Training Needs Research Applied to the Development of a Standardised Incident Investigator Training Framework

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ABSTRACT

In response to the rail industry lacking a consistently accepted standard of minimal training to perform incident investigations, the Australasian rail industry requested the development of a unified approach to investigator training. This paper details how the findings from a training needs analysis were applied to inform the development of a standardised training package for rail incident investigators. Data from job descriptions, training documents and subject matter experts sourced from 17 Australasian organisations were analysed and refined to yield a draft set of 10 critical competencies. Finally the draft of critical competencies was reviewed by industry experts to verify the accuracy and completeness of the competency list and to consider the most appropriate level of qualification for training development. The competencies identified and the processes described to translate research into an applied training framework in this paper, can be generalised to assist practitioners and researchers in developing industry approved standardised training packages.

Keywords: Investigation, Training Development, Rail

INTRODUCTION

Rail incident investigation is evolving as a specialisation within the safety discipline. In Australia, it is mandatory that serious transportation incidents be investigated. Proactive risk management has also prompted an increasing number of organisations to corporately mandate the investigation of minor transportation incidents. The Australasian rail industry lacks a consistently accepted standard of minimal training necessary to perform rail incident investigations. Although several courses are currently available, none of the current courses offer the breadth of development required for a comprehensive career pathway in incident investigation in Australasia (Biggs, Banks and Dovan, 2012; Short, Kains and Harris, 2010). Consequently, the competency of personnel responsible for conducting investigations varies considerably. With the objective of enhancing human performance regarding incident investigations, members of the Australasian rail industry requested the development of a unified approach to investigator training.

When developing a unified approach, it is essential that thorough research be conducted to identify the training needs of investigators across the industry sector. A Training Needs Analysis (TNA) provides a structured process to comprehensively research training needs and apply the findings to course development. Although many courses are developed without thorough consideration of training needs (Arthur, Bennett, Edens & Bell, 2003) it is commonly recognised that there are many benefits, such as increased productivity and quality of employee performance, associated with conducting a TNA to inform the development of training programs (Denby, 2010; Kai Ming Au, Altman and Roussel 2008). This paper reports on how the findings from a TNA have been applied to inform the development of a standardised training package for rail incident investigators.

IDENTIFYING THE TRAINING NEEDS

To determine the most appropriate TNA process for this research, the analysts were guided by their purpose. As the Australasian rail industry requested the development of an industry-approved national training package, the most appropriate levels of analysis were at the task level (Goldstein and Ford 2002) and the industrial level (Banks, Biggs and Dovan, 2014). At the task level, the analysts aimed to identify the tasks performed by rail incident investigators and the knowledge, skills and abilities that underpin the competencies that are required to be performed under the conditions relevant to the position. At the industry level, the analysts aimed to identify the industry's objectives with regards to the profession of rail incident investigators and the extent to which training can assist in achieving these goals.

This research builds upon preliminary task analysis findings reported by Biggs, Banks and Dovan (2012). Biggs and colleagues implemented a modified-Delphi method involving a combination of qualitative and quantitative techniques with a panel of subject matter experts to generate a weighted list of 71 rail incident investigator capability requirements. Consistent with previous research conducted in the United Kingdom (Biesma, 2008) they identified that generic requirements such as being objective and using critical thinking tended to be rated higher than the industry specific requirements such as knowledge of rail vehicle crash dynamics. The current study builds upon the previous research by challenging and refining the identified list of 71 capability requirements to determine the set of competency, knowledge and skill requirements for rail incident investigators.

The analysts gathered additional exploratory data through onsite observations of training content being delivered to students in rail incident investigation courses and observations of job context and task demands on rail worksites. Further exploratory data was gathered through reviewing existing training materials, job descriptions, published research literature, and regulatory and legislative material. For example training documents were analysed to ascertain competency areas currently demanded and supplied to the rail industry with regards to incident investigators. Comparatively job descriptions were analysed to ascertain job tasks, job context, knowledge requirements and skill requirements. Thematic analysis of the exploratory data in addition to the previously identified list of 71 capability requirements identified key preliminary conclusions.

These preliminary conclusions were challenged and validated through the structured process of a modified-Delphi method. Findings from the collated training needs research were presented to a panel of 52 rail incident investigator experts. The panel was sourced from 19 stakeholder organisations operating in either Australia or New Zealand. The stakeholder organisations comprised statutory bodies, safety boards, regulators, transport authorities, rail transport service providers, transport investigators, and private companies that operate trains to transport freight. The experts were asked to review the draft list of rail incident investigator competency, knowledge and skill requirements and to confirm, add, or delete items. Based on the responses from the expert panel, the analysts amended the draft and presented a revised list to the same panel. Panel members were invited to confirm, add, delete or amend their responses in light of the group data. Additionally members were invited to consider the 10 core competencies that were identified as pertinent for the training of rail incident investigators and rank the importance of the corresponding knowledge and skill requirements.

