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Original Article

Comparing safety culture and learning culture

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Abstract This article examines the alignment of learning and safety culture in organisations. It tests the hypothesis that factors that indicate a good learning culture might also signify good safety and *vice versa*. The hypothesis was tested through an intensive literature review. Areas of alignment of learning culture and safety culture were identified. Six components of learning culture and safety culture can be measured by the same instrument. These components form guiding principles for measurement of safety culture and learning culture. Another eight component areas were identified where learning culture and safety culture partially align. Four further components were found to be relevant to either safety culture or learning culture and do not align. Overall, there is a relationship between learning culture and safety culture, but gauging one does not provide a reliable measure of the other.
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Keywords: safety; learning; culture; organisation

Introduction: The Relationship between Safety and Learning Culture

It is widely acknowledged that safety and learning are both critical elements in creating a safe working environment. On the surface, safety culture and learning culture seem fundamentally different, yet on closer inspection there are remarkable similarities. Safety and learning culture are

ethereal, tacit and embedded in everyday practice. They are customarily difficult to conceptualise and measure (Flin *et al*, 2000; Marsick and Watkins, 2003). However, there have been advances in the identification and measurement of key factors that indicate positive safety and learning culture, potentially improving the practical implementation of both.

The focus on culture across the learning and safety domain is grounded in a more general shift in organisationals towards exploring social and environmental factors that impact work. The terms *culture* and *climate* are sometimes used interchangeably in relation to safety and learning in the workplace. However, some studies have delineated these terms such that culture embodies values, beliefs and underlying assumptions, whereas climate describes the perceptions of the workforce in relation to the organisational 'ambiance' (González-Romá *et al*, 1999; Flin *et al*, 2000). This means that culture is a relatively stable, overarching feature of an organisation. Climate, on the other hand, is measured through workforce attitudes and perceptions that evolve and can be different when measured at any given point in time. Climate evolves in relation to culture and can therefore be viewed as a sub-set or feature of culture. Culture is normally viewed and measured through observable indicators (Flin *et al*, 2000). However, these indicators tend to be multi-faceted, tacit and complex. Therefore safety culture and learning culture are difficult to observe and measure directly. Nevertheless, culture is a useful lens through which to conceptualise safety and learning in the workplace.

The ways in which safety is perceived has evolved to aid organisations in the operationalisation of employee well-being and the creation of safer workspaces (Dedobbeleer and Béland, 1991; Cooper, 2000; Glendon and Stanton, 2000). Early conceptualisations of safety focused on the development of technical solutions. As new and safer mechanical systems developed rapidly, safety science tended to focus on technical malfunction. As mechanical systems improved, attention turned towards *human error* and human operational problems, rather than technical malfunctions. Unsafe practices and judgements are still viewed as a key source of system breakdown. Other sources of errors and accidents are *socio-technical* factors, which relate to the interaction between human and technical factor. Over the past decade, *culture* has became a critical factor in safety science and organisational psychology research as a means of interpreting incidents and understanding safety in organisations.

Safety culture is difficult to measure for all sorts of reasons. First, the measurement can be difficult where cause and effect is not straightforward to identify. Second, there are legal implications that restrict the measurement of safety culture. These legal associations are not so significant in learning culture, where there are far fewer legal constraints. Therefore learning culture appears to provide a simpler means of conceptualising the social and organisational factors that support the development of knowledge and skills in the workplace (Marsick and Watkins, 2003; Škerlavaj *et al*, 2007). Learning is significant in

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an era of continual change and innovation and is often used as a mechanism to stimulate creativity and originality (Martins and Terblanche, 2003). However organisational learning culture research typically is weak in identifying the specific processes or actions that make the learning effective (Engeström, 2001). New and improved methods and mechanisms for the measurement of learning culture and safety culture would undoubtedly help organisations improve learning and create safer workplace environments.

One way to improve the measurement of safety and learning culture could be to identify common factors. Factors that indicate an affirmative learning culture may point to good safety. Similarly, factors that indicate a positive safety culture may signify good learning. Any association of safety culture and learning culture measurement could be helpful for organisations. However, the relationship between learning culture and safety culture is not well understood. Interdisciplinary research across these fields has been limited (Lukic *et al*, 2010). To improve measurement methods, this study explored whether and in what ways safety and learning culture interrelate, specifically examining to what extent they occupy the same conceptual space. Drawing on literature spanning a number of disciplines, the aim was to identify whether and how measures of learning culture could be used to assess safety culture and *vice versa*.

This research identifies which factors of learning culture and safety culture are aligned. It examines whether and how measures of learning culture could indicate good safety and *vice versa*. The study contributes to organisational practice by identifying key principles that can be used by organisations to streamline safety and learning culture. The analysis advances the theoretical understanding of learning culture and safety culture by aligning key constructs across two disciplines that are usually unrelated, laying a foundation for future empirical studies.

