

Using Cognitive Work Analysis to Evaluate Psychological Wellbeing in School-based Camps

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ABSTRACT

Every year, large numbers of school students attend residential camps in Australia and around the world. While it is assumed that these experiences promote psychological development and wellbeing through exposure to novel environments and challenges, little research has evaluated the extent to which camps facilitate psychological well-being (PWB). This study represents a novel application of Cognitive Work Analysis (CWA) to describe the current residential camp system, providing insight into how the current design of school-based residential camps support PWB. The Six-Factor Model of PWB was adopted, which proposes six dimensions of PWB: self-acceptance, positive relations with others, environmental mastery, purpose in life and personal growth. The first phase of CWA, Work Domain Analysis, was used, with an initial model developed by the researchers and validated through workshops with nine subject matter experts. The model indicates that some PWB dimensions are well supported in the current system (e.g., positive relations with others), while others (e.g. purpose in life and personal growth) are less well supported. Further, the model provides insight into which functions or activities support which PWB dimensions, enabling changes to be made to the design of camps to better support specific dimensions.

KEYWORDS

Systems analysis, Cognitive Work Analysis, Outdoor Education, Psychological Wellbeing

Introduction

Attendance at residential camps is a common experience for school students in Australia. School-based residential camps involve a minimum overnight stay at a site with structural facilities (e.g., cabins and kitchen), with attendance organised through a school setting and often are a curriculum requirement (Gray, 2019). Generally, the purpose of school camps is for students to interact outside of the classroom, enhance the learning experience, and foster personal development (Garst, et al., 2011; James & Williams, 2017). It has further been proposed that outdoor education programmes, such as residential camps, have the potential to increase positive youth development and psychological well-being (PWB; Garst et al, 2011). However, there is currently a lack of research into the extent to which camps foster the development of PWB.

According to Ryff (1989), PWB is a combination of six dimensions: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. This eudaimonic perspective of PWB suggests that well-being is more than positive affect and happiness; that it includes life directions, goals, and aspects of self-actualisation (Ryff, 1989).

The aim of this study was to describe the current residential camp system using a systems theory-based approach, to provide insight into how the current design of school-based residential camps

support the six dimensions of PWB proposed by Ryff (1989). The study was undertaken in collaboration with a large outdoor education organisation in Australia.

Cognitive Work Analysis (CWA; Vicente, 1999), a systems theory-based method, was applied to gain a holistic understanding of the residential camp system. Systems approaches have recently been applied in the outdoor education context (e.g., Carden, Goode, Read, & Salmon, 2017; Trotter, Salmon, Goode, & Lenne, 2017). Systems theory considers that outcomes (such as PWB) emerge from the complex and dynamic interaction of components (e.g. individuals, their decisions and actions, and the environment).

CWA is a multi-phase systems analysis framework that considers systems from an ecological psychology orientation. In this study, the first phase of CWA, Work Domain Analysis (WDA), was used to develop a model of the system of interest. The objective of WDA is to describe the purposes of a system and the constraints imposed on the activities within the system (Vicente, 1999). To achieve this, the abstraction hierarchy method is used to describe the system across five levels. The levels include: the functional purpose/s (the overall purposes of the school-based residential camp system and the external constraints imposed on its operation); values and priority measures (the criteria that camp providers can use to measure progress towards the functional purposes); generalised functions (the general functions of school-based residential camps that are necessary to achieve the functional purposes); physical functions (the functional capabilities and limitations of the physical objects within the school-based residential camp system); and physical objects (the physical objects used at school-based residential camps to undertake the generalised functions). Nodes at each of these five levels are linked using means-ends links, where nodes in the level below are the means that support the linked node above to be achieved. The result is a model which provides a detailed description of a system, identifying the physical objects and functions that enable the functional purpose to be achieved. WDA has previously been used in a range of domains to develop models of various systems, including to assess the efficacy or impact of a system.

Method

Following processes adopted in previous studies (Carden et al., 2019; Salmon, et al., 2016), initially, a preliminary WDA was developed by the research team, and was then validated at two SME workshops.

