Abstract

The general background of this study is an interest in how cultural tools contribute to structuring learning activities. The specific interest is to explore how such tools co-determine employees’ problem solving actions in health, safety and environment (HSE) training activities in a multi-national company context. Theoretically, the research takes its point of departure in a socio-cultural perspective on the role of cultural tools in learning, and in a complementary interest in the role of communicative framing of learning activities.

In the research reported here, the focus is on how employees learn to organise HSE actions in the context of using Problem Based Learning (PBL) applied as a cultural tool. More specifically, our interest is in how PBL promotes adult learning by drawing on learners’ experience and involving them in reflective and social processes in the given context.

The empirical material consists of video and interview documentation of employees participating in HSE training applying PBL. Interaction analysis is used as an approach/method. The aim of interaction analysis is to identify how the participants use resources in the complex social and material context they (inter)act in. An assumption in interaction analysis is that verified observations are the best empirical material for generating analytical knowledge about learning.

Expected findings argue how PBL to a significant degree frames the HSE learning practices. Furthermore, PBL can be used to structure problem solving through participation and negotiation. In this way, problem solving emerges through experience situated in specific practices rather than through abstract knowledge.

The practice included in this research is a multi-national production company, which over a period of extensive growth and several organisational changes, has not managed to secure adequate safety culture. Safety implementation processes traditionally involve a large amount of training, which is associated with reduced productivity for the time spent on training. Therefore, the company in question wants to find ways to implement more efficient HSE training programmes applicable in different cultures.
Introduction

Safety at a workplace is the absence of any danger or harm that involves the People, Equipment, Material, Environment and Processes (P.E.M.E.P). There exist legislative regulation from national governments and standardised systems (ISO 18001, OHSAS) for organisations to control negative safety outcomes on multiple levels. Since past major disasters like the atomic catastrophe of Chernobyl, there has been a consensus that this alone is not enough and the notion of safety culture became a focus of safety research. Thus, research has been directed at influencing the working culture towards improved safety awareness and safety behaviour.

Whenever there is a need for an implementation of a safety culture there is a demand on staff training, mostly regarding safety awareness and behavioural programmes. However, typical training approaches have shown limited sustainable long-term effect and there have been difficulties in dealing with intercultural issues in multi-national companies. Here, a multi-national company is one organisation with units that are geographically separated. They have the same organisational structures and production processes. Hence, organisational needs for training are expected to be similar, but the national legislative regulations and culturally-derived perceptions differ between the geographically separated units. This creates challenges when it comes to the design and implementation of training interventions.

According to Burke et al. (2006), research within the field of safety training include indiscrepancies when it comes to focus, perspectives on and approaches to learning. Furthermore, the authors have identified that existing research not necessarily is incorporated into the design and implementation of safety training. The authors suggest a discussion on “how best to achieve different types and levels of knowledge acquisition through training and optimise the transfer of training.” (p.2).

The practice included in this study is a multi-national production company, which over a period of extensive growth and several organisational changes, has not managed to secure adequate safety culture. Safety implementation processes traditionally involve a large amount of training, which is associated with reduced productivity for the time spent on training. Therefore, the company in question wants to find more efficient and sustainable ways for HSE education that is applicable at all sites across the globe.

Problem Based Learning (PBL) covers a multitude of educational practices. The application of PBL involves problem solving inquiries, reflective and social processes, which intend to promote adult learning and, similarly, constitutes important factors when it comes to cultural change. (Tynjälä and Räkkinen, 2005). Yeo (2007) found in his exploratory study that “PBL systemizes learning in a way, that informal learning patterns are transformed into specific structures to facilitate workplace learning.” (p.2). He implicates that this systemisation leads to the generation of organisational knowledge. Thomassen (2009) discusses the so called Facilitated Work Based Learning (FWBL) as a practice-oriented method that is derived from the educational model of project organised problem based learning (POPBL) from Aalborg University in Denmark. The author addresses transfer of knowledge as an objective of FWBL where integration of knowledge should be directly linked to the applicability of this knowledge.
in a specific work situation. In this way, the link between the work and the learning situations constitutes a crucial ingredient in a PBL-based transfer of knowledge.