The article begins with a detailed review of safety culture and learning culture literature, explaining how relevant papers from both areas were sourced, selected and summarised. The article then classifies key indicators of learning culture and safety culture abstracted from these articles. The method used to synthesise these key indicators into broad themes for learning culture and for safety culture is outlined. These broad themes are compared and aligned across the safety culture–learning culture nexus. Finally, the article concludes by defining principles for effective learning and safety culture.

Method

Our starting point for drawing together ideas and concepts related to organisational learning and safety was to carry out a systematic literature review in both disciplines. Key indicators of learning culture and safety culture were identified

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and compared through a systematic literature review and synthesis (Levac *et al*, 2010). The method comprised four phases:

Phase 1: Literature search. Two extensive literature searches were implemented, one on safety and the other on organisational learning. The aim was to identify relevant articles with indicators or measures of learning culture or safety culture.

Phase 2: Identification of indicators. The indicators of learning culture or safety culture identified in the review articles were abstracted and listed.

Phase 3: Analysis and synthesis of indicators. The indicators of learning culture or safety culture were grouped into broad themes.

Phase 4: Comparison of indicators of learning culture and safety culture. The broad themes (spanning learning culture and safety culture) were compared first to ascertain potential alignment across the learning culture–safety culture nexus and second to identify specific indicators that were not aligned.

Through examination of the alignment of factors that indicate positive safety and learning culture, the study identified whether measures of learning culture may indicate the quality of safety culture within organisations and vice versa. The project phases are described in detail in the following sections.

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Literature search

The first goal of the research was to identify factors that indicate a positive learning or safety culture. Two in-depth literature searches were carried out. One search focused on finding relevant papers with key indicators of learning culture, while a second search sourced papers with indicators of safety culture. Articles were sourced using search engines CSA Illumina and Google Scholar with specific keywords. The following search keywords combinations were used to source papers on learning culture: ('learning culture'/'learning climate') + (attributes/ descriptors) + (instrument/measure*). In the second search, the following keywords combinations were used to source papers on safety culture: ('safety culture'/'safety climate') + (attributes/factors/descriptors) + (instrument/measure*/survey).

The key criterion for selecting articles was that the papers included either indicators of safety culture or of learning culture. Empirical papers and review papers were incorporated only if they included some key indicators. From an initial (extended) list, a shortlist was created using a two-stage filtering process. Initially, non-relevant papers were filtered out by reading the abstracts. All remaining papers were then examined to identify and abstract the key indicators. A number of articles were discarded at the second stage of filtering, since these papers did not focus on safety culture or learning culture or did not include indicators of either.

A total of 51 articles on safety culture were sourced. Thirty-four of these papers were shortlisted, reviewed and summarised. Seventeen were discarded

since they did not meet the shortlisting criteria or were not accessible. A total of 55 articles on learning culture were sourced. Fourteen were shortlisted, reviewed and summarised. The remaining papers were discarded either because they did not meet the shortlisting criteria or were not accessible.

This means that a total of 48 relevant papers were identified, reviewed and summarised. These summaries were used to pinpoint factors that were indicators of learning culture or of safety culture.

Identification of indicators

In phase two of the study, specific indicators of safety culture and learning culture were identified and abstracted from the 48 article summaries. This analysis exposed two distinct types of indicators:

(a) Broad indicators of learning culture and safety culture such as 'senior management commitment' (for safety culture), or 'promoting dialogue and inquiry' (for learning culture).
(b) Narrow indicators. These were often items within questionnaire instruments in empirical studies (for example, 'I can discuss problems in work with my workmates when I need' for learning culture, or 'all colleagues understand emergency response' for safety culture).

A list of reviewed articles with the number of indicators and measures identified for each is included in Table 1.

Analysis and synthesis of indicators

Broad and narrow indicators of learning culture and safety culture were analysed and grouped into themes, as illustrated in Table 2. Themes include commitment, collaboration, workplace conditions and so on. Two distinct thematic analyses were carried out – one for learning culture and one for safety culture. Analysis was completed by colour-coding the indicators depending on which article the indicator was abstracted from, which construct the indicator referred to (safety culture or learning culture), and the type of indicator (general indicator or specific measure). The indicators were grouped into emergent themes and then the results were transferred to a database.

A second iteration of the analysis was carried out to refine the emerging themes and to check for reliability. The themes were refined by re-examining each indicator. Groupings were discussed and refined by three researchers to reach consensus over each individual categorisation. Any disparity around the categorisation of a specific indicator within a particular theme was resolved through team discussion and negotiation. One output from this phase of the analysis was a number of learning culture themes, each comprising key indicators of learning culture. Another output was a number of safety culture

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Table 1: Indicators identified from the literature