Participants

Participants were nine subject matter experts (SME) with an average of 13.56 years' ($SD = 11.24$) experience in outdoor education and an average of 1.96 ($SD = 1.70$) years employed within the particular outdoor education organisation. Participants held a range of roles within the organisation including Programme Coordinator ($n = 3$), Community Programme Manager ($n = 1$), Site Manager ($n = 2$), Risk Management Coordinator ($n = 1$), Head of Camps ($n = 1$) and Chief Executive ($n = 1$).

Materials

The CWA software tool (Jenkins, et al., 2007) was used to develop the WDA. Workshops were conducted in meeting rooms with a computer and projector allowing for an overview presentation on PWB and the Six-Factor Model to be presented to participants and the CWA software tool to be displayed during the workshop. Wide format printed copies of the initial WDA were provided to participants, as well as printed copies of the definitions of each dimension of PWB for participant reference. A demographic questionnaire was used to gather information about the participants.

Procedure

Approval to conduct the study was granted by the Institutional Human Research Ethics Committee.

The preliminary WDA was drafted by the research team. First, the six dimensions of PWB were placed into the model as value and priority measures. Next, documentation review was conducted using organisational documentation describing each camp, with relevant information used to populate the WDA. The remainder of the WDA was built based on the knowledge and expertise of two of the research team members (one team member had 24 years' experience in outdoor education, another had 10 years' experience, along with 15 years' experience applying CWA).

Next, validation workshops were held to gain additional SME input to ensure the accuracy and completeness of the WDA. SMEs attended one or both sessions. Eight participants attended an initial workshop (Workshop 1). Three participants attended a second workshop (Workshop 2). Two participants attended both. At each workshop, participants completed a demographic questionnaire and were given a short overview presentation. Then, participants reviewed the preliminary WDA model and provided feedback on the content, terminology and structure of the model. The input offered by SMEs was integrated into the model during the workshop using the CWA software.

Results

The validated WDA model is shown in Figure 1.

