Concept mapping as a tool to visualize and enhance the knowledge structure of the master's dissertation: an empirical exploration in the field of communication sciences

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Introduction

At the department of communication sciences at a Belgian research-intensive university, a number of efforts have been undertaken in recent years to enhance the quality of master's dissertations, such as introducing more structured and collective academic supervision moments, increasing the number of (compulsory) methodological modules in course programmes and explicating the grading criteria of the master's dissertation through detailed rubics. However, it is felt that more significant gains can still be made, particularly in terms the overall structure of master's dissertations, whereas the more lower-order skills of students, such as the mastery of concrete techniques (e.g. applying statistical techniques) were thought to be less problematic. In this manner, a mismatch between students and academics may be located at the level of the dissertation's macro-structure, reflecting the perennial difficulty of teaching students to develop structure in academic writing (Wingate, 2012). As communication sciences at this university forms an 'academic region' (Bernstein, 2000), appropriating (competing) discourses, both from the humanities (e.g. applied ethics) and from other social sciences (e.g. evolutionary psychology), master's dissertations written in this department tend to be highly diversified in terms of methodology, theoretical frameworks and the types of data which are collected.

Concept mapping as a diagnostic and pedagogic tool

To explore the possibility of redressing this mismatch between the expectations of students and those of academics within the context of an epistemologically diverse department, the technique of concept mapping was introduced. Concept mapping enables students to visualize their knowledge structures in an open an dynamic way. Requiring students to stipulate the conceptual linkage between concepts allows the detection of learning stages and post-intervention outcomes. As a tool, it allows teachers to discuss and enhance learners' knowledge structures through a pedagogic dialogue (Hay, 2007; Hay, Kinchin & Lygo-Baker, 2008). More specifically, the general structure of students' concept maps is also thought to be a reflection of students' actual knowledge. In this light, the empirical typology developed by Kinchin offers a particularly pertinent coding scheme, consisting of three structures: *spokes*, *chains* and *networks*. Where a concept map takes the form of spokes (all

ideas directly and exclusively connected to one key idea, but with very little or no other interconnections), this suggests a flat knowledge structure, or, in other words, a novice stage of learning. Concept maps in the form of chains suggest a more integrated awareness, albeit without the linkage between the different hierarchical levels of the map. Finally, concept maps which take the form of a net -with multiple links between the different concepts at different levels of the map- are deemed to indicate an expert awareness of the subject or problem which has been visualized. (Hay, Wells & Kinchin, 2008; Kandiko & Kinchin 2012; Kinchin, Lygo-Baker & Hay, 2008).

Data collection, preliminary analysis and further research

From March to May 2014, a total of 37 students in the final year of their undergraduate degree in communication sciences were asked to draw the knowledge structure of the master's dissertation for which they had started to make preparations.[1] For this, Novak's instructions (2010) on how to build a concept map were followed. To explore the differences between individual students and differences between the different sub-fields of communication sciences, identical instructions were given to all students during the different data-collection sessions.

A preliminary analysis of the structure of the maps which were collected shows that almost all students were able to explicate their vision on the knowledge structure of the master's dissertation which they intended to write. The number of concepts meaningfully employed in the maps varied from 11 to 22, with an average of 15, whereas the number of meaningful linking statements varied from 7 to 25, with an average of 16. The number of concepts and the number of links in each map was explored in relation to the grades given to the project at the end of the third year. However, no correlation was found. This does confirm the technical issues implicated with the use of concepts maps and the limits of their suitability as a diagnostic or assessment tool (Conradty & Bogner, 2012).

Most maps were identified as displaying a 'chain' structure, with one or two parallel hierarchies of connected concepts (from grand paradigms at the top of the chain to empirical operationalisations at the bottom). In spite of the fact that the students were explicitly asked to think about crosslinks between different levels of the map, very few crosslinks could be identified between the most abstract concept and the lower-order concepts. In the whole sample, only one map was eventually

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1 In Belgian higher education, the vast majority of students undertake studies at master's level, immediately after having obtained a bachelor's degree at the same department. Thus in spite of the Bologna reforms, a bachelor's degree is still principally seen as a step towards a master's degree. For this reason, some bachelor's programmes contain an extensive research project in their third year which effectively counts a preparation or pilot study for the actual master's dissertation the following year.

classified as a net. This strongly suggests that third-year students still endorse a linear and product-oriented vision on knowledge in relation to their master's dissertation, a view which, in some cases, may even persist in stages of the process of doctoral study (Kandiko & Kinchin 2012). Finally, in terms of the number of concepts and the structural characteristics of the maps, the contrasts between the different research traditions within the field of communication sciences did not emerge in the maps. This suggests that students' linear thinking about the knowledge structure of their dissertation is not directly implicated with the specificity of their epistemological backgrounds.

These findings certainly suggest that further research is needed on the links between concept maps and other indicators. It also suggests that concept maps may be primarily useful as a pedagogic tool in a dialogical context of supervision to stimulate student growth, rather than as a stand-alone diagnostic tool. For this reason, the same cohort of students will be followed up when fully enrolled for their actual master's dissertation and the individual maps will be integrated in supervision activities.

References

Bernstein, B. (2000). *Pedagogy, Symbolic Control and Identity: Theory, Research and Critique* (rev edn). Lanham (USA): Lanham, Rowman & Littlefield.

Conradty, C., & Bogner, F. X. (2012). Knowledge presented in concept maps: Correlations with conventional cognitive knowledge tests. *Educational Studies, 38*(3), 341-354.

Hay, D. (2007). Using concept maps to measure deep, surface and non-learning outcomes. *Studies in Higher Education, 32*(1), 39-58.

Hay, D. B., Kinchin, I. M. & Lygo-Baker, S. (2008). Making learning visible: The role of concept mapping in higher education. *Studies in Higher Education, 33*(3), 295-311.

Hay, D. B., Wells, H. & Kinchin, I. M. (2008) Quantitative and qualitative measures of student learning at university level. *Higher Education, 56*(2), 221-239.

Kandiko, C. B., & Kinchin, I. M. (2012). What is a doctorate? A concept-mapped analysis of process versus product in the supervision of lab-based PhDs. *Educational Research, 54*(1), 3–16.

Kinchin, I. M., Lygo-Baker, S. & Hay, D. B. (2008). Universities as centres of non-learning. *Studies in Higher Education, 33*(1), 89-103.

Novak, J. D. (2010). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations.* Routledge.

Wingate, U. (2012). 'Argument!' helping students understand what essay writing is about. *Journal of English for Academic Purposes, 11*(2), 145-154.