for migrant workers, in many parts of the world (Loosemore & Malouf, 2019). Our study contributes to the literature on migrant safety training research, which has been found to be alarmingly scarce in the contemporary literature (Peiró et al., 2020). To the best of our knowledge, no previous studies significantly considered NTS in the construction sector. Aiming to respond to this lack in the literature, the CSTP comprises both technical and non-technical contents highlighting how NTS contributes to safety behaviours and are relevant in the construction sites. Despite some studies showed that it would be difficult to teach soft-skills to migrant workers (e.g. Menzel & Shresta, 2012), CSTP relies on a social constructivistic approach, which results in more meaningful outcomes. This is in line with the tenet of Peiró and colleagues (2020), which argued that as migrant workers are likely to express different

safety values and norms, safety training should also encompass non-technical skills. Moreover, the safety package developed in this study comprises not only on-class participatory and interactive training but also e-learning which is somewhat scarce in the safety literature regardless of the proved effectiveness (e.g. Schmeeckle, 2003). Furthermore, despite most of the literature on migrant safety training relies on first generation instructional models (Peiró et al., 2020), the CSTP relies on a cognitive and social constructivistic approach which considers sensemaking, feedback, and social interactions from the trainer and among the participants as the basic processes to challenge own cultural values and practices about safety misaligned with those of the host country. The use of a social constructivistic approach could favour the shared sensemaking process of the participants, thus also promote training transfer and it is a great procedure to critically consider values, assumptions and practices about safety.

Moreover, the CSTP consists of activities that include strategies aimed at mindsets and behavioural changes in the workplace and the analyses of potential hindering and facilitating factors. These practice and feedback activities have been found to be strongly related to transfer (Burke & Hutchins, 2007). Moreover, these activities are in line with the propositions of the dynamic model of training transfer recently developed by Blume and colleagues (2019), which highlights a new relevance on the relationship between intention to transfer, initial attempts to utilise the training and the integration of feedback received from the transfer attempt. The CSTP relies in engaging activities both in class (e.g. role playing, group activities) and on-line (e.g. safety games). These engaging activities could counteract the potential influence on migrant workers of the Matthew effect proposed by Merton (1969). Meta-analyses have found that the level of engagement in training has overall positive impact on safety and health outcomes (Burke et al., 2006; Robson et al., 2012). Anyway, it should be noted that due to the number of studies available and the great heterogeneity of the population involved, it was not possible to reach definitive conclusion. Moreover, the review meta-analysis of Ricci and colleagues (2016) found that classroom theory with active learning was quite efficient in managing knowledge transmission.

As the training involves both on-line and engaging in-class activities it is necessary that the trainers possess digital skills enabling them to use the platform and they need social skills to engage in group activities. Engaging in group activities (such as role-playing) can potentially result in conflict between the trainees. Thus, it is important that the trainer has experience in conducting these kinds of activities and working with groups. Moreover, the CSTP here described needs to be delivered in a training environment, which ensures sufficient physical space to conduct the group activities and allow the participants to try and practice the procedures they learn. Finally, given that the trainees target group is migrant workers, the trainers need to have some cross-cultural skills and be able to obtain benefit from the richness

of the cultural perspectives that emerge in the class, especially when there are culture sensitivity topics.

Despite these strengths, the CSTP suffers some limitations. The CSTP focuses on construction workers and, even if it considers the role of supervisors to support transfer does not directly develops tools to improve the role of supervisors as an actor supporting training transfer. Vignoli et al. (2018) found that trainees who reported higher levels of supervisors' safety transformational leadership were more likely to intend to transfer non-technical skills after a training program. We suggest that future development of the CSTP could combine training to the workers with training of their supervisors. Despite training at the same time workers and their supervisors could be quite difficult to do in some countries (as the mandatory training does not always align), this could increase the likelihood to actually modify and maintain over time safety behaviours especially of migrant workers. In fact, acknowledged models on training transfer (e.g. model of transfer process developed by Baldwin and Ford, 1988) pointed out that support in the work environment (such as support by the supervisors) is important to trigger the transfer of training process. A strong relationship between supervisory support and transfer of training has also been acknowledged in the integrative literature review of Burke and Hutchins (2007). Overall, the relevance of the context is acknowledged in the transfer of training literature (e.g. Blume et al., 2019). Future studies should analyse the effectiveness of this training in a migrant workers' sample using both qualitative and quantitative data in order to collect in-depth information, and reduce possible bias that could lead to a wrong interpretation of the results when assessing the effectiveness of a safety training program (Vignoli, Punnett, & Depolo, 2014).