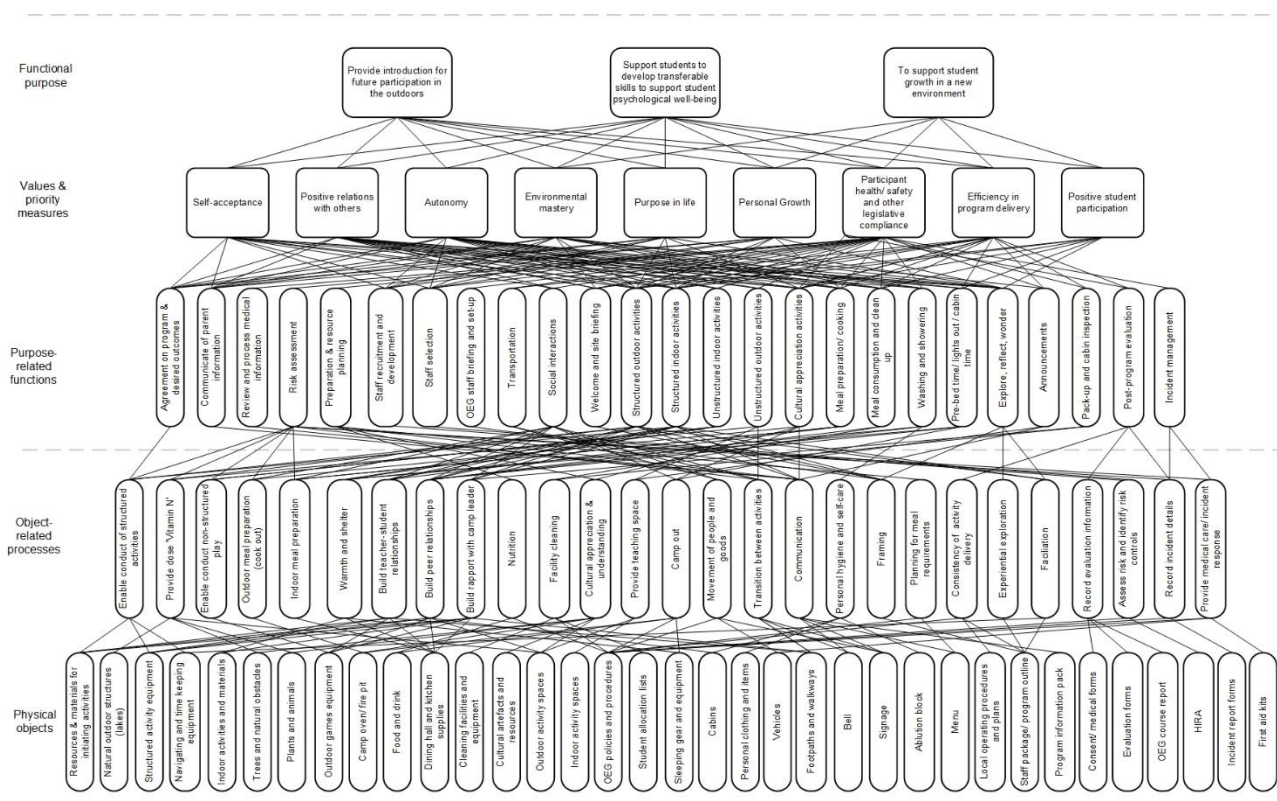


Figure 1: Validated WDA model

At the highest level, three functional purposes were identified, including *'to support student growth in a new environment'*. The second level includes nine values and priorities. Here, the six dimensions of PWB were included, as well as the additional nodes such as *'efficiency in programme delivery'* and *'positive student participation'*. The next level, purpose-related functions, includes the 25 functions and can be broadly grouped into programme design, planning and preparation, the

conduct of camp activities, sustenance and hygiene, and camp pack up and evaluation. At the object-related processes level, 27 nodes were identified, most of which supported the purpose-related functions that involved the students at camp. Finally, at the lowest level, 35 physical objects were identified including themes of activity equipment, natural objects, communication equipment, personal belongings and policies and procedures.

Discussion

The aim of this study was to describe the current residential camp system using CWA, to provide insight into how the current design of school-based residential camps support the six dimensions of PWB. The WDA provides a structured way to consider the whole residential camp system, and to what extent different functions, processes and objects support the six PWB dimensions. To the authors' knowledge, this study is the first to apply WDA to the residential camp context.

Visual inspection of the means-ends links in the WDA indicates that some PWB dimensions are well supported (e.g., positive relations with others), while others (e.g. purpose in life and personal growth) are less well supported. Further, the model is useful as it shows which functions support which PWB dimensions. For example, positive relations with others was found to be facilitated within all student-related functions at the camp. However, some functions such as unstructured indoor and unstructured outdoor activities were not found to support many dimensions of PWB.

These results represent potential avenues for strengthening the extent to which residential camps support PWB. For example, unstructured activity time could be used to facilitate purpose in life, personal growth and autonomy by providing students with a list of activities designed to make them reflect on purpose in life and personal growth at the beginning of camp and instructing them to complete each of the activities independently by the end of the camp. Future work is planned to use the model to identify how residential camps and outdoor education programmes generally can be designed to optimise the PWB of students.

References

- Carden, T., Goode, N., Read, G., & Salmon, P. (2017). Sociotechnical systems as a framework for regulatory system design and evaluation: Using Work Domain Analysis to examine a new regulatory system. *Applied Ergonomics*, 1-9.
- Garst, B., Browne, L., & Bialeschiki, M. (2011). Youth development and the camp experience. *New Directions for Youth Development*, (130), 73-87.
- Gray, T. (2019). Outdoor learning and psychological resilience: making today's students better prepared for tomorrow's world. *Curriculum Perspectives*, 39, 67-72.
- Jenkins, D., et al. (2007). The Development of a Cognitive Work Analysis Tool. In D. Harris, *Engineering Psychology and Cognitive Ergonomics* (pp. 504-511). Berlin: Springer.
- Ryff, C. (1989). Happiness Is Everything, or Is It? Explorations on the Meaning of Psychological Well-Being. *Journal of Personality and Social Psychology*, 57(6), 1069-1081.
- Salmon, P., et al. (2016). More than meets the eye: Using cognitive work analysis to identify design requirements for future rail level crossing systems. *Applied Ergonomics*, 53, 312-322.
- Trotter, M., Salmon, P., Goode, N., & Lenne, M. (2017). Distributed improvisation: a systems perspective of improvisation 'epics' by led outdoor activity leaders. *Ergonomics*, 61(2), 295-312.
- Vicente, K.J. (1999). *Cognitive Work Analysis*. Mahwah, NJ: Lawrence Erlbaum Associates.