In this paper, PBL is considered as a cultural tool providing a bridge between concrete actions in a learning situation carried out by individuals and the specific cultural work setting. In terms of Wertsch (1993), PBL as a cultural tool mediates actions; an active process where the tool is essential when it comes to its potential of shaping actions and, as well, to the unique use of the specific tool. The aim of the paper, is to theoretically discuss and reflect upon how a bridging of ‘learning’ and ‘work’ settings by means of PBL, could influence the design and implementation of safety training intervention in order to improve safety awareness and safety behaviour. In this way, the paper describes the foundational approach to the planned empirical investigation, which will take place in the above-mentioned multi-national company.

The paper starts with an introduction to safety training at the workplace and its relation to legislation, rules and processes that are of concern at the workplace training. Then, safety training and workplace learning are discussed from the point of view of communities of practice. After that, a chapter on problem based learning in a work context is followed, emphasising employee-initiated problem settings sensitively facilitated by the managers. Finally, the paper discuss and conclude upon the implications of applying PBL as a cultural tool. Each chapter introduces and discusses related work to the specific topic in question and it ends with a reflection, where previous research is related to the theoretical approach applied in this study.

Safety Culture in a multi-national context

Safety in an organisational context has the goal to prevent any physical harm to employee at a workplace and to avoid financial cost and possible damage of reputation that comes with it. Thus, safety can be described as “absence of accidents or incidents”, but also the “freedom from unacceptable risk” Although, it is recognised that is neither absolute safety nor zero risk (Neto, 2009).

Today, in any large organisation, having a safety management system (SMS) to manage health, safety and environment (HSE) is standard in the industry. SMS do effectively ensure that organisations are in compliance with the legislation, but their effect on accident prevention is questioned. Hence, there has been focus on the concept of safety culture. Safety culture is often also described as safety climate and the terms are often used interchangeably in research literature, as they have common features (Guldenmund, 2000). There exist various definitions of both concepts within the safety research literature of which the following are widely accepted and/or of historical importance.

The International Atomic Energy Agency defines safety culture as “that assembly of characteristics and attitudes in organisations and individuals which establishes that, as on overriding propriety, nuclear plant safety issues receive the attention warranted by their significance.” INSAG (1991).
Zohar (1980) states that safety climate is “... a summary of molar perceptions that employees share about their work environments.” (p.96). Safety climate is typically measured by questionnaire surveys, which include employees’ perceptions of attitudes and beliefs about risk and safety among peers and towards their leadership.

Many organisations have realised that it is necessary to make safety culture a primary value in organisations that internalize the safety issues and reflects to attitudes and behaviours of employees. Regardless of the notion, that organisational culture just exist in an organisation or is something that an organisation has, many organisations regard safety culture as a management tool to improve a specific safety outcome.

Seymen and Bolat (2010) state that “the aim of building a positive safety culture is creating an environment in which employee can be aware of the risks they may face with and protect themselves from unsafe situations” and “safety culture can be considered as a management tool which will be beneficial in controlling employees’ believe, attitude and behaviours (Fernandez-Muniz et al., 2007)”.

Four main characteristics of a “positive safety culture” are appointed by Pigeon and O’Leary (1994; 2000). These are: (1) senior management’s dependence to the safety subject by both their statements and their actions; (2) observing an intensive care towards the safety risks and dangers in every level of the organization; (3) forming norms and procedures that can handle every defined safety risk and threat; and (4) reflecting organisational learning to application through such mechanisms as observations, accident/damage analysis, feedback systems. To implement such a “positive culture”, there is a need for the individual employee to understand how their daily actions contribute in this process along with the need to learn new ways of working (Robson, 2010).

In the search for a globalised approach it seems to be obvious to look at cultural differences on a cross-national level. In this respect, it is stated that macro level (national and organisational) considerations have been neglected in evaluations of the effectiveness of worker safety training programmes. (Burke et al., 2008)

When Seymen and Bolat (2010) studied how national culture affects safety culture, they identified the following three main dimensions of safety climate from the current literature that can directly be linked to Hofstede’s cultural dimensions of national organisations: (1) Management commitment to safety addresses the degree to attention to which managers show their subordinates safety. Given the necessary importance, it provides resources activities such as participation of managers from all levels to safety activities with their subordinates and safety training; (2) Employees’ involvement addresses the compliance of employee with safety procedures and personal efforts to improve working conditions in respect to safety (Fernandez-Muniz et al., 2007) Involving employees’ in the decision making process enhances safety (Cooper, 1995) and has significance in establishing and sustaining safety culture; and (3) Risk perception is influenced by the way safety is managed (Mearns and Yule, 2009), i.e. the relationship between managers and subordinates.
Hostedes’ (2011) dimensions describe how values in the workplace are influenced by culture and are generally accepted as the most comprehensive study that is stable over time and has a convenient structure for empirical research. The first four described values that distinguish were Power Distance (PD), Individualism versus Collectivism (I/C), Masculinity versus Femininity (M/F) and Uncertainty Avoidance (UA). The later added dimension, Long-Term Orientation, was found to be not related to safety culture, and the newest dimension, Indulgence versus Restraint has not been explored yet in this respect.

