All about the teacher, the rain and the backpack: The lack of a systems approach to risk assessment in school outdoor education programs

Clare Dallat*, Paul M. Salmon, Natassia Goode

Centre for Human Factors and Sociotechnical Systems, University of the Sunshine Coast, Faculty of Arts and Business, Locked Bag 4, Maroochydore DC, QLD, 4558, Australia

Abstract

Inadequate risk assessment has been highlighted as a contributing factor in the deaths of several children participating on school outdoor education programs. Further, whilst the systems thinking approach to accident prevention is now prevalent in this domain, the extent to which schools consider the overall led outdoor system during risk assessment processes is not clear. The aim of this study was to determine whether the systems thinking perspective has been translated into risk assessments for outdoor programs. Four school outdoor education risk assessments were analysed and Rasmussen’s (1997) Risk Management framework was used to map the hazards and actors identified in the risk assessments. The results showed that the hazards and actors identified reside across the lower levels of the Accimap framework, suggesting a primary focus on the immediate context of the delivery of the activity. In short, from a systems perspective, not all of the potential hazards were identified and assessed. This suggests that current risk assessment practice is not consistent with contemporary models of accident causation, and further, key risks could currently be overlooked. The need for the development of a systems theory based risk assessment process is discussed.

© 2015 The Authors. Published by Elsevier B.V.
Peer-review under responsibility of AHFE Conference

Keywords: Led outdoor sector; Systems-thinking; Risk assessment; Hazards

*Corresponding author.
E-mail address: clare.dallat@research.usc.edu.au
1. Introduction

Risk assessments are not a new requirement for outdoor education programs, although there remains confusion over how to conduct them [1-5]. Australian Workplace Health and Safety legislation (e.g. www.worksafe.vic.gov.au; www.worksafe.qld.gov.au) and Education Departments (e.g. DEECD, Victoria; DET, NSW) mandate that a risk assessment should be completed prior to the conduct of an activity or program. However, recent findings from the Coroners Courts identified inadequate risk assessment as a key contributing factor in the deaths of several children participating on school outdoor education programs [6, 7]. The second of these inquests [6] highlighted the lack of a comprehensive risk assessment methodology as one of the key challenges facing the domain.

The domain’s literature is populated with a significant number of articles detailing specific methodologies for risk assessment [8, 3, 4, 9, 5]. Parkin and Blades [8], for example, recommend that, “three factors need to be considered when identifying risks: the participants, the equipment and the environment” (pp. 11). They also suggest that hazards in combination may lead to an adverse outcome and as such, “risk identification should include the identification of all these authors’ emphasis) likely risk combinations (e.g. participants/equipment/ environment hazards - potential and likely)” (pp.10). This statement is indicative of the majority of articles that advocate a similar approach to risk assessment in the led outdoor sector. This dominant ‘Participant, Equipment and Environment’ approach appears to limit the potential factors which require consideration during risk assessment to the immediate context of, and within, the confines of the activity itself.

This approach appears to be counter to current thinking in the led outdoor activity domain regarding accident causation, as well as within the broader field of safety science. Within the led outdoor activity domain, it has been established that systems models are the most appropriate for understanding accidents and preventing future occurrences [10, 11]. Recent analyses of both minor and fatal incidents within this domain has demonstrated that multiple contributory factors from across the led outdoor activity system were in fact present [15]. This perspective has long been the driving force behind accident analysis and prevention in other safety critical domains [12, 13, 14].

Having established that systems models are the most appropriate for accident analysis and prevention within the led outdoor activity sector, a domain-specific systems accident analysis method was developed [10, 11, 15, 16]. This involved adapting Rasmussen’s [12] framework to describe the led outdoor activity system. The framework (known as UPLOADS) consists of six system levels: government bodies, regulatory associations, activity centre planning, local area government, schools and parents; supervisory and management decisions and actions; decisions and actions of leaders, participants and other actors at the scene of the incident; and equipment, environment and meteorological conditions. The purpose of the method is to guide investigation and the analysis of incidents. Potentially, it could also be used to evaluate the comprehensiveness of risk assessments for outdoor education programs, as it describes all of the hazards within the outdoor activity “system” and where they reside, as well as the actors involved in the provision of activities.