Article	*Constructs*	*Number of general indicators identified*	*Number of specific measures identified*
	Safety culture	0	4
Bourne and Franco-Santos, 2010	Learning culture	0	6
Cegarra-Navarro and Rodrigo-Moya, 2007	Learning culture	0	6
Clarke, 1999	Safety culture	2	24
Clarke, 2005	Learning culture	5	26
Cooper, 2000	Safety culture	3	0
Coyle *et al*, 1995	Safety culture	8	29
Dedobbeleer and Béland, 1991	Safety culture	9	9
Díaz and Cabrera, 1997	Safety culture	5	0
Evans *et al*, 2007	Safety culture	9	18
Flin *et al*, 2000	Safety culture	5	0
Fogarty and Buikstra, 2008	Safety culture	7	0
France *et al*, 2010	Safety culture	2	2
Gibbons *et al*, 2006	Safety culture	1	79
Glendon and Stanton, 2000	Safety culture	4	0
Glendon and Litherland, 2001	Safety culture	2	3
Grote, 2008	Safety culture	0	60
Harvey *et al*, 2001	Safety culture	4	2
Harvey *et al*, 2004	Safety culture	7	1
Håvold and Nesset, 2009	Safety culture	13	4
Hofmann and Stetzer, 1998	Safety culture	0	16
Høivik *et al*, 2009	Safety culture	6	0
Johnson, S. E. (2007)	Safety culture	3	0
Johnston and Hawke, 2002	Learning culture	5	0
Kath *et al*, 2010	Safety culture	6	0
Lähteenmäki *et al*, 2001	Learning culture	3	20
Lawrie *et al*, 2006	Safety culture	1	28
Lee, 1998	Safety culture	4	4
Leung, 2006	Learning culture	0	12
Lin *et al*, 2008	Safety culture	14	21
Lofquist *et al*, 2011)	Safety culture	0	3
Marsick and Watkins, 2003	Learning culture	4	0
Mikkelsen and Grønhaug, 1999	Learning culture	0	70
O'Connor *et al*, 2011	Safety culture	0	5
Olsen, 2010	Safety culture	0	9
Pearn *et al*, 1995	Learning culture	6	0
Pedler *et al*, 1996	Learning culture	11	0
Popper and Lipshitz, 2000	Learning culture	9	0
Probst, 2004	Safety culture	9	0
Sambrook and Stewart, 2000	Learning culture	15	1
Tarrini, M. 2004.	Learning culture	0	68
Varonen and Mattila, 2000	Safety culture	4	0
Vinodkumar and Bhasi, 2009	Safety culture	6	46
Westerberg and Hauer, 2009	Learning culture	6	26
Wiegmann *et al*, 2004	Safety culture	5	0
Williamson *et al*, 1997	Safety culture	6	21
Wu *et al*, 2010	Safety culture	3	12
Zohar, 2010	Safety culture	5	3

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Table 2: Aligned themes across learning culture and safety culture

Theme	*Safety culture*	*Learning culture*
Open Communication	Safety knowledge (tacit and explicit) and safety targets are shared across the organisation. Communication is open (formal and informal) and multidirectional. Effective systems are in place to enable knowledge sharing (Hofmann and Stetzer, 1998; Glendon and Stanton, 2000; Glendon and Litherland, 2001; Arboleda *et al*, 2003; Harvey *et al*, 2004; Probst, 2004; Wiegmann *et al*, 2004; Gibbons *et al*, 2006; Evans *et al*, 2007; Grote, 2008; Fogarty and Buikstra, 2008; Lin *et al*, 2008; Håvold and Nesset, 2009; Vinodkumar and Bhasi, 2009; Lofquist *et al*, 2011).	There are multiple open channels of communication to allow for effective information flow. There are systems in place to capture and share relevant knowledge across the company (Pedler *et al*, 1996; Popper and Lipshitz, 2000; Lähteenmäki *et al*, 2001; Marsick and Watkins, 2003; Tarrini, 2004; Clarke, 2005; Leung, 2006; Cegarra-Navarro and Rodrigo-Moya, 2007; Westerberg and Hauer, 2009).
	15/34[a]	9/14
Employee empowerment	Employees have autonomy, are involved in decision-making in relation to safety and encouraged to make suggestions to improve safety. Workers are encouraged to question unsafe practices and have the authority to stop such practices (Williamson *et al*, 1997; Hofmann and Stetzer, 1998; Lee, 1998; Glendon and Stanton, 2000; Wiegmann *et al*, 2004; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Grote, 2008; Lin *et al*, 2008; Vinodkumar and Bhasi, 2009; Kath *et al*, 2010; Olsen, 2010)	Organisations empower employees to exercise their ability to actively engage in learning (Pedler *et al*, 1996; Mikkelsen and Grønhaug, 1999; Lähteenmäki *et al*, 2001; Johnston and Hawke, 2002; Marsick and Watkins, 2003; Clarke, 2005; Leung, 2006; Westerberg and Hauer, 2009).
	12/34	8/14
Collaboration	Industrial operation can only be productive when it is safe. Productive operation requires effective work within and across teams so that everyone collaborates to improve safety (Lawrie *et al*, 2006; Grote, 2008; France *et al*, 2010; Olsen, 2010).	There are opportunities for collaboration (within and outside the company) and opportunities for individuals to develop teamwork skills (Pedler *et al*, 1996; Lähteenmäki *et al*, 2001; Johnston and Hawke, 2002; Marsick and Watkins, 2003; Clarke, 2005; Westerberg and Hauer, 2009).
	4/34	6/14