High PD is associated with top-down management and one way communication with an preventive effects towards a positive safety culture (Mearns and Yule, 2009). That means that low PD, which allows active participation of employee, is a more convenient structure to achieve an efficient safety culture (Mearns and Yule, 2009; Reason 1997).

The I/C dimension is closely associated with “Employee’s involvement” and “Risk perception” and describes the individuals and the relation between them. The Individualism dimension is seen as beneficial when targeting a positive safety culture (Mearns and Yule 2009). In relation to this dimension, a participative and empowering approach with detailed personal training and emphasis on personal responsibility towards safety is suggested. Collective cultures safety is shown as mutual beneficial and cooperative themes where collective training are impressive factors.

The M/F dimension is associated with risk perception. In masculine cultures, giving opportunities for personal development and rewarding individual contributions can be efficient motivational tools, whereas in feminine cultures various visual, auditorial and virtual tools towards the whole organisation will be more efficient.

Uncertainty avoidance (UA) is found to be a particularly interesting factor for safety training as potential moderator for effectiveness of safety training in organisations (Burke et al., 2008). Burke et al. (2008) describes how workers of different UA are likely to learn/train differently. Cultures of high UA are expected to be more goal-oriented with standardised, structured, didactic training approaches to avoid ambiguity and uncertainty in the conducted training. Thus, there will be lesser focus on more experimental methods, such as role-playing, discussion of cases, scenario simulations involving feedback, with a high degree of engagement of trainees in the learning process. Research has shown that “increased engagement in the learning process provides trainees with opportunities for dialogue and critical examination of the training content, enabling them to potentially develop more comprehensive understanding of conceptual structures reading the content of safety knowledge.” (Burke, 2008, p.137). Experimental learning methods are thought to increase variability in the training process and involve elements of counterfactual scenario thinking, which enhances procedural knowledge and skills (Segura & Marris, 2005). Anticipation and flexibility in responds to changing of unexpected events are acquired with such learning methods. Hence, Burke et al. (2008) hypothesise that safety training – safety outcome effect decreases with increased UA. There has been some critique on Hofstedes’ dimensions, yet they are generally accepted as a convenient tool and perceived as stable over time. Also it is suggested to look at other conceptualisations that relate to these dimensions.
Reflections

In order to create a safety culture in a multi-national context, the workplace in terms of a learning environment, constitutes a crucial ingredient when it comes to how the employees can understand the way their daily actions and interactions contribute to this culture. In terms of Vygotsky (1986), this has to do with the contextual impact arising from social interactions, how people make use of tools to create opportunities for learning and the role of facilitation as a contributing factor to learning. In this regard, Hofstede (2011) and Seymen and Bolat (2010) illustrate how the development of a safety culture is dependent on social and cultural experiences and, consequently, not universal and unvarying processes.

When it comes to these cultural dimensions of national organisations, management commitment, employees’ participation and the relationship between managers and employees are considered as influential for safety attitudes and behaviour. These issues introduce a challenge, namely to create links between them in order to create a sustained safety culture. In comparison with goal-oriented, standardised and structured cultures based on high Uncertainty Avoidance, the approach reflected in this paper is moving towards more open-ended approaches where the manager acts as a facilitator potentially reducing the power distance to the employee.

Safety training and workplace learning

Training in the context of Health, Safety and Environment (HSE) or shortly described as safety training, involves legislation, rules, processes, machines and materials that are of concern at the workplace. Typical areas that are covered are: execution of restricted work tasks, operation of machines, handling of materials, emergency procedures and others that follow the conception of People, Equipment Material, Environment and Processes (P.E.M.E.P). Misalignment between safety procedures and operational procedure often creates conflicts in the manufacturing process. However, workplace learning concerning safety also includes other forms of training and/or sharing or knowledge.