The systemic nature of accidents requires that any risk assessment process focuses on risks across the system in which activities are provided. Despite this, the extent to which led outdoor activity providers consider the overall led outdoor system during risk assessment processes is not clear. Certainly the literature suggests that the focus is mainly on the leader and participants, the equipment being used, and the environment, which in turn suggests that various parts of the system are being ignored. The aim of this study was to investigate whether the systems thinking perspective on accident causation was adopted in four recent risk assessments for school outdoor programs. Rasmussen’s [12] Accimap framework was used to map the identified hazards and their interactions considered in the risk assessments across the led outdoor activity system. In addition, this paper will aim to describe: 1) the types of hazards that are currently considered in risk assessments for outdoor education programs in schools; and 2) the actors that are identified as performing a role in controlling the risks associated with these hazards.
2. Method

2.1. Design

The study involved a qualitative analysis of four publicly available risk assessments undertaken by schools conducting outdoor education programs. The study was approved by the University of the Sunshine Coast Human Ethics Committee.

2.2. Identification of risk assessments

The search engine Google (www.google.com.au) was accessed on the 3rd February 2015 and the following search term: ‘risk assessment for outdoor education programs in Australia’ was entered, achieving 825,000 results. The search results were reviewed in concurrent order (starting from page 1) for current, accessible and completed school-based outdoor education risk assessments, which also provided a reasonable geographical representative sample from across Australia. Two risk assessments that met the above inclusion criteria but which, after closer inspection did not contain any identified hazards, were excluded. The first four risk assessments meeting the inclusion criteria were accepted for analysis.

2.3. Risk assessment content analysis

Each risk assessment was coded individually, which involved identifying all of the hazards and actors. To assess the extent to which the risk assessments adopted a systems approach, the UPLOADS Accident Analysis Framework was then used to represent the findings [10, 17, 11, 15, 16]. This involved placing the hazards and actors identified onto the appropriate level of the framework. For example, if the hazard ‘severe weather’ was identified in the risk assessment, it was placed at the ‘Environment and meteorological conditions’ level. If the hazard of becoming ‘Lost’ while participating in the activity of bushwalking was identified, it was placed at the ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ level. For the actors, if, for example, instructors and participants were identified, this was placed at the ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ level. If parents were identified, this was placed at the, ‘Activity Centre Management, planning and budgeting, local area government, parent and schools’, level.

3. Results

3.1. Overview of risk assessments

Of the four risk assessments, one was completed for a single activity that a school group was to participate in (cycling), while the second was created to cover two activities (‘mass surf swims’ and ‘creek swims’). A third focused on multiple activities occurring on an outdoor education program occurring within a centre (a ‘hard-top’ location where there is a variety of activities available and accommodation is both camping and bunk bed style). The fourth risk assessment centred on the activity of camping in a school outdoor program. Three risk assessments were state based and represented three different states in Australia, with the final assessment designed to be used for schools operating nationally (different schools under the same faith-based governance). Across all four risk assessments, 21 led outdoor activities (e.g. abseiling, cooking, canoeing, surf swims and cycling) were identified.

3.2. Hazards and associated UPLOADS levels

Overall, 77 types of hazards were identified across the four risk assessments. 76 of the hazards were found to be situated across the two lower levels of the UPLOADS framework; these levels being, ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ and, ‘Equipment, environment and meteorological
conditions’. One hazard (Student Numbers) was identified at the ‘Supervisory and management decisions level’ (Level 3).

The Accimap containing the identified hazards for the four risk assessments is presented in Figure 1. The numbers in brackets represents the number of times they were mentioned. The most commonly populated level was the ‘Environment and meteorological conditions’ level (42 hazards) whereas the next level, ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’, contained 34 hazards. Only one identified hazard, “Student Numbers” was represented in the ‘Activity Centre Management, planning and budgeting, local area government, parent and schools’ level. No other levels of the Accimap were represented from the hazards identified within the four risk assessments.

At the ‘Equipment, environment and meteorological conditions’ level, 64% of the UPLOADS taxonomy was represented, whereas only 17% appeared at the ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ level. This percentage reduced even further upon reaching the ‘Supervisory and management decisions and actions’ level of the UPLOADS framework, with only 10% of the UPLOADS causal factor taxonomy factoring in the risk assessments.

Hazards and risks associated with physical injuries and illnesses featured prominently with, “Pre-existing conditions”, “falls”, “strains and sprains”, “fractures”, “burns”, and “allergic reactions” together accounting for 50% of all hazards represented across the ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ level of the framework.