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Alignment of espoused and enacted priorities	Enacted safety behaviours are aligned with espoused priorities (Williamson *et al*, 1997; Zohar, 2010).	Espoused priorities for learning and employees' learning behaviours are aligned (Lähteenmäki *et al*, 2001; Clarke, 2005; Leung, 2006; Bourne and Franco-Santos, 2010).
	2/34	4/14
Internal systemic alignment	Safety policy, procedure and rules are consistent (Wiegmann *et al*, 2004; Lawrie *et al*, 2006; Vinodkumar and Bhasi, 2009; Zohar, 2010).	Internal policies, systems and procedures are aligned to encourage effective learning (Lähteenmäki *et al*, 2001; Leung, 2006; Westerberg and Hauer, 2009).
	4/34	3/14
Management	Management prioritises safety, welcomes opinions of employees, follows safety rules, tackles unsafe practices, allocates sufficient resources, clearly understands safety implications of operational issues (Dedobbeleer and Béland, 1991; Coyle *et al*, 1995; Díaz and Cabrera, 1997; Williamson *et al*, 1997; Hofmann and Stetzer, 1998; Flin *et al*, 2000; Glendon and Stanton, 2000; Varonen and Mattila, 2000; Harvey *et al*, 2001; Harvey *et al*, 2004; Wiegmann *et al*, 2004; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Evans *et al*, 2007; Fogarty and Buikstra, 2008; Grote, 2008; Lin *et al*, 2008; Håvold and Nesset, 2009; Høivik *et al*, 2009; Vinodkumar and Bhasi, 2009; France *et al*, 2010; Kath *et al*, 2010; Olsen, 2010; Zohar, 2010; O'Connor *et al*, 2011).	Managers have the commitment and competences to support learning (Pearn *et al*, 1995; Popper and Lipshitz, 2000; Sambrook and Stewart, 2000; Lähteenmäki *et al*, 2001; Clarke, 2005; Westerberg and Hauer, 2009).
	25/34	6/14

[a]The number of articles out of the total number reviewed articles for safety culture or for learning culture.

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themes, each with a number of associated indicators of safety culture. A synthesised summary statement of these themes was created.

In the Phase 3 of the study, these emergent themes of learning culture and safety culture were analysed to identify alignment across the learning culture–safety culture nexus.

Comparison of indicators of learning culture and safety culture

The final phase of the study was a thematic alignment across the safety culture–learning culture nexus. The learning culture themes were reviewed and compared with the safety culture themes. Synthesised summary statements and individual indicators (grouped under each theme) were used to determine the degree of alignment across the themes. Three researchers carried out the thematic alignment independently. The results were compared and any disagreement was resolved through debate and discussion. The output was the set of aligned themes outlined in Table 2 and described in the following section.

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Results and Discussion

This study identified some alignment of factors across the safety culture–learning culture nexus as follows:

- six themes of safety culture and learning culture were aligned (Table 2);
- eight themes were partially aligned, with a lesser degree of association (Table 3); and
- four themes were relevant only to safety culture or learning culture, not both (Table 4).

Areas of full alignment between safety culture and learning culture

Six themes of safety culture and learning culture have a degree of association. These themes are open communication, employee empowerment, collaboration, alignment of espoused and enacted priorities, internal systemic alignment and management. These themes are summarised in Table 2. The table indicates the number of articles representing each theme (out of the total number of papers reviewed).

Open Communication is an important theme bridging safety culture and learning culture. For a positive safety culture it is important that managers and supervisors encourage open communication (Hofmann and Stetzer, 1998; Kath *et al*, 2010). Employees have to be able to discuss issues cooperatively with managers and peers. Any issues raised by personnel have to be communicated openly to other colleagues across the site (Gibbons *et al*, 2006). Similarly, a positive learning culture requires transparency through open dialogue operationalised through multiple channels of communication. Therefore both safety

