

**Issues in Preschool Concept Mapping: An Interaction  
Design Perspective**

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## **Abstract**

This thesis reports on a research project that applied the existing knowledge of concept mapping as theorised by Joseph D. Novak in the area of early childhood education. It reports on the investigation of educational issues from a design perspective.

Concept maps are knowledge representation tools that promote meaningful learning. Novak claimed that young children could quickly learn to make concept maps. He theorised that the human skills for concept mapping are developed by 3 years of age. However, current scholarship that reports on various models of concept maps, by young children, all lack the crucial element of Novak's concept map template, linking phrases. In this doctoral project, I developed a designed prototype that allowed preliterate children to add the crucial element. This thesis contributes to the areas of early childhood education, concept mapping, and interaction design.

The intent of the designed tool was to allow preliterate children to represent the elements of concept maps with mastered communication skills (e.g. spoken and iconic languages). With this tool, I sought to contribute to current understandings of the issues in preschool concept mapping and the types of suitable child-friendly alternatives to Novak's template.

Drawing from several disciplines I argue that making knowledge explicit with a concept map requires representational and cognitive skills that young children have not yet mastered. These skills are concept labelling with written language and concept organisation with hierarchy. The poor performance of these skills with mapping tools currently used in preschool has been used to underpin arguments that young children cannot build Novak's concept maps.

To investigate these issues in the classroom a Bridging Design Prototype (BDP) was developed with structuring features that: 1) promoted children to label concepts with verbal and/or symbolic language, and 2) scaffolded children's control over the cognitive skills needed for organising such concepts. The BDP method is original to this research and grounded in user-centred design and learning principles.

Case studies were performed in two preschools where twenty-one 4.6- to 6-year olds alone, with peers, and/or teachers, used the BDP to represent concepts and propositions with verbally-labelled symbols. In turn, these symbols were mapped in the following ways: 1) organised in a sequential pattern with arrows, clusters and/or hierarchically, and 2) edited, revisited and shared. Teacher instruction was found to be effective when it promoted student autonomy, and ineffective when student participation was heavily mediated.

An outcome of this applied research was that some preschool children were able to generate mapping structures that incorporated linking phrases. This result suggests that young children's ability to communicate concepts with maps is limited by their literacy skills rather than their stage of development. The results presented in this thesis suggest that the conflation of available tools and the cognitive ability of young children are not tenable.

Child autonomy during the mapping activities promoted active inquiry, meaning negotiation, and transformed teachers into partners, which are concept mapping-related interactions rarely reported in preschool. Finally, the active participation of children at different developmental stages (preliterates, emergent writers and special needs children) is further evidence of the inclusive and scaffolding features of this tool.

The research outcomes show that some preschool children can represent and manipulate the constitutive elements of a concept map with suitably designed authoring tools. While modest, these outcomes are promising, considering interactions with the BDP were limited to one session of less than 50 minutes.