Within the ‘Environment and meteorological conditions’ level, weather and subsequent weather conditions presented strongly. “Lightning”, “temperature”, “rips”, “drowning” and, “weather conditions”, collectively accounted for 33% of the identified hazards at this level of the framework.

Within the remaining hazards populated on this level of the framework, there was significant variance in the types of hazards identified. For example, one risk assessment identified “Environment being harmed by a human” as a hazard requiring action, whereas another referred to the potential for “Allergic reaction to Arts and Crafts Material”.

3.3. Actors identified

It became evident that the higher the number of hazards that were identified in the risk assessments, there were subsequently more actors which were also documented within the risk assessments. This finding however, was not repeated in relation to a correlation between the number of activities and the number of actors. In this case for example, Risk Assessment 1 had 16 identified activities, yet only four actors whereas, Risk Assessment 2 had two activities yet identified six actors with responsibility for risk control implementation.

An ActorMap for the actors represented in the four risk assessments is presented in Figure 2. Three levels of the ActorMap were populated with actors identified in the risk assessments. The ‘Decisions and actions of leaders, participants and other actors at the scene of the incident’ level contained the highest number of actors referred to within the four risk assessments (12 in total). One risk assessment (surf swim and creek swim program) highlighted the role of “Parents” and “Local Council”, consequently populating the ‘Activity Centre Management, planning and budgeting, local area government, parents and schools’ level. Another risk assessment (the multi-activity program with both camping and bunk bed options) included the “Catering Manager” role in the risk assessment process; this populated the ‘Supervisory and management decisions and actions level’ of the ActorMap.
Government department decisions and actions  
Regulatory bodies and associations  
Local area government, schools and parents  
Activity centre management planning and budgeting  
Supervisory and management decisions and actions  

<table>
<thead>
<tr>
<th>Decisions and actions of leaders, participants and other actors at the scene of the incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited skill (1)</td>
</tr>
<tr>
<td>Chafing (1)</td>
</tr>
<tr>
<td>Trailer reversing (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment, environment and meteorological conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleeping problems (1)</td>
</tr>
<tr>
<td>Unknown site (1)</td>
</tr>
<tr>
<td>Tissue collapse (1)</td>
</tr>
<tr>
<td>Exposed to insects (1)</td>
</tr>
</tbody>
</table>

Fig. 1. Accimap representing hazards identified within the four risk assessments.

4. Discussion

The aim of this study was to investigate whether the systems thinking perspective on accident causation was adopted in four recent risk assessments for school outdoor programs. In order to achieve this, the types of hazards considered in four risk assessments for outdoor education programs in schools were identified, along with the actors who were recognized in the risk assessments as performing a role in controlling the risks associated with these hazards. Both hazards and actors were then mapped using a led outdoor activity accident analysis framework based on Rasmussen’s [12] Risk Management Framework [10, 11, 15, 16].

The findings suggest that the risk assessment approaches within the four risk assessments may not be consistent with contemporary models of accident causation. The identified hazards and consequent risk assessment strategies were found to populate only the lower levels of the framework, with 76 of the 77 hazards identified focussing on the immediate context of the activity only. Further, the actors identified populated primarily across the immediate delivery context of the activity – those at the so-called ‘sharp-end’ were most commonly referred to within the risk assessment. The findings of this study undoubtedly reflect the risk assessment approach most commonly referred to within the domain’s literature on risk assessment – one that focuses almost exclusively on the immediate confines of the activity and specifically, on the “People, the Equipment, and the Environment” [2, 8, 3, 4, 9, 5].

A second important finding is that the hazards identified at the lower levels are not consistent with the hazards known to be prevalent in accidents in this domain. With only 17% of UPLOADS causal factor taxonomy being represented at the second level of the framework (Decisions and actions of leaders, participants and other actors at the scene of the incident), it seems evident that even in a level garnering significant attention in the risk assessments, many hazards were in fact not being considered at all. Further, at the level which represented most congruence between the four risk assessments and the UPLOADS causal factor taxonomy (‘Equipment, environment and...
meteorological conditions’), with only 64% of the UPLOADS causal factor taxonomy represented, many hazards at this level were also not being considered.