Table 3: Partially aligned themes for safety culture and learning culture

Motivation	Safety behaviour is underpinned by individual motivation and job satisfaction (Lee, 1998; Glendon and Litherland, 2001; Harvey *et al*, 2001; Harvey *et al*, 2004; Lawrie *et al*, 2006; Grote, 2008; Håvold and Nesset, 2009; Høivik, *et al*, 2009; France *et al*, 2010; Zohar, 2010).	Employees are inspired, confident, willing to learn, develop and embrace change (Pearn *et al*, 1995; Sambrook and Stewart, 2000; Lähteenmäki *et al*, 2001).
	10/34	3/14
Recognition and Reward	Systems are in place to reward employees for good safety performance, to gather ideas for improving safety and to allow employees to report ideas without fear of repercussions (Coyle *et al*, 1995; Hofmann and Stetzer, 1998; Clarke, 1999; Wiegmann *et al*, 2004; Gibbons *et al*, 2006; Grote, 2008; Vinodkumar and Bhasi, 2009).	Systems are in place for rewarding learning (Clarke, 2005; Leung, 2006; Bourne and Franco-Santos, 2010).
	7/34	3/14
Competence	Employees are competent in their job, use of safety equipment and know the safety rules and own responsibilities towards safety. There are well-trained safety officers in place (Coyle *et al*, 1995; Clarke, 1999; Flin *et al*, 2000; Harvey *et al*, 2001; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Grote, 2008; Lin *et al*, 2008; Håvold and Nesset, 2009; Høivik *et al*, 2009; Vinodkumar and Bhasi, 2009).	Employees develop competences for learning as well as job-specific competences (Popper and Lipshitz, 2000; Lähteenmäki *et al*, 2001; Clarke, 2005).
	11/34	3/14
Commitment	Individuals are committed to safety and to caring for colleagues (Díaz and Cabrera, 1997; Williamson *et al*, 1997; Glendon and Stanton, 2000; Varonen and Mattila, 2000; Harvey *et al*, 2001; Arboleda *et al*, 2003; Wiegmann *et al*, 2004; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Grote, 2008; Fogarty and Buikstra, 2008; Vinodkumar and Bhasi, 2009; Høivik *et al*, 2009; Kath *et al*, 2010).	The organisation demonstrates commitment towards employees' learning (Sambrook and Stewart, 2000; Johnston and Hawke, 2002; Clarke, 2005; Leung, 2006).
	14/34	4/14
Workplace conditions	Workplace conditions are adequate for safe work (Dedobbeleer and Béland, 1991; Coyle *et al*, 1995; Fogarty and Buikstra, 2008; Grote, 2008; Lin *et al*, 2008; Vinodkumar and Bhasi, 2009; Wu *et al*, 2010).	Workplace conditions are conducive to learning (Sambrook and Stewart, 2000; Lähteenmäki *et al*, 2001; Johnston and Hawke, 2002; Clarke, 2005).
	7/34	4/14

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Table 3: (Continued)

Risk	Accurate risk assessment, prioritisation of risks, awareness of own risk-taking actions and reactions to other risk-taking behaviours (Dedobbeleer and Béland, 1991; Díaz and Cabrera, 1997; Williamson *et al*, 1997; Hofmann and Stetzer, 1998; Lee, 1998; Flin *et al*, 2000; Harvey *et al*, 2001; Harvey *et al*, 2004; Lin *et al*, 2008; Vinodkumar and Bhasi, 2009; Wu *et al*, 2010; O'Connor *et al*, 2011).	Risk taking is encouraged and mistakes are accepted and viewed as an opportunity for learning (Sambrook and Stewart, 2000; Lähteenmäki *et al*, 2001; Westerberg and Hauer, 2009; Bourne and Franco-Santos, 2010).
	12/34	4/14
Opportunities for learning	There are opportunities to discuss and learn from safety issues. Information is used to improve safety. Safety training covers a sufficient range of skills, knowledge and behaviours (Dedobbeleer and Béland, 1991; Grote, 2008; Håvold and Nesset, 2009; Vinodkumar and Bhasi, 2009; Olsen, 2010).	A wide range of opportunities for learning are available (Pedler *et al*, 1996; Popper and Lipshitz, 2000; Lähteenmäki *et al*, 2001; Marsick and Watkins, 2003; Leung, 2006).
	5/34	5/14
Policy and procedures	Adequate and clear safety policy and procedures are in place. Accountability standards are in place and consistently applied (Díaz and Cabrera, 1997; Lee, 1998; Clarke, 1999; Cooper, 2000; Flin *et al*, 2000; Varonen and Mattila, 2000; Glendon and Litherland, 2001; Probst, 2004; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Evans *et al*, 2007; Fogarty and Buikstra, 2008; Grote, 2008; Lin *et al*, 2008; Wu *et al*, 2010).	Policies and procedures for learning are developed in an agile and participatory way (Pedler *et al*, 1996; Popper and Lipshitz, 2000; Lähteenmäki *et al*, 2001; Clarke, 2005; ; Cegarra-Navarro and Rodrigo-Moya, 2007)
	15/34	5/14

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Table 4: Non-aligned themes for safety culture and learning culture

