

USING STUDENT AND FACULTY GENERATED CONCEPT MAPS AS A BASIS FOR COURSE DEVELOPMENT

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Abstract. The goal of this ongoing project was twofold: to involve students in the construction of concept maps, and to explore the utility of student and faculty constructed concept maps as a tool for course development in a new semester in which a book change had been implemented. Students were required to construct concept maps for each chapter in a culture and psychology text during the first semester (Fall 2006). For the second term (June 2006), the instructor utilized the concept maps constructed by the students as a basis for course development. During this period, the instructor also implemented a book change, so a complete matching of course content is unlikely, but potentially the concept map development may provide a structure that can be modified or adapted to meet the needs of the new course. Limits of the project include the specific books chosen.

1 Introduction

Concept maps have been applied in a variety of educational and multimedia formats. In education, concept maps have been used as a way to represent knowledge of a learner or instructor, and as a method of assessing learner progress and understanding (Ruiz-Primo, Schultz & Shavelson, 1997; Novak, 1998; Novak & Gowin, 1984, Pearsall, Skipper, & Mintzes, 1997). Concept maps have also been used as a way to visually represent course structure and content (e.g., Clark & James, 2004), and to develop and organize program objectives and outcomes (McDaniel, Roth, & Miller, 2005).

The current paper reports on a work in progress, which involves utilizing concept maps constructed by students and faculty in a college level course during Autumn 2005 as the basis of course development for future instances of the course (currently being developed for June 2006 and Autumn 2006). Students taking the course during the different terms will not be the same. In addition, a textbook change was made during the implementations of the class. Shireav and Levy (2004) was used during the Fall semester of 2005, and Matsumoto and Juang was used in June 2006, and will be used in Fall 2006. Textbook changes are often problematic for instructors, who need to evaluate the extent to which previous course content applies, and to evaluate the strengths and weaknesses associated with texts. Concept maps provided a means of addressing concept and topic similarity across the different implementations of the class that goes beyond looking at the table of contents of the books.

2 Concept Map Construction in Initial Course

Concept maps were implemented in an upper college level class on culture and psychology. The class was taken by psychology majors and by other students to meet a general studies requirement. Twenty students completed the class at the main site, and an additional three students completed the class at a remote campus. This textbook selected for the initial class (Shireav and Levy, 2004) was a relatively small book focused on cross-cultural psychology. The instructor's overview of the text suggested that students would be required to have an understanding of the ideas and concepts covered in a general psychology class, and to be able to extend these concepts across cultures. Concept maps served as a way for students to explicitly think about these connections, and as a way for the instructor to monitor student understanding of the text.

Students had no previous experience with concept mapping before beginning the course, although a few had used mind maps or spider maps. They construct concept maps for each textbook chapter. Concept map training included sample maps, group mapping sessions and explanation of linking terms. Students were not required to use software for map construction and most turned in paper copies of the maps. However, six students successfully downloaded the CmapTools software (Cañas et al, 2004), and used it for their maps, typically emailing their maps to the instructor. These students were primarily the students who were taking the class at a remote site approximately two hours away, although a few students at the main campus site also successfully used IHMC CmapTools software. Students also had the option of using an alternative software package (Inspiration), which was available in one of the computer labs on campus.

Students created their concept maps using a list of concepts from the textbook, but were allowed to use other concepts and structural information from the text as well. Some chapters required more than one concept map for complete coverage of the topics. Feedback for maps was minimal. After the initial set of concept maps had been reviewed by the instructor, a class session on general map construction and common errors was held, and students spent class time building group maps. Some students appeared to take the mapping process more seriously than others. One student initially complained about the concept mapping process, but eventually indicated that she felt like she understood the topics more fully after she had mapped them. Faculty maps for chapters were not typically shared with students, but for two particularly complex chapters, faculty maps were shared via a classroom projector, or through an online course management system. When faculty maps were shared, student maps were generally very similar, and were not graded for these chapters.

Concept map construction by students may have been more effective if the procedure suggested by Novak and Cañas (2004) had been used. Novak and Cañas suggested that students use expert skeleton maps as a basis for their own map building. However, the current unavailability of expert concept maps in many areas is problematic. The instructor could create such maps before each topic, but in some cases the instructor will not be an expert in each specific domain or sub-area of a complex field.

For the purpose of comparing concept maps across terms, student-created paper and pencil maps were not very useful due to the time frame involved, and the relative incompleteness of many student maps. An example of a student map for the introductory chapter of Shireav and Levy is shown in Figure 1. This is a relatively poor student map, as most students built on the instructor’s sample map for the initial chapter.