To enhance the accuracy of the data collected, analysts informed all expert panel members that the purpose of the analysis was to ascertain the importance of each knowledge and skill requirement to inform the development of an industry-approved national training package. Panel members were then instructed to rank the requirements using the categories of '*essential*', '*desirable*' and '*not required*'. A further option of selecting '*unsure*' was also provided for each requirement to reduce the risk of respondents selecting a central rating if they were undecided. Based on a 3-point Likert scale ranking, the analysts utilised the derived means to classify the knowledge and skill requirements into the categories of '*essential*', '*desirable*' and '*not required*'. Scores of 2.7 and above were deemed to be '*essential*' to the competency framework of rail incident investigations, while '*desirable*' categories were scored 2.7 to 2. Knowledge and skill requirements that scored below 2 were not included as they were rated by the expert panel as being not required. An abbreviated list, detailing knowledge and skill requirements with a mean score greater than 2.5, is presented in Table 1.

Table 1: Rail Incident Investigator Competency, Knowledge and Skill Requirements

Competency 1: Use Interpersonal Communication Strategies in the Workplace

Knowledge

Essential
- legislation, regulations, policies, procedures and guidelines relating to workplace communication
- effective communication strategies and techniques to address barriers and build and maintain relationships

Desirable
- knowledge of organisation processes and hierarchy
- official communication channels

Skills

Essential
- speaking and listening relating to sustained and sometimes complex communication exchanges

Desirable
- taking part in interpersonal exchanges of information, with a flexible use of register and a range of strategies for interaction
- using a range of communication techniques that include establishing rapport, active listening, probing, reflecting, negotiation, conflict resolution

Competency 2: Use Written Communication Strategies in the Workplace

Knowledge

Essential
- legislation, regulations, policies, procedures and guidelines relating to written communication such as privacy, freedom of information, information security, confidentiality, copyright

Desirable
- principles of effective written communication at a high level of complexity
- differences in style between workplace communication for different purposes
- channels of communication and processes for obtaining advice, approvals etc
- investigative report style/template
- organisational policy for recordkeeping - paper-based and electronic

Skills

Essential
- linking complex ideas in written material through selection and use of words, grammatical structures, headings and punctuation appropriate to the purpose
- spelling, punctuation and grammar for workplace documents at an experienced level

Desirable
- reading and writing at a complex level to cope with a range of workplace materials
- writing and sequencing abstract concepts according to the required purpose of written material

Competency 3: Conduct Investigative Interviews

Knowledge

Essential
- application of legislation to interviewing including privacy, ethics, confidentiality and freedom of information
- questioning techniques
- legal requirements relating to recording of information

Desirable
- organisational policies and guidelines relating to interviews
- legal and ethical considerations for conducting interviews
- legal and organisational requirements for documentation
- rules of evidence and admissibility

Skills

Essential
- using interviewing techniques to suit a range of situations and interviewees
- engaging in exchanges of sometimes complex oral information
- varying style and language structure to suit a range of interviewees
- using techniques to deal with difficult interview situations and to defuse potentially dangerous situations
- using critical analysis, evaluation and deductive reasoning
- using problem solving and decision making related to interviewing
- using judgment, to test the veracity of information and vary questions and interviewing techniques to suit
- preparing interview documentation requiring accuracy of expression and formality in structure and format

Competency 4: Gather, Record and Store Evidence

Knowledge

Essential
- organisational policies, guidelines and regulations in the context of gathering and managing evidence
- management of secure information
- evidence legislation relevant to the jurisdiction

Desirable
- rules of evidence relevant to the jurisdiction
- legislation for freedom of information, privacy, security, occupational health and safety, Crimes Act 1914 and Criminal Code Act 1995
- legislation and procedures relating to public interest

Skills

Essential
- organising and problem solving
- accessing information from a range of research sources including witnesses, organisational documents, site environment

Desirable
- liaising and negotiating
- communicating with people from diverse backgrounds
- making comparisons and exercising judgment about facts in written materials
- collecting and processing physical and photographic

disclosures, protected disclosures or whistle blowing	evidence adhering to organisational procedures for handling and storage
	- using information technology for managing records, files and databases

Competency 5: Contribute to Workplace Safety

Knowledge

Essential
- occupational health and safety procedures
- workplace hazards and associated risks