Theme	*Safety culture*	*Learning culture*
Social regulation	Social regulation of safety behaviour can occur horizontally (between peers) and vertically (between managers and employees) (Gibbons *et al*, 2006; Grote, 2008; Høivik *et al*, 2009; O'Connor *et al*, 2011). 4/34	n/a
Safety versus *Productivity*	Companies should align productivity and safety. Investing in safety leads to long-term profit (Díaz and Cabrera, 1997; Williamson *et al*, 1997; Clarke, 1999; Flin *et al*, 2000; Gibbons *et al*, 2006; Lawrie *et al*, 2006; Høivik *et al*, 2009; Grote, 2008; Lin *et al*, 2008; Håvold and Nesset, 2009; Kath *et al*, 2010; O'Connor *et al*, 2011). 11/34	n/a
Equipment	Appropriate safety equipment is available and equipment is up-to-date and well maintained (Dedobbeleer and Béland, 1991; Coyle *et al*, 1995; Díaz and Cabrera, 1997; Hofmann and Stetzer, 1998; Clarke, 1999; Evans *et al*, 2007; Grote, 2008; Vinodkumar and Bhasi, 2009). 9/34	n/a
Innovation	n/a	The organisation encourages new ideas (Clarke, 2005; Westerberg and Hauer, 2009; Bourne and Franco-Santos, 2010). 3/14

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culture and learning culture ideally are underpinned by communication processes and systems that capture and share and evolve relevant knowledge across the organisation. This knowledge improves safety and learning through purposeful use instigated by personnel

Employee empowerment was identified as another critical factor contributing to safety and learning culture (Coyle *et al*, 1995; Gibbons *et al*, 2006). An empowered attitude increases each individual's motivation to 'make a difference' and 'go beyond the call of duty', taking responsibility for safety (through an individual's safe operations) and learning (by individuals connecting with and contributing to organisational knowledge). In safety culture, employee empowerment usually means personnel have a 'substantial voice in safety decisions, have the leverage to initiate and achieve safety improvements, hold themselves and others accountable for their actions, and take pride in the safety record of their organization' (Wiegman *et al*, 2004, p. 120). Workers should be encouraged to question unsafe practice and have the authority to stop dangerous actions. Similarly, for learning culture organisations should empower workers to exercise active agency for learning. Employees should make decisions, suggest ideas and take a critical view of the organisation (Westerberg and Hauer, 2009).

Another shared theme is *collaboration*. From the literature we identified that safety and learning should be a collaborative task shared by employees across each organisation (Lähteenmäki *et al*, 2001; France *et al*, 2010). Collaboration is critical for safety, as safe and productive operation requires effective work practices both within and across teams. Learning also requires opportunities for collaboration both within and outside the organisation to develop team and groupwork skills. Collaboration is most effective when individuals have confidence in colleagues' knowledge and expertise. Mutual support in achieving collaborative goals is essential for a positive safety and learning culture (Grote, 2008; Westerberg and Hauer, 2009).

The *alignment of enacted and espoused priorities* is a critical theme bridging safety culture and learning culture (Argyris and Schon, 1978; Wiegmann *et al*, 2004). This theme refers to the alignment between an employee's intentions and their actions: what people do and their intended outcome (Leung, 2006; Zohar, 2010). If an employee carries out a learning activity with the intention to achieve accreditation, rather than to learn, the result could be surface, rather than deep learning. Similarly, if an employee reports a colleague who is behaving in an unsafe manner with malicious intent, rather than to improve safety, the outcome may be harmful. Therefore individual and organisational values have to be aligned with professional practice.

The *managers' role* in facilitating and maintaining a positive culture featured prominently in the safety culture and learning culture literature. Management response to and continued involvement in employee initiatives is essential for maintaining employee motivation and cooperation (Gibbons *et al*, 2006). For a

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positive safety culture managers have to prioritise safety and allocate sufficient resources. To achieve this goal, managers have to understand clearly the safety implications of operational factors, including their own attitude, behaviours and competencies. They should adopt safe practice themselves and exemplify positive safety behaviour. Managers should be receptive of employees' concerns, suggestions and criticism and should be able and willing to challenge unsafe practices (Hofmann and Stetzer, 1998). Similarly, for a positive learning culture managers should exhibit the commitment and competences to encourage and support learning.

Internal systemic alignment featured prominently in both safety and learning culture literature (Vinodkumar and Bhasi, 2009; Westerberg and Hauer, 2009). Organisational environments comprise largely of policies, procedures, and practices and a positive safety climate requires alignment across these components (Zohar, 2010). Safety and learning policy, procedure and rules sometimes are not aligned with each other. One example of safety misalignment is where employees are expected to report incidents, yet contractors lose their contract if they are involved in a number of incidents. This misalignment may result in contractors not reporting every incident. Similarly, learning assessments may not provide an accurate measure of competency. For example, writing a report on how to install equipment is not an authentic measure of ability. Integrating learning and safety actions within an overarching, organisational system is one way to avoid inconsistencies within organisations (Flood and Romm, 1996).

A number of partially aligned themes were also identified through this study.

Areas of partial alignment between safety culture and learning culture

The analysis uncovered eight themes that partially aligned across safety and learning culture (see Table 3). Partially aligned themes include: motivation, recognition and rewards, competence, commitment, workplace condition, risk, opportunities for learning and policy and procedures. These themes were not completely aligned. The summary statements and individual indicators revealed similarities and differences across these constructs, illustrated in Table 3. Although these themes have some parallels, they are distinct across safety culture and learning culture. These similarities and differences are outlined below.