Lastly, the CSTP has yet to be tested to establish its effectiveness. The CSTP will be evaluated using a framework focusing explicitly on training transfer (Author b) which will take into account also potential cultural differences among the trainees.

5. Conclusion

The paper presented the development of the CSTP, a theory-based safety training package dedicated to migrant workers in the construction sector. Using second and third generational instructional approaches to training, the CSTP translates and integrates state-of-the art of construction migrant workers' training into a comprehensive training package by addressing the challenges of one of the most multicultural and multilingual work contexts such as the construction sites (Edirisinghe, & Lingard, 2016). Overall, the CSTP can be a reliable and effective instrument for organisations in the construction sector aiming to increase the workers' level of safety with special attention to the migrant workers that has proved to be one of the most vulnerable groups.

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Author a. Details omitted for double-blind reviewing.

Author b. Details omitted for double-blind reviewing.

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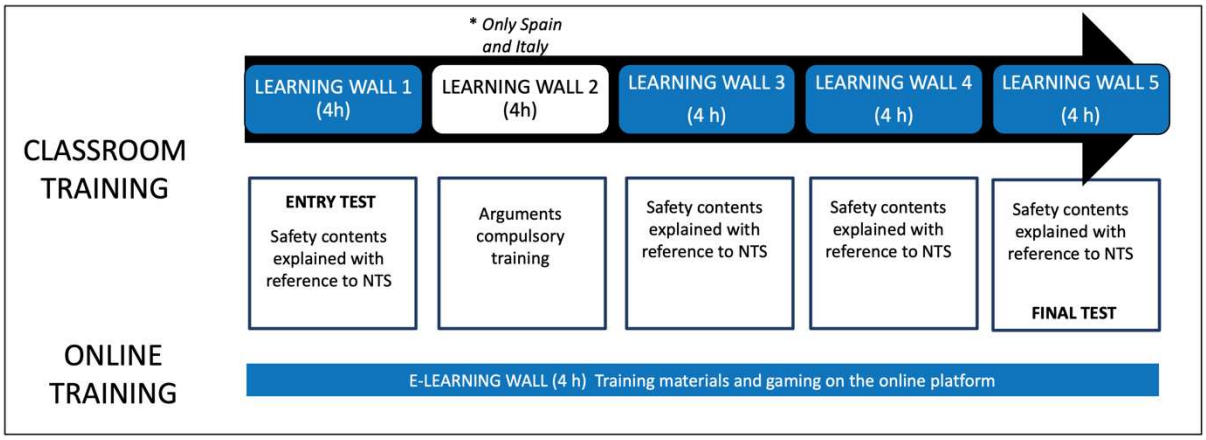
The authors declare that there is no conflict of interest

Table 1 – Technical contents and technical and non-technical skills integrated in the CSTP

Typology	Description of Contents and Skills
Technical	Concepts of prevention, protection, accident, occupational disease, danger and risk Organization of prevention and risk assessment Basic theoretical notions on: risks, signage, Personal Protective Equipment (PPE), training obligations Risks at the workplace (mechanical, electrical, equipment, physical, chemicals, goods handling, interference, and subcontracting) Work in conditions of physical stress, temporal pressure, alcohol intake Emergency management
Non-technical	Situational awareness Communication Teamwork Decision making Management of fatigue and stress

Figure 1: Description of the learning wall including the number of learning walls, contents, tests, and type of training (online and classroom)



Note. Learning wall 2 exclude the UK as in this country the regulations on safety training provides that the contents and training materials can't be modified