Employee training and development in HSE embrace a large variety of methods, including formal training in the company but off-the-job, such as workshops and seminars, to more non-formal methods on-the-job like peer-assisted learning and participation in committees. Others methods are concerned about personal relationships and feedback such as coaching and mentoring. These forms of workplace learning can also be categorised in respect to the degree to which ‘learning’ and ‘work’ is separated (Stern and Sommerlad, 1999). Traditional safety training is commended to be carried out on a regular basis to prevent deterioration of knowledge and is said to be particularly important for new employees. An essential part of various safety education programmes are occasional safety meetings, small group safety activities to maintain the workers’ interest (Robson, 2010).

According to Reason (1997) a safety culture is made up by several sub-cultures including a learning culture. At this point it cannot be denied that learning is a central part in developing a sustainable safety culture. Yet, there has been only limited focus on
safety culture and its relation to learning. Safety culture aims at risk reduction and the prevention of accidents or lost-time incident (LTI) meaning workers injuries. When the concept of safety culture and the implementation process is discussed, most often there is mentioned the need of training. Such training often strives for changes in behaviour that are the cause to any accidents or even major disasters. In order to prevent such, it is necessary to understand risks, processes and protection mechanisms of both direct and indirect causes. Indirect causes for example are management decisions and organisational structures as well as cultural factors such as attitudes, beliefs and values.

Hudson (2007) point out the importance of compliance between safety culture and organisational culture and also that it is very unusual that safety tools and procedures which are produced in any culture produce the same results, when they are transferred to another culture. Essential for workplace learning is the understanding of transfer of knowledge from the learning context to the workplace context (Thomassen et al., 2013). When the learning is designed as part of the daily work, transfer may be inherent as it already is in the context of use.

**Reflections**

A way to perceive workplace learning is through participation in activities directly related to authentic work tasks. In this sense, safety training is an on-the-job activity where the performance of the daily work practice becomes the theme for the training and learning. This is in line with what Wenger (2002) defines as social learning systems operating in communities of practice. According to Wenger (1998) communities of practice are composed of practitioners operating as a community in a specific domain, which in the context of this paper is related to a multi-national production industry. In contrast to traditional off-the-job safety training designs, this paper applies Lave and Wenger’s (1991) concept of communities of practice, where the community creates a social structure facilitating workplace learning through actions and interactions with others. In particular, this paper focuses on Wenger’s concept of (work) practice by considering it as a learning space, where information, documents, ideas, experiences and problems are shared, discussed and reflected upon (Wenger, 2002). This community is surrounded by a common ground, the domain (Wenger, 2002), within which the safety training and workplace learning practice operate. The common ground acts as an enabler when it comes to choosing the themes worth sharing in a learning situation. In this paper, the domain includes, for example, legislation, rules, processes and materials related to the specific workplace and, naturally, these aspects differ between practices and lines depending on the national legislative framework. In line with Thomassen et al. (2013), we propose that the suggested approach can offer support to cultural differences such as attitudes, beliefs and values and, thereby, increase individual safety awareness and behaviour. Furthermore, we assume that it might align a transfer of knowledge between the workplace practice and the learning context, which can maintain employees interest in maintaining workplace learning and a safety culture.

An emerging question concerns how this kind of approach can be cultivated? In line with Wenger et al. (2002), we emphasise the role of the manager, who, in the context of this paper, plays an important role in facilitating the social learning system, e.g. to foster interactions and maintain a trustful and respectful structure for the individual
employees. This would create the framework for the individuals to make sense of and apply the new knowledge in practice. It is assumed that the development of a shared practice takes time and sustained interactions, which require authentic facilitation.

Problem based learning in a work context

A report from 2010 of the National Institute for Occupational Safety and Health (NIOSH) in the USA recognised that adult learning theory is “especially relevant to workplace learning”. They ask for models where “adults bring work-related experiences and problem-solving approaches into training; they need training programs that permit self-direction; and they learn best through experiences” (Robson, 2010, p. 80). Adult learners at the workplace are a very diverse population varying a lot in their learning experiences, physical conditions and personal characteristics. Problem Based Learning (PBL) involves the learner into reflective and social processes, draws on the learners experience and hereby promotes adult learning (Tynjälä and Häkkinen, 2005).