The study identified potential stark differences in an individual's *motivations* in terms of learning culture and safety culture. For example, self-development is a key motivation in learning culture (Lähteenmäki *et al*, 2001). However, in safety culture the primary concern is not only the well-being of oneself, but also the safety of others (Lawrie *et al*, 2006). In looking after others, an individual also takes care of his or herself.

The analysis pinpointed a significant motivation for employees across both safety culture and learning culture as *reward and recognition*. There is evidence

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that both safety culture and learning culture may be improved in organisations where robust reward and recognition systems are in place. However, the ways in which safety and learning are rewarded and encouraged in organisations is strikingly different. In the workplace, safety is an imperative that cannot be compromised (Coyle *et al*, 1995). Therefore constant, positive reward for safe behaviour is vital. By contrast, learning is usually viewed as desirable, but not always crucial. Employees' jobs are not automatically at risk where people do not engage in a positive learning culture. Therefore the ways in which rewards for safe practices and learning practices are implemented will be different.

In the literature, we identified a range of job-specific and meta-cognitive *competencies* that were critical for work (Clarke, 2005). The meta-cognitive competencies described in the organisational learning literature are similar to those outlined in the safety literature. These competencies include the ability of employees to judge their ability relative to others and their confidence to engage in learning or safety behaviours. However, there are also noticeable differences. Safety competencies are explicitly trained in organisations. There is an underlying assumption that employees may not have even the most basic of safety competencies; for example how to exit a building in the event of fire. By contrast, it is often assumed that personnel know how to learn, even though this is not always the case. Few initiatives are in place to allow employees to expand their learning competencies and learn how to learn.

Organisations and individuals have to demonstrate *commitment* to safety and to learning for effective safety and learning culture (Johnston and Hawke, 2002). However, in safety culture individual employees must demonstrate commitment to the safety of others. By contrast, learning is often viewed as an individual's goal. Therefore commitment to learning is seen by organisations as an individual trait, rather than a collective characteristic.

Individuals should be aware of the *risk* their actions entail for both safety and learning culture (Popper and Lipshitz, 2000; Glendon and Litherland, 2001). However, there is a stark contrast in risk taking in learning culture compared with safety culture. Risk taking is encouraged in learning culture but avoided in safety culture. It is essential that employees understand the potential consequences of risk-taking actions and manage risks appropriately for a positive safety culture.

Workplace conditions should be conducive for both learning and safety culture. Organisations should maintain optimal conditions for effective work. However, the literature signals that safety culture tends to be around a number of physical features of the workplace environment, including maintenance and housekeeping. By contrast, workplace conditions for learning culture focus on human actions and processes, including human resource activities, learning support and the organisation of work (Sambrook and Stewart, 2000).

Opportunities for learning are important. Positive safety and learning culture is encouraged when employees can identify and engage in formal and informal

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learning. There is evidence in the literature that organisational learning opportunities are both planned and unplanned. This is in stark contrast to the requirements for a positive safety culture, where 'unplanned' actions should be avoided. Another notable observation from the literature is that the content of safety culture and learning culture training tends to be different in nature: safety training tends to be specific while learning content can be either specific or generic (Håvold and Nesset, 2009).

There is clear evidence in the literature that in both in learning culture and safety culture *policy and procedures* are developed collaboratively and updated regularly (Cooper, 2000; Grote, 2008). However, there are some discernible differences. Safety policy and procedures are enforced, whereas learning policy and procedures are used more for guidance. Another variance is that safety procedures are more specific than learning procedures. Also notable is that policies around accountability are more prevalent in safety culture.

A number of other themes were identified from the analysis. Rather than bridging the learning–safety nexus, these themes related to *either* learning culture *or* safety culture.

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Areas of misalignment between safety culture and learning culture

The analysis identified four themes limited to either safety culture or learning culture. Non-aligned themes include: social regulation, safety versus productivity, equipment and innovation. The themes are summarised in Table 4.

Innovation was a significant theme appearing regularly in the literature on learning culture, but was absent in the safety culture literature. One explanation could be that the sorts of risk-taking activities often required for innovation are at odds with the compliance aspect of safety culture (Vinodkumar and Bhasi, 2009). Therefore innovation and compliance are competing factors.

Social regulation was identified in the literature as an important aspect of safety culture. This prevalence of social regulation in safety could be due to the effect of each individual's practices and behaviours on other personnel (Gibbons *et al*, 2006). However, it seems easier for organisations to request individuals to obey safety rules (for example, 'hold the handrail' or 'wear your safety helmet') than to comply with learning (for example, 'learn this concept'). This could be because some facets of safety culture are behavioural, while learning is cognitive. We found indications where mandatory learning was viewed as critical, particularly in circumstances where employees have to work collaboratively in hazardous settings.