So what do these findings tell us about risk assessment for led outdoor activities and programs? First and foremost, they suggest that current approaches to risk assessment are in contradiction to current thinking and approaches to accident causation, both within the led outdoor domain itself (e.g. Salmon et al, 2014), and within the wider field of safety science [14, 13, 12]. Multiple studies have demonstrated that numerous contributory factors, evident from across the led outdoor activity system, were present in both minor and fatal incidents within this sector [15]. This systemic nature of accident causation requires any risk assessment process to focus on risks across the system. In other words, by accepting the presence of contributory factors which lead to accidents, of all magnitudes, throughout the system, we could reasonably expect the hazards found in risk assessments to populate across all levels of the UPLOADS framework, and not solely within the lower levels. In short, the factors (or hazards) that were found to be contributory following an incident, must have also been present, prior to the incident. By the absence of such factors populating the majority of the UPLOADS framework in this study, it seems that potential hazards, and consequently, potential risks to participants, were not being identified on these outdoor education programs. A second important implication is that the hazards identified at the lower levels may not be paint the full picture of hazards present at these levels. The hazards identified only covered 22% of those included in the UPLOADS taxonomy (which was developed based on a comprehensive assessment of the contributory factors involved in led outdoor activity accidents). This suggests that current approaches also do not support the identification of the range of hazards at the leader, participant, equipment and environment levels. Therefore, in short, the focus of current risk assessment approaches is too narrow, both in terms of the levels of the system considered, and in terms of the leader, participant, equipment and environment hazards considered.

It is worth noting that hazard identification is only one aspect of a risk assessment process, as described in most WHS guidelines and international standards (ISO 31000, AS/NZ 4360). Additional steps involve assessments of the potential severity and frequency of associated risks arising from interaction with the hazard, before documented controls can be considered, prioritised and implemented (IEC 31010:2009 Risk Management – Risk Assessment
Techniques). If hazards exist throughout the system, associated with the conduct of an outdoor education program, but which remain unidentified, it seems evident that the processes with which to reduce the potential of harm associated with those hazards, will not be implemented. A systems perspective posits that effective and appropriate risk controls must also target the interactions between the higher-level factors and the lower level factors [12]. An interesting further line of research would be to assess the other components of risk assessment and their concurrence with contemporary models of accident causation. Does, for example, the assessment of severity take into account interactions between components and the fact that small events can lead to emergent behaviours of a far greater magnitude (i.e. large scale catastrophes)?

The recent coronial inquest into the death of a student on an outdoor education camp in Victoria, Australia [6], highlights the tragic yet unintended, consequences of failing to consider hazards and risks within the entire system. One of the Coroner’s findings surrounded the inappropriateness of the dam as a place to swim in in the first place. Upon analysis of the incident, it became evident that various “Actors” involved with planning the activity (well before the actual activity occurred) believed that it was both someone else’s role to ensure adequate, qualified supervision at the dam and further, the assumption was made on historical evidence from previous camps, that a qualified lifeguard would be provided (it later became apparent that this person had in fact left their position, several years prior). It is possible that, employing a systems based approach to risk assessment, where hazards at all levels within the system, were identified and potential risks managed, that this gap would have been identified, and consequently may have led to the essential controls being implemented to reduce the likelihood of such a tragedy occurring.

Finally, the limitations of the study and directions for future research should be considered. As a proof of concept study only a small sample of risk assessments were analysed. This limits the ability to generalise these results and findings to the wider domain. However, given that all the existing guidance regarding risk assessment for outdoor education programs focusses primarily on hazards associated at the activity delivery end - namely, on people, equipment and the environment, it seems highly likely that the risk assessments included in this study are reflective of the sector.

To conclude, this study has demonstrated that, in four recent risk assessments, a systems approach was not employed. This is inconsistent with what we know about accident causation and potentially represents a key failure of current approaches. At worst, this suggests that we may not currently comprehend the hazards and risks present during led outdoor activities. More work is therefore required to enable potential hazards and risks across the entire led outdoor system to be identified and importantly, the potential interactions of these hazards and risks to be understood. The various actors across the same system need to be identified, as well as their interactions, with both each other, and the potential hazards and risks. It may, for example, be the case that by adopting a systems based methodology to risk assessment that additional actors will be identified. Nonetheless, in order for this work to occur, we need to understand better the current barriers to developing and implementing systems-based approaches to risk assessments within the led outdoor activity domain. The wellbeing of the entire system could depend on it.

References