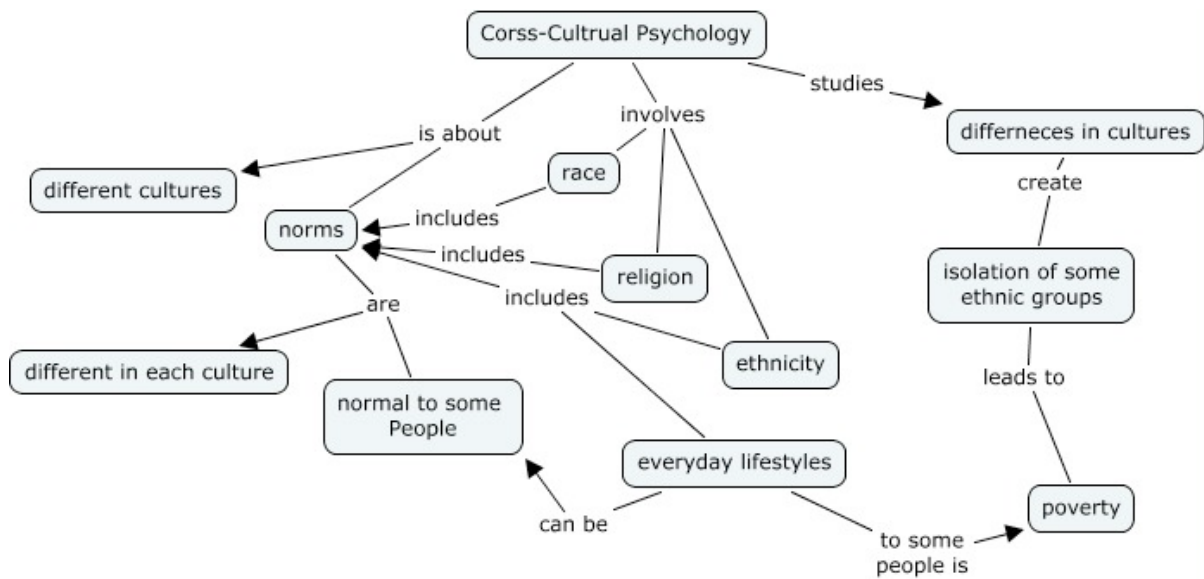


Figure 1. Example of unedited student map from Chapter 1 of Shireav and Levy.

3 Mapping between First and Second Courses

The books used during the different terms were not identical in terms of chapter and content organization. Shireav and Levy (2004) consisted of 394 pages, divided into 12 chapters. Matsumoto and Juang (2004) consisted of 550 pages, divided into 16 chapters. A complete analysis of correspondence between the two books is beyond the scope of this paper. Individual chapters on introductory materials and selected focus topics will be considered in depth. The analysis of the match will be done through the following: comparison of student-generated and faculty-generated concept maps of Shireav and Levy with initial drafts of faculty maps of Matsumoto and Juang chapters. In most cases, faculty maps will be used due to the relative incompleteness and unavailability of electronic versions of student maps. Although the switch to the new text was made for the June 2006 implementation of the course, students did not construct concept maps due to the accelerated nature of the course.

Several chapters were chosen for comparison based on approximate overlap in content coverage. The overlap in chapter coverage was evaluated in terms of review of table of contents, and the key terms included in each chapters. From this analysis, a comparison was made of a selection of concept maps for the initial chapters and the chapters that have the closest alignment in key terms. The concept maps that will be included in this paper are from the introductory chapter, and for chapters on cross cultural research, development and abnormal behavior.

Several issues developed in the comparison of concept maps for different texts. Content coverage for a chapter may require more than one concept map. In addition, the individual topics may be covered in different chapters in the different texts. The “Compare to Cmap” feature allows comparison of pairs of concept maps, but a comparison to a set of maps is more problematic, and likely needs to occur at the level of propositions. This process could be completed by converting all concept maps to propositions, combining propositions for concept maps covering a single chapter, and comparing proposition lists. This process might be appropriate when considering overall coverage of the texts as well.