Fundamentally PBL is based on Kolb’s well known learning cycle is characterised by the four phases (1) concrete experience; (2) reflective observation; (3) abstract conceptualisation; and (4) active experimentation (Kolb, 1984). Yeo (2007) explored the role of PBL in a workplace context through interview of ten international PBL trainers, statistical evaluation of qualitative surveys and additional questionnaires. His findings show that PBL has a significant relationship to workplace learning by transforming informal learning patterns into specific structures to systemise the learning at the workplace. Implications made upon his research suggest “a coherent relationship between experimental learning, team learning, single and double-loop learning, and triple-loop learning.” (p.369). Furthermore, “a key contribution is that the complexity of learning embedded in the systemic process of PBL ultimately leads to the generation of competitive organisational knowledge.” (p.369). Implications from this model suggest that managers act as consultants by first identifying work-based problems that both need immediate attention and have long-term effects for the organisation. PBL activities can then be developed in cooperation with line supervisors. PBL activities as Yeo (2007) suggest need to be comprehensive, task driven and time sensitive. Furthermore, reporting structures need to be adjusted to facilitate short communication times and building communities of practice across spaces and cultures is stressed. Lastly, managers need to be equipped with the right facilitation skills. Consequently, the lack of experience in combination with the chosen complexity of problems often leads to inappropriate assessment of learning goals (Poikela, 2004).

Thomassen (2011) investigated two cases in software development companies, where the method of facilitated work based learning (FWBL) was introduced. In this sense, FWBL targets training without absence from the work, direct applicability, customised learning, and context orientation. However, Thomassen states that participants had difficulties in understanding the concept of FWPL and did not succeed in removing the feeling of uncertainty related to the application (Thomassen ibid.).

Both the PBL-model described by Yeo (2007) and the model of facilitated work based learning (FWBL) form a basis for how a PBL approach can be applied to the specific safety area. The transformation of such problems into objects of problem solving that
may be the starting point for a facilitated learning. The facilitation process may posit the potential to induce cultural change that is to be discussed here.

Reflections

This paper is an attempt to discuss and reflect upon how problem based learning (PBL) might be used as a cultural tool to overcome the barriers of learning and adapting across departments, sites, locations and nations by creating a space for individual learning within a common domain and practice. Related work has shown in what ways PBL is suitable for workplace learning by transforming informal learning strategies to sustained systematic and framed structures. In this way, PBL offer employees opportunities to learn through work-based problem solving in a comprehensive, facilitated, task-driven and self-directed way. By connecting employees’ work-related experience to training and learning situations each individual can, in his or her own way, benefit from the informal learning experience and explore the sense of community and practice. Related work (Yeo, 2007) describes PBL as a facilitator-initiated and problem based approach. In this paper, we want to investigate how a more employee-initiated PBL framework can contribute to cultural, collective and individual change in the different work practices that are involved in the study. In doing so, we particularly intend to focus on the aspect of problem setting, meaning that the facilitators would apply a more open-ended, but focused, role and, thereby, enabling the PBL activities to become more employee-initiated and directed. In this way, we consider PBL as having the potential to create opportunities for workplace learning as arising from employees’ experiences and interests. The suggested open-ended, but focused approach, constitute an extended PBL model where the facilitators work alongside the employees and fully understand the inherent possibilities and challenges related to such an open-ended and focused approach. The role of the facilitator is to take a step back, which not necessarily means that they are less engaged in the training and learning situation. Such an approach requires facilitators that can make sense of the employee-initiated and directed themes and interests, and based on this build upon and introduce relevant emerging topics. In this way, the problem setting can be initiated from the facilitator, but building from observed experiences and interests. It is assumed that this might imply conditions for sharing of practice-oriented interests in the form of a collective cultural experience, represented through self-initiated and focused activity and, as such, offering opportunities for individual, collective and cultural change.

Discussion and conclusion: PBL as a cultural tool

In the previous chapters we have described characteristics of learning about safety and how problem based learning relates to workplace learning. The dominant discourse of safety training has introduced some difficulties. In particular, cultural tools dealing with intercultural issues related to safety training in multi-national companies. The core of the problem is that culturally-derived perceptions of safety differ between geographically separated units, which create challenges when it comes to sustain a safety culture. As an alternative, we have proposed problem based learning (PBL) as a cultural tool, which is based on employees and facilitator interactions within communities of practice, included in a safety legislative domain. Particularly, the PBL model focuses on the issue of problem settings, which are employee-initiated and where
facilitators take on an open-ended but focused role. The facilitators act as creative planners where they build the training and learning from observed employee experiences and interests. Such a cultural tool extends the traditional PBL model through open-ended pedagogies and interest and experience based learning bringing spaces for work and learning closer to each other.