Safety versus *productivity* was a theme identified only in the safety culture literature, where balancing productivity and safety seems critical (Díaz and Cabrera, 1997; Håvold and Nesset, 2009). However, there was no evidence of a similar balance required in learning culture. In fact, research in professional learning evidenced that productivity is sometimes prioritised over learning,

when employees are not given sufficient time to learn. It is possible that there is a strong link between learning and productivity that has not been evidenced through this analysis because there is too little empirical research in this area.

Equipment was a prominent theme in the safety culture literature (Grote, 2008), possibly influenced by early conceptualisations of safety focused on the development of technical solutions. By contrast, although the organisational learning literature indicated that workplace conditions should be conducive for learning, equipment was mentioned in few studies.

Aside setting theoretical foundation for future research, these outcomes have practical relevance for organisations, as discussed in the next section.

Key Principles for Safety and Learning Culture

Generally, this study identified themes bridging safety culture and learning culture:

- six themes where safety culture and learning culture are fully aligned (open communication, empowerment, collaboration, alignment of enacted and espoused priorities, management and internal systemic alignment),
- eight themes where safety culture and learning culture are partially aligned (motivation, recognition and rewards, commitment, competence, workplace conditions, risk, opportunities for learning and policy and procedures), and
- four themes that pertain only to safety culture or learning culture.

The analysis of alignment of these themes allowed the development of key principles for safety and learning culture. These principles were developed on the basis of the themes that align across learning culture and safety culture. The principles can be used to help companies implement and streamline safety and learning activities.

Positive safety and learning culture share are based on:

1. *Open communication* – Multiple, open channels of communication should be in place to allow for effective and multi-directional information flow. Effective systems should be implemented to capture and share relevant knowledge across the company.
2. *Employee empowerment* – Employees should be involved in decision-making around safety and learning. They should be encouraged to question practices and make suggestions about improvements in both safety and learning.
3. *Collaboration* – Opportunities should be available for collaboration within and across teams and employees should be supported in developing necessary teamwork skills.
4. *Alignment of espoused and enacted priorities* – Enacted behaviours should align with espoused policies, procedures and rules.

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5. *Internal systemic alignment* – Policies, procedures and rules should be consistent with each other.
6. *Management* – Managers should have the commitment and competences to encourage learning and safety, creating conditions necessary to implement safety principles (open communication, empowerment, collaboration, alignment of espoused and enacted priorities and internal systemic alignment).

Figure 1 illustrates these key principles and how they relate to the themes. From the literature, we identified four themes that are vital for safety and learning culture: *open communication, employee empowerment, collaboration* and *alignment of espoused and enacted priorities*. These four central themes are underpinned by two further themes: *management* and *internal systemic alignment*. Management is critical for facilitating good *open communication, employee empowerment, collaboration* and *alignment of espoused and enacted priorities* (Gibbons *et al*, 2006). Similarly, *internal systemic alignment* underpins *open communication, employee empowerment, collaboration* and *alignment of espoused and enacted priorities* (Flood and Romm, 1996). These aligned themes are at higher level of abstraction and generalisability than the non-aligned themes identified through this study. Overall, the higher the level of abstraction of the themes, the greater the degree of alignment between safety culture and learning culture.

These guiding principles can be used by safety managers to guide the development of policies and practices. Themes that are misaligned across learning culture and safety culture are equally important and should also be taken into consideration. Alignment across themes could be meaningful when

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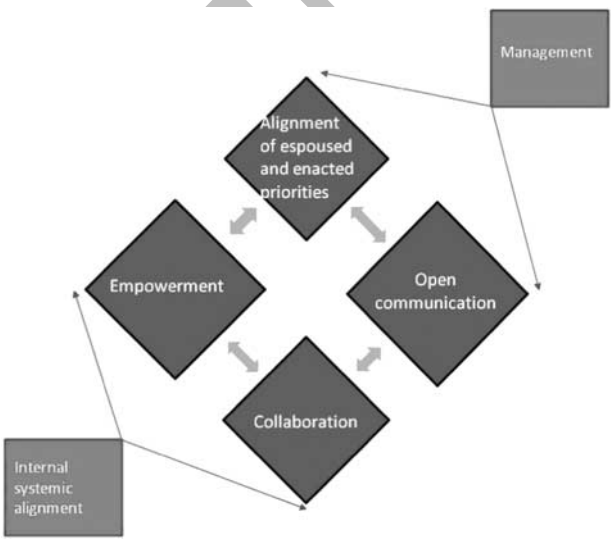

Figure 1: Principles for effective safety and learning culture.

setting policy or strategy. However, it is less useful when operationalising or measuring learning culture and safety culture in practice.

Understanding the relationship between safety culture and learning culture is critical to improving organisational performance (Evans *et al*, 2007; Grote 2008; Lofquist *et al*, 2011). This study provides a baseline from which to understand the complex interrelationships across safety culture and learning culture.

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