In each book, the introductory chapter addressed basic issues and definitions. The two texts took a different approach in this chapter. Shireav and Levy (2004) distinguished between cross-cultural psychology, cultural psychology and multicultural psychology. They then defined culture, and distinguished it from a number of other terms that are often used interchangeably with culture (e.g., ethnicity, race, and nation). They then described some areas in which cultural differences have been examined. Matsumoto and Juang (2004) utilized less terms and definitions in their chapter. They examine psychology as a field which has unique contributions to make to the study of culture. They also address culture and related terms, but spend more time considering the practical implications of culture. The comparison of concept maps for the two chapters was done using the “Compare to Cmap” tool in Version 4.03 of CmapTools. For the Shireav and Levy, the chapter was addressed in an instructor concept map, and in several student maps. When the instructor maps for the two introductory chapters were compared using the “Compare to Cmap” in CmapTools Version 4.03 of Cmaptools, a single map for Shireav and Levy was compared to one of two maps developed for Matsumoto and Juang, a map that focused on definitions of culture. The other map was consider to have less connection between chapters as it was devoted to the goals of psychology, and how psychology might be important to the study of culture. The “Compare to Cmap” tool showed minimal overlap between the concept maps from the different texts, in terms of concepts and propositions, indicating a different emphasis in the two textbooks for this chapter. Less than 20 percent of the concepts matched (based on partial text matching).

Similarly, the chapters on research methods in cross-cultural psychology did not indicate much overlap. Shireav and Levy (2004) presented an overview of research methodology, general goals of research, measurement scales and statistics. They also considered problems with equivalence across cultures, and the need to know more. Shireav and Levy include a list and description of dimensions on which cultures are expected to differ. They also include a separate chapter on critical thinking in cross-cultural psychology, which includes information about heuristics and biases that may influence interpretation of results. Matsumoto and Juang (2004) described several types of cross-cultural research studies, and described a number of theoretical, data analysis and interpretation issues important in cross-cultural studies. They describe similar terms in the dimensions on which cultures may differ (individualism-collectivism, power distance, etc), but these are not the main focus of the text (many of these topics were dicussed in the introductory chapter in Shireav and Levy). Matsumoto and Juang provided a guide for students to use in evaluating cross-cultural research. Comparison of the concept maps again indicated very little overlap between chapters. The Matsumato and Juang chapter contained information relevant specifically to cross cultural research, and the Shireav and Levy chapter contained information such as statistical methods, and general research methods.

In the chapters on development, both texts describe the primary concepts of temperament and attachment. Both texts also address Piaget’s theory of cognitive development, and Kohlberg’s model of moral development, as well as the general stages of development. Both texts address these theories in terms of their cultural relevance, indicating the potential for greater overlap in the concept maps for these chapters. The overall concept maps for these chapters had very low amounts of overlap, but within the specific areas related to the major theories, and to topics such as attachment and temperament, there was more overlap across maps, indicating that comparing maps at similar levels of focus may be ideal.

Similarly, Matsumoto and Juang (2004) break down Psychological Disorders and Treatment into two separate chapters, while Shireav and Levy (2004) cover similar material in a single chapter. Both books address definitions of abnormal behavior, and the existence of culture-bound syndromes. Both books address the relative incidence of

disorders such as schizophrenia and depression in different cultures. Matsumoto and Juang address specific ethnic groups and mental health concerns. They also address issues of mental health for refugees. Both texts address diagnostic issues, and potential biases. Matsumoto and Juang include a separate chapter on treatment, which addresses multicultural approaches to treatment to a greater degree than Shireav and Levy. In terms of the concept maps, the Compare to Cmap tool did not find very good matching across the maps. In some cases, the difficulty was due to wording changes or synonyms. However, differences in map focus are also important.

Of the four topics considered in this paper, none showed an extremely good match across textbooks. The maps created from the Matsumoto and Juang text were more specific to the topics of cross-cultural psychology for the research methods chapter, and focused on different sets of definitions in the initial introductory chapter. In the chapters on development and abnormal behavior, there was better matching at the lower levels than at the overall maps, indicating a need to compare maps with very similar focus questions or topics. Concept maps provided a way for the instructor to externalize the process of relating content between the two texts. The Compare to Cmap tool was useful in demonstrating the relative lack of relationship across the concept maps, again indicating the need to consider map topic and focus in the comparison process.

4 Summary

This article reports on a project in progress, in which the researcher is exploring the use of concept maps to assess the overlap between two textbooks selected for different implementations of a college-level course. Although students constructed concept maps in the first of these implementations, they rarely created electronic versions of their maps. During the second implementation of the class (taught in June 2006), instructor-created concept maps for the two textbooks are being compared at the level of the chapter, using the Compare to Cmap tool in Version 4.03 of CmapTools. Differences in chapter and topics emphasis are one limitation, and further analysis may examine the concept maps on a propositional level once all maps are completed. Concept maps may be useful in identifying relative strengths and weaknesses of textbooks, and in finding key domain components. Some maps are available at IHMC Public Cmaps, cmap papers 2006, course development maps.

5 References

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