Desirable
- legal rights and responsibilities of the workplace parties
- the ways in which occupational health and safety is managed in the workplace, and legal requirements
- preferred order of ways to control risks
- participative arrangements for workplace safety

Skills

Essential
- applying objective identification of workplace safety issues

Desirable
- documenting hazards in clear language according to organisational guidelines
- accessing workplace safety legislation, policies and procedures electronically or in hard copy
- reading documentation such as workplace safety legislation, policies and procedures and applying them to work practices

Competency 6: Analyse Investigation Evidence

Knowledge

Desirable
- methods of analysis such as Reason model/ICAM
- data collection and management systems
- the influence of human factors on data analysis, for example: prejudice and bias
- inductive/deductive reasoning processes
- construction of sound inductive arguments

Skills

Essential
- undertaking critical analysis and problem solving
- communicating including questioning and negotiating meaning
- preparing written reports and recommendations requiring accuracy, and formal structures and language

Desirable
- using deductive reasoning and evaluation techniques related to information analysis and corroboration

Competency 7: Manage an Incident Investigation

Knowledge

Essential
- investigation methodology and techniques
- applicable acts, standards, regulations and guidelines (such as the Rail Safety Acts and Regulations, AS4292/AS1742.7)
- investigation approaches including just culture, learning culture and compliance
- ethical standards

Desirable
- rules and types of evidence
- storage and continuity of evidence
- jurisdiction, powers and restrictions to investigate
- organisational guidelines for reporting, documenting and information management
- confidentiality and privacy issues

Skills

Essential
- undertaking analysis and problem-solving
- writing summaries, briefing papers and reports requiring clarity, accuracy and formality of structure and language
- undertaking initial site survey and preserving incident site
- using planning and time management in the context of investigations
- reading complex written materials such as legislation, regulations, codes of practice and legal precedents and applying them to work practices

Desirable
- engaging in exchanges of sometimes complex oral information
- leading a team including selecting, managing and mentoring team members

Competency 8: Manage own Professional Performance

Knowledge

Essential
- safety management systems

Desirable
- ethical practice, dignity and respect in the workplace

Skills

Essential
- working autonomously and requesting assistance from subject matter experts when necessary
- setting, accepting responsibility for and completing tasks to a high standard
- time management and organisation skills to meet deadlines
- maintaining effective work behaviour in the face of setbacks or pressure

Desirable
- contributing to work as a member of a team

Competency 9: Manage Team Performance

Knowledge	**Skills**
Essential	*Essential*
- relevant organisational policies, procedures and work practices	- literacy skills to communicate decisions and to write quality reports
Desirable	*Desirable*
- relevant legislation	- high level leadership skills to inspire trust and confidence in teams, managers and stakeholders
- team dynamics and its impact on personal work performance	- communication and interpersonal skills to convey expectations, negotiate, resolve conflict and motivate performance
	- critical thinking and problem-solving skills to address HRM issues
	- coaching and mentoring skills

Competency 10: Apply Rail Industry Knowledge	
Knowledge	**Skills**
Desirable	*Desirable*
- Railway Safety Management (AS4292)	- application of railway Safeworking Rules
	- derailment cause analysis

As can be seen in Table 1, after final consultations the approved competency list included nine generic competencies and one industry specific competency. It can also be observed that the generic competencies such as 'conduct investigative interviews' had a greater number of perceived essential and desirable requirements than the industry specific competency 'apply rail industry knowledge'.

DEVELOPMENT OF THE TRAINING FRAMEWORK

To translate the training needs findings into an applied training framework the analysts interviewed training development experts sourced from the Australian Training and Logistics Industry Skills Council and Government Skills Australia. Interviews were conducted to research appropriate qualification levels and training content. The training experts unanimously recommended that the training package be developed to align with the national qualification framework. Development of a training package to align with the dominant education framework ensures that the proposed qualification has flexible pathways, portability and comparability within the national qualification framework. Within Australia, the national policy regulating qualifications for education and training is the Australian Qualification Framework (AQF) (AQF, 2011).

The AQF defines 10 qualification levels based on the relative complexity of achievement expected and the amount of work required by graduates to demonstrate that level of competence. Level 1 has the lowest complexity with graduates achieving a Certificate I qualification. Comparatively level 10 has the highest complexity with graduates achieving a Doctoral Degree. After reviewing the list of 10 competencies, and their corresponding knowledge and skill requirements, the training experts made recommendations to assist the analysts in developing draft training packages at a Certificate III, Certificate IV and Diploma level. The three draft training packages were then presented to the panel of 52 rail incident investigator experts for industry feedback. Industry experts were asked to consider the draft training packages, market demand and current supply of training courses to determine the most appropriate level for the standardised rail incident investigator qualification.