Figure 2: Structure of the interactive platform

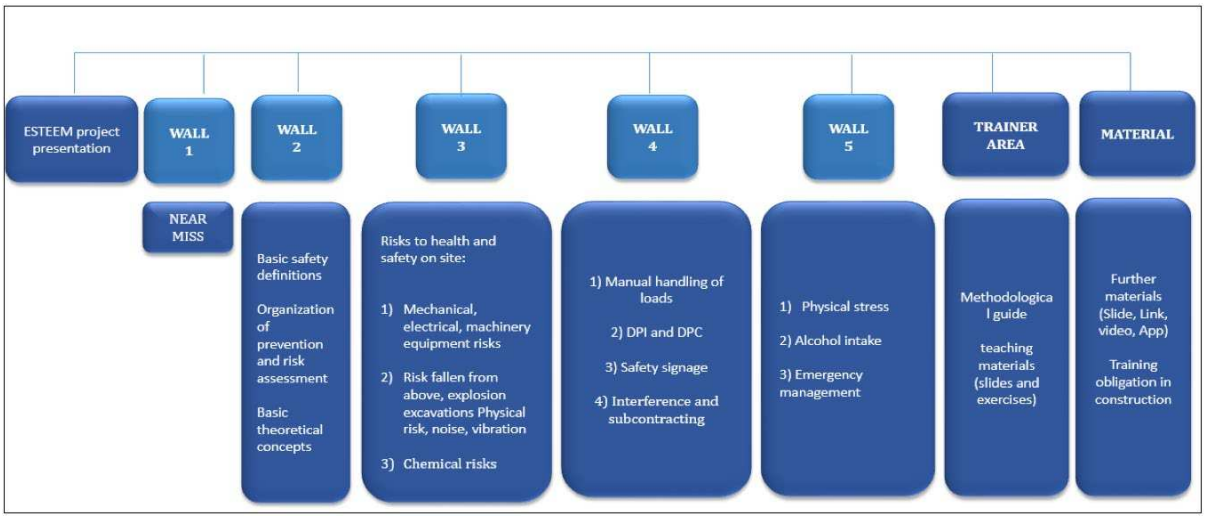


Figure 3: Example of Pin the Pain game and relative feedback

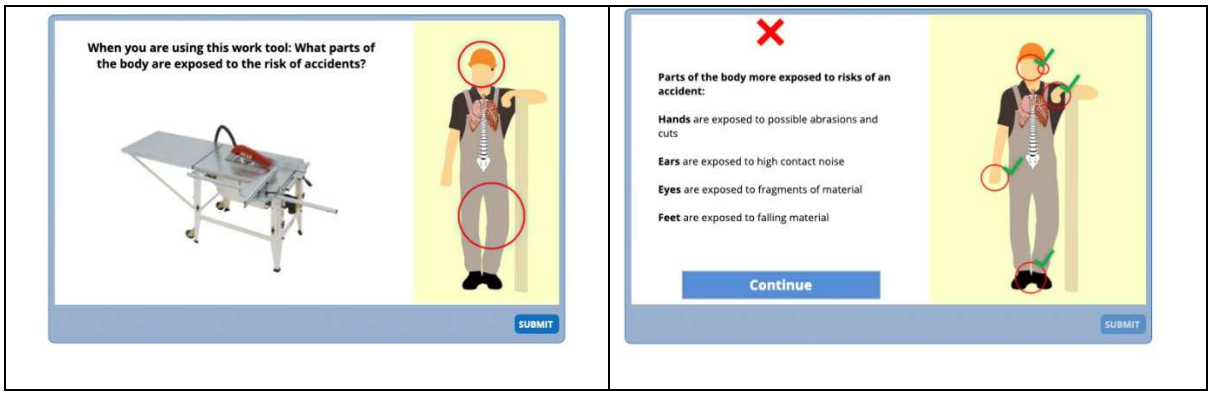


Figure 4: Example of feedback in the games of the interactive platform (Hazard Hunt game)