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Learning from Incidents Questionnaire (LFIQ): The validation of an instrument designed to measure the quality of learning from incidents in organisations

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ABSTRACT

Effective learning is essential for a safe workplace. Through learning from incidents (LFI), knowledge is applied and embedded within the work environment in ways that can prevent future incidents. In order to improve their LFI processes, such as incident reporting and analysis, or the dissemination of investigation outputs, organisations need an instrument that allows them to diagnose the quality and effectiveness of their LFI processes, making sure that LFI leads to positive safety outcomes. This paper outlines an instrument that measures the quality of LFI processes and practices: the Learning from Incident Questionnaire (LFIQ). The LFIQ identifies employees' perceptions and experiences of LFI processes and practices. This paper describes the validation of the LFIQ instrument via a pilot study conducted at two energy companies involving 781 participants. Through factor analysis the instrument was shown to have sufficient validity to become a useful tool for industry; by gaining insight into employees' perspectives on LFI, frontline managers and supervisors can have evidence on which to base improvements to the local work environment and prioritise areas for improvement.

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1. Introduction

Effective learning from incidents (LFI) is critical for safe working. It allows knowledge to be applied and embedded in work environments in ways that can prevent future incidents (Cooke and Rohleder, 2006). However, learning processes often are not implemented effectively, since the design of LFI initiatives is seldom based on empirical evidence from research on Workplace and Organisational Learning (Lukic et al., 2010).

In many organisations, the activities designed to enable employees to learn from incidents are based around the dissemination of the findings from incident investigations (see for example Phimister et al., 2003; Lundberg et al., 2009). However, dissemination of incident information does not always result in learning and action to change professional practice in the ways that are needed to prevent future incidents. In order to learn people have to move

beyond receiving incident information to actively engaging with this information and, where necessary, changing practice (Lukic et al., 2010). To do this employees have to apply and make sense of incident information in ways that are meaningful to their job role; they have to reflect on the information and actively connect it to their professional practice (Lukic et al., 2013).

There are at least two main problems in moving individual employees towards actively engaging with incident information and, when necessary, changing practice (Lukic et al., 2013). First, many LFI activities focus on employees receiving and reading incident information, rather than engaging with incident knowledge. Second, during work there are few opportunities for employees to reflect and make sense of incident information in relation to their own job role. This problem is particularly acute with frontline employees. Front line managers and supervisors are not always able to engage front line employees with incident information in ways that maximise reflection and sense making. The research reported in this article is part of a larger study that aimed to address these problems. The need for a tool to measure LFI activity across each industrial site, and even across the sector, was heralded by the Energy Institute, a membership organisation that

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wanted to measure employees' perceptions and experiences of learning from incidents within and across organisations. The study, Engaging with Learning From Incidents (LFI-Engage, <http://www.gcu.ac.uk/academy/lflengage/>), was funded by the Energy Institute to improve the effectiveness of LFI in organisations by supporting front line managers and supervisors in understanding the current status of LFI capability at their site, how this can be improved and how to more effectively engage with frontline employees on learning from incidents. The main output was a Toolkit designed to support front line managers and supervisors, especially with regards to encouraging sense-making and reflection within the LFI process. This paper reports the development and validation of a tool from the Toolkit, the LFI Questionnaire tool, which is designed to diagnose the quality of current LFI activities in an organisation with a view to understanding how these activities might impact on each individual's learning.

Research by [Lähteenmäki et al. \(2001\)](#) was the first to suggest that the initial step in improving LFI should be to examine existing LFI activities within each organisation. Arguably, this process calls for a valid and reliable instrument, which is sensitive to specific features of organisational learning ([Easterby-Smith et al., 1998](#); [Gherardi and Nicolini, 2000](#)). There are a number of methodological approaches that could be used to diagnose quality of LFI, including ethnographic ([Buescher et al., 2009](#)), 'sensemaking' ([Snowden, 2002](#)), socio-cultural ([Sanne, 2008](#)) and cognitive-psychology based approaches ([Stanton and Walker, 2011](#)). The associated instruments are difficult for managers and supervisors to implement for various reasons – primarily because they are too specialised and technical to be used by non-researchers and are therefore out of scope for use by frontline staff.