The Certificate IV level was identified as the most appropriate level for the standardised qualification. AQF guidelines indicate that Certificate IV qualifies individuals to apply a broad range of specialised knowledge and skills in varied contexts to undertake skilled work. Graduates of a Certificate IV have broad factual, technical and theoretical knowledge in a specialised field. They also have technical skills, communication skills and cognitive skills to identify, analyse, and respond to information from a range of sources and to apply solutions of a non-routine nature to problems. The typical duration of a Certificate IV qualification is between six months and two years.

In this study, the analysts applied the training needs research to inform the development of the Certificate IV in Rail Incident Investigation. This specialist qualification covers the competencies required by those responsible for rail incident investigation under a range of legislation, regulations, mandated government and organisational policy and instructions. It comprises nine core units selected to train critical skill and knowledge requirements from all 10 of the competencies identified in the training needs analysis. For example recommended core units include: gather and

manage evidence; analyse information; and manage own professional performance. Additionally 16 electives have been recommended to provide flexibility for organisations to tailor the qualification to meet individual needs within an industry approved framework. For example recommended elective units include: investigate non-compliance; examine track infrastructure; and prepare a brief of evidence. Industry feedback from the panel of rail incident investigator experts confirmed that the proposed qualification would meet industry needs for training Australasian rail incident investigators.

Findings from this study can be applied by future researchers and practitioners who aim to develop effective training courses. Two key findings from the current research that may be generalised to assist in future course development include: even specialised job positions such as rail incident investigator require training of generic competencies; and consultations with all stakeholder groups facilitates development of industry approved and appropriate courses. More specifically with regards to generic competencies, the current study identified that the majority of training needs related to generic knowledge and skill requirements. All AQF approved courses incorporate generic learning outcomes that are transferable and non discipline specific. The AQF recognises four broad categories of generic learning outcomes. These include: fundamental skills such as numeracy and literacy; people skills such as working with others and communication skills; thinking skills such as decision making and problem solving; and personal skills such as acting with integrity. Rail incident investigator experts confirmed that these generic learning outcomes were important for rail incident investigators and should be incorporated into the standardised training framework in addition to job specific learning outcomes.

With regards to consultations, findings from this study highlight the importance of obtaining data from all stakeholder groups. Representatives from the rail industry were able to articulate the relevant knowledge and skill requirements for the job position. They provided valuable insights into how important the competencies were to the successful performance of incident investigations and current competence levels in investigative teams. Representatives from the training industry were able to identify relevant qualification levels and how competencies mapped to already existing courses. Gathering unique training needs data from the different expert sources was necessary to scientifically guide the development of the training framework for current and future incident investigators.

BENEFITS FROM APPLYING RESEARCH TO PRACTICE

The transportation industry stands to gain substantial benefits from taking a more collaborative approach to the development of rail incident investigations. Development of a standardised competency framework would be financially advantageous to organisations as the training development costs could be shared across several organisations. A standardised capability framework would allow nationally recognised career pathways to be articulated. This would be beneficial for organisations that operate across State boundaries as graduates' qualifications would be recognised at a National level. The introduction of a professional standard may also provide greater consistency in graduate competencies and investigator performance. To translate the current researched framework into applied training, it is recommended that the Certificate IV training package in rail incident investigation be further developed into a curriculum. Once approved it should be implemented and evaluated to ensure graduates are obtaining appropriate industry skills and knowledge for their role as rail incident investigator.

CONCLUSIONS

Inconsistent minimal training standards may produce variable levels of competency in personnel. To enhance human performance and achieve consistently high job outcomes, a unified approach to training needs to be established. A TNA can be considered an essential first step in a workforce development process. This paper describes the application of TNA findings to inform the development of a standardised training package for rail incident investigators. Training needs were identified through a combination of research methods including observations, document reviews and consultations with subject matter experts. Nine generic competencies and one industry specific competency were identified as critical for rail incident investigator training. Certificate IV was perceived by

industry experts to be the most appropriate level of qualification for investigator training. The developed Certificate IV in Rail Incident Investigation is a specialist qualification that covers the competencies required to conduct investigations under a range of rail incident contexts. It comprises nine core and 16 elective units to deliver critical learning outcomes while maintaining flexibility to meet individual needs within an industry approved framework. It is envisaged that the development of a Certificate IV course could produce graduates with have broad factual, technical and theoretical knowledge in the specialised field of rail incident investigation. The structured and theoretically sound TNA protocol described in this paper for researching the training needs of incident investigators may be applied internationally to guide workforce development through the development of standardised training.

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