The multi-national production company that is included in this study has initiated a cultural tool closely related to the proposed approach of facilitated learning embedded within PBL. The tool, ‘Safety Dialogue’, is an interventional resource based on dialogues between a manager and an employee in a situational context. Hereby, the manager observes, then encounters a worker and engages in a dialogue about the current work through critical questioning. In this process, which is closely related to the aspect of problem setting, the discussion should emphasise possible consequences of unsafe acts and safe behaviour. Ideally, the dialogue ends with an agreement on the safest way to work. There is no assessment of the process and the only control is the registration upon execution. The mere personal appearance of managers and the demonstration of safety as priority are thought to influence safety culture in a positive way. We have not yet come across a thorough examination of how, why and/or if the Safety Dialogue tool works, but there is empirical evidence in the form of reported positive effects in the company of interest.

The study that will follow aims to determine differences and/or similarities, in the way HSE training is conducted at a chosen worksite in four nations, where the company in question has production. Through participatory research the intention is to capture what learners/ workers and managers perceived as important knowledge, and what knowledge is demanded based on past experiences, legislative circumstances and cultural characteristics from both a national and organisational perspective. The ultimate goal is to find a way to move the process of ‘work’ and ‘learning’ together into one environment where communities of practice play a significant role. Interaction analysis will be used to explore the relations between culture, work and learning in a participatory research approach. The qualitative analysis during the explorative phase will help to design a method of facilitated PBL that stimulates problem setting activities promoting critical thinking and potentially influencing a safety culture analogue to the ‘Safety Dialogue’ tool.

Vygotsky (1986) developed ideas around the impact of social interactions between learners and facilitators as contributing to individual learning but within wider communities of learners, rather than a solitary action. Leading from Vygotsky’s work, a more recent well-developed movement that substantially has developed socio-cultural approaches to training and learning, has been formulated and taken into account within this study, e.g. Lave and Wenger (1991), Wenger (1998; 2002). Furthermore, Wertsch (1993; 1998) describes cultural tools as mediational means mediating the human actions. In the context of this paper, such a mediating process is considered as both empowering and constraining. The coming study targets to identify these issues and in doing so, change, not just examine, human action and the cultural practice in which the mediation takes place. Rather than considering PBL as a cultural tool for promoting learning, we consider it having the potential to create opportunities for community and practice based learning as arising from the employee’s experiences and interests. In
doing so, we intend to put PBL at the heart of everyday learning. Based on this, the
study will look more closely to interactions, at how PBL and related resources available
are used, at how this pedagogical design pursue interest, and at the decision that the
facilitator takes in relation to the employees’ own decisions for action. All of these, and
potentially more, are approaches that are particularly important within this study.

References

and organizational climate in safety training effectiveness. *European Journal of Work and
Organizational Psychology*, 133–152.

Occupational Safety&Health (IOSH) Meeting, Pearson Park Hotel.

Analysis of the Casual Relationships between Its Key Dimensions. *Journal of Safety Research*
38, 627-641.


Hofstede, G. (2001). *Cultural Consequences Comparing Values, Behaviors, Institutions, and

45(6), 697–722.

Series* No.75- INSAG-4, Vienna.


Cambridge: Cambridge University Press.

Mearns, K., & Yule, S. (2009). The Role of National Culture in Determining Safety

researchers and practitioners. *2009 International Nuclear Atlantic Conference*.

Poikela, E. (2004). Developing criteria for knowing and learning at work: towards context-


Robson, L., Stephenson, C., Schulte, P., Amick, B., Chan, S., Bielecky, A., Wang, A.,
Heidtting, T., Irvin, E., Eggerth, D., Peters, R., Clarke, J., Cullen, K., Boldt, L., Rotunda, C.,
&Grubb, P. (2010). *A systematic review of the effectiveness of training & education for the
protection of workers*. Toronto: Institute for Work & Health; Cincinnati, OH: National Institute
for Occupational Safety and Health. This publication can also be tracked as DHHS (NIOSH)
Publication No. 2010-127.

the individual and organizational levels, In D. R. Mandel, D. J. Hilton, & P. Catellani (Eds.),


