Mental models and users’ behaviour towards constructed wetlands in a green building

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1. Introduction

According to the Green Building Council of South Africa (2014) buildings are considered to be one of the leading contributors to climate change; thus building green is believed to be an opportunity to efficiently utilise resources in addition to creating an environment that is believed to be healthier and more productive for people and communities. Typically, green building designers are required to incorporate certain features into the construction of green buildings. Some of these features include vigilant site selection that assures a minimal impact on the surrounding environment, energy conservation, water conservation and recycling (www.epa.gov). All these mentioned features are tasked to contribute towards sustainable and eco-friendly buildings. However, these features are potentially meaningless if the individuals occupying the building lack a clear understanding of these features and do not behave in environmentally sustainable ways. Various studies have been carried out in the past examining how an individual’s mental model may influence their beliefs and actions in a variety of contexts (Kieras & Bovairs, 1984; Gentners 2002, Johnson-Laird, 2010). This research looks at occupants’ mental models of the constructed wetland built in a green building to recycle waste water and their behaviours in relation to this constructed wetland system. Comparisons are also made between the occupants’ mental models and the mental models of the designers of the constructed wetland system.

2. Methods

The participants selected for this study were the six employees (mostly engineers, but also one cleaner) who worked in the Vodafone Site Solution Innovation Centre (VSSIC); the green building under consideration. In addition to the six employees of the VSSIC, two expert individuals that were involved in the design, development and construction of the constructed wetland were included in the sample. This study explored the use of observations, interviews and drawings in order to access the occupants’ mental models of the functioning of the constructed wetland system. The mental models of the VSSIC occupants were compared to the mental models of the two experts in order to identify significant differences and similarities among the two sets of participants. The study also investigated how the VSSIC occupants’ behaviours towards the constructed wetland system linked to their mental models.

3. Results

The participants’ mental model diagrams of how they believed the constructed wetland system functions, in addition to the observations and the interview transcripts, formed the primary data. Through the analysis of their mental models diagrams similarities and differences were identified in expert and novice mental models. Four of the six participants produced mental models that differed significantly from the actual functioning of the system; and only two employees displayed mental models that were close (but not identical) to that of the experts. An example of two VSSIC occupants’ inaccurate mental models included the belief that sunlight played a great role in heating the rocks in the systems reed bed in order to allow for the water filtering process to begin. Another participant believed that the maintenance workers added chemicals to the constructed wetland system and manually filtered the water.
4. Discussion

The findings reflected a diverse range of understandings of how the constructed wetland system actually works. Current literature postulates various interpretations regarding the accuracy and completeness of mental models (Zhang, 2008). Besnard et al., (2004) asserted that based on the analysis conducted in their study that “flawed mental models can be disastrous when the operators are interacting with the dynamic critical system” (pg119). In this study the “flawed” mental models did not lead to behaviour that was so inappropriate that the constructed wetland system tended towards failure.

References