LFI must be considered across the whole organisation, or site, to capture all facets of the LFI process across different levels ([Lukic et al., 2012a](#)). The primary reason is because the cumulative effects of individual LFI activities across a site impact on the overall success - or failure - of LFI within an organisation. However, no instrument to measure LFI across an organisation is currently available. This paper proposes an instrument, the Learning from Incident Questionnaire (LFIQ), to measure the quality of LFI processes and practice across an organisation or site.

2. Conceptual underpinnings

A comprehensive review of the literature was conducted to investigate existing models to provide a theoretical and conceptual platform for the questionnaire. [Chiva et al. \(2006\)](#) summarise that diagnostic instruments measuring the effectiveness of organisational learning tend to focus on two conceptual areas: (1) learning activities and their sequence, and (2) specific factors facilitating effective learning. With regards to the former, instruments addressing learning activities and their sequencing typically measure discreet phases of the learning process, for example the work of [Drupsteen et al. \(2013\)](#) who conceptualised LFI as a series of steps to understand loss of learning potential in the process. In contrast, facilitating learning is based on measuring well-established properties or components (i.e. factors) which aid in effective learning. These two features - the activities and the factors inherent to effective learning - are interrelated as the *what* and *how* of learning. That is, the activities required to achieve effective learning outcomes are triggered by the factors associated with effective learning. Both these notions have been incorporated into instruments designed to measure safety climates, such as the Nordic Safety Climate Questionnaire, where learning activities (the *what*) are a subscale of safety climate ([Kines et al., 2011](#)); specific factors that enable learning (the *how*) have also been considered

subscales of safety climate instruments, for example, individual motivation ([Nielsen et al., 2016](#)) and commitment to the workplace ([Nielsen et al., 2008](#)). There are also tools aimed specifically at measuring the quality of organisational learning that cover both conceptual features, such as the instrument for Organisational Climate for Learning from Errors at Work (OLE) ([Putz et al., 2013](#)) or the model proposed by [Edmondson \(1999\)](#) relating team psychological safety, learning behaviours and performance. However, these tools tend to focus on a single organisational factor (e.g., learning climate) rather than the quality of the overall LFI processes. The conceptual baseline for the LFIQ were two models, developed through earlier empirical research: the LFI Framework ([Lukic et al., 2012a](#)) and the LFI Process Model ([Lukic et al., 2012b](#)). The reason these models were selected is because they were the first within the literature in this field to explore learning activities across the various phases of LFI ([Lukic et al., 2010](#)).

2.1. The LFI process model

The LFI Process Model ([Fig. 1](#)) is used to map LFI activities across a site to phases of the LFI lifecycle ([Lukic et al., 2012b](#)). The LFI Process Model was developed through analysis of LFI activity on different industrial sites. There are normally six phases of LFI: reporting incidents, investigating incidents, developing incident alerts, disseminating information, contextualising information and implementing actions (see [Fig. 2](#)).

The LFI Process Model describes these phases as sequential. That is, (1) reporting an incident (including a near miss) is essential in raising awareness and allowing for preventive actions to be formulated. This leads to an (2) investigation of the incident(s) to determine both the immediate and underlying causes of the incident. Based on this investigation, recommendations for improving safety or changing practice are developed and shared across the relevant site in the form of an (3) incident alert. Incident alerts are tools to help employees understand how to prevent similar incidents from reoccurring. (4) Dissemination should be targeted towards relevant rather than all groups of workers, i.e., those employees who will benefit from each particular incident alert. The (5) contextualisation phase is important in learning as incident information has to be critically assessed and reflected upon within each employee's relevant workplace context. The final phase requires the (6) implementation of actions and changes by all relevant employees, thereby using the information with the aim of preventing similar incidents in the future.

This process forms a foundation to understand the effectiveness and inter-relationship of existing LFI activities on sites.

2.2. The LFI framework

Before 2012, Learning from Incidents was not underpinned by theories of organisational or adult learning ([Lukic et al., 2012a](#)). The LFI Framework ([Fig. 1](#)) represents an early attempt to underpin LFI activity with these theories (*ibid*), taking into consideration critical components that influence organisational learning, such as how lessons are learned, the severity of the consequences of an incident and the people involved as well as team learning components, such as trust ([Edmondson, 1999](#)). The Framework was selected as a baseline for the LFIQ because it integrates concepts from diverse yet related learning theories that: (a) serve as analytical lenses to understand facets of LFI and (b) provide prescriptive values when developing interventions in LFI. The framework is based on five key learning components identified through the literature as being important for effective LFI (for a detailed description of each component see [Lukic et al., 2012a](#)):

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