

## PROFESSIONAL DEVELOPMENT FOR KINDERGARTEN TEACHERS: CONCEPT MAPPING

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**Abstract.** The purpose of this paper is to describe the professional learning of kindergarten teachers as they acquire the necessary knowledge and skills to use concept mapping for both instructional planning and as an instructional strategy to promote children's conceptual development. A research center located in the southeast of the United States of America is currently conducting a series of professional development sessions with kindergarten teachers from one large, urban city focused upon helping young children build core knowledge essential to school success. Concept mapping has been introduced in these training sessions, with a survey and questionnaire administered at the conclusion of the fifth meeting. The results of this study will be used to plan the final training session for the participants this school year, as well as to plan the incorporation of concept mapping into professional development in the upcoming year

### 1 Background

An American research center located in a southeastern state has the mission of strengthening the quality of education in the state by planning and developing collaborative programs and activities among universities, community colleges, and public schools. One project working towards this mission places a team from the research center in partnership with a large, urban school district in an effort to develop a seamless continuum of transitions beginning with prekindergarten and moving through 3rd grade. The research team is composed of five professionals who contribute expertise in various areas of research: educational leadership, early childhood education, and research methodology. Three team members have extensive experience conducting practice-focused research with teachers in classroom contexts. This research team knows that many children enter school educationally disadvantaged, especially when compared to their more affluent peers (West, Denton, & Germino-Hausken, 2000). Access to knowledge building experiences, where books and instructional materials of high-quality are readily available, differs greatly among neighborhoods of varying income levels (Neuman & Celano, 2001). This differential access is an issue because it impacts children's background knowledge, which greatly impacts their school success (Duke, 2000). "Impoverished early environments are powerful predictors of adult failure on a number of social and economic dimensions. Impoverishment is not so much about the lack of money as it is about the lack of cognitive and non-cognitive stimulation given to young children" (Heckman, 2006, p. 3). In an effort to provide all district kindergarten children with cognitive stimulation, the research team implemented a series of professional development sessions designed to provide kindergarten teachers with the knowledge and skills needed to use concept mapping as both a planning and an instructional tool.

Concept maps are graphical representations of knowledge that help children visualize and understand the relationships among hierarchical concepts (Novak and Cañas, 2008). Linking words on these maps show the relationship between two concepts, and these can be read as complete thoughts. Having teachers use concept maps as a planning tool helps them see the large picture of connections and relationships among the concepts and skills they are planning to teach, thereby helping them make these associations more explicit during instruction. Using concept mapping as an instructional tool provides children with a visual representation of the information they are learning. Dual coding theory recommends using non-linguistic instructional tools such as graphic organizers and concept maps to assure that knowledge is stored in children's memories in multiple ways (Sadoski & Paivio, 2001). The purpose of this paper is to describe the professional development of teachers as they learned how to use concept mapping as a tool to organize their own knowledge to plan instruction for children, as well as a tool to help children visualize and make connections

among the concepts they are learning.

## 2 Professional Development for Kindergarten Teachers Using Concept Mapping

A series of professional development sessions was provided for the kindergarten teachers in spring 2010. Each session ranged from 1 to 1 ½ hours. In February and April, a full day of training was provided with three consecutive sessions given each day. Two training sessions were provided in the month of February, giving the teachers a total of nine professional development sessions they could attend January through April of 2010 (Table 1). Attendance ranged from 35 to 87 people per session.

As the research team planned the series of training sessions the same question kept arising: How can professional development best be designed and delivered to maximize kindergarten teachers' use of concept mapping? The team knew that to be successful, the information presented to the teachers must focus on the content that they are supposed to teach, must be linked to daily classroom practice, and must be sustained over time to affect student learning (Gusky, 2000). With this in mind, the research team planned the training sessions at least once per month to provide the opportunity to work with teachers over time. Each session focused upon the current theme from the teachers' science and reading series to assure that the participants found the content relevant. The research team extended ongoing support to teachers by providing contact information to answer questions between training sessions.

## 3 Professional Development Strategies

The monthly professional development sessions provided to the kindergarten teachers incorporated several different strategies for teaching about concept mapping. According to Novak and Gowin (1984), learning should be considered an active process that involves acquiring, creating, and using knowledge. Therefore, each session for the kindergarten teachers incorporated a variety of professional development strategies to assist the teachers in acquiring the knowledge and skills needed to create and use concept maps in their own classrooms. Table 1 shows the date of each training session, along with the professional development strategies used at each session.

Professional Development Strategies	Dates of Professional Development Sessions								
	1-27	2-16		2-24	3-31	4-27			
Provide Computer-generated Concept Map	✓	✓	✓	✓	✓	✓	✓	✓	✓
Provide Pictures to Make a Concept Map	✓		✓	✓	✓	✓	✓		✓
Present Slide Show on Concept Mapping				✓					✓
Display Concept Map Using Pictures			✓	✓	✓	✓	✓		✓
Show Video Clips of a Class Making a Concept Map		✓							
Engage Participants in Creating a Concept Map			✓	✓					✓

Table 1. Kindergarten Professional Development Strategies by Session

### 3.1 Provide Computer-generated Concept Map

Individuals learn in many different ways, some through visual stimulation and others through auditory learning (Silver, Strong, & Perini, 2000). With differing learning styles in mind, the research team introduced concept mapping to the teachers at the first session by presenting and explaining several computer-generated concept maps. One computer-generated map presented to the participants at this initial training session (Figure 1) was a planning tool for their current science theme. Providing teachers with computer-generated concept maps was the only professional development strategy that was used during each of the nine training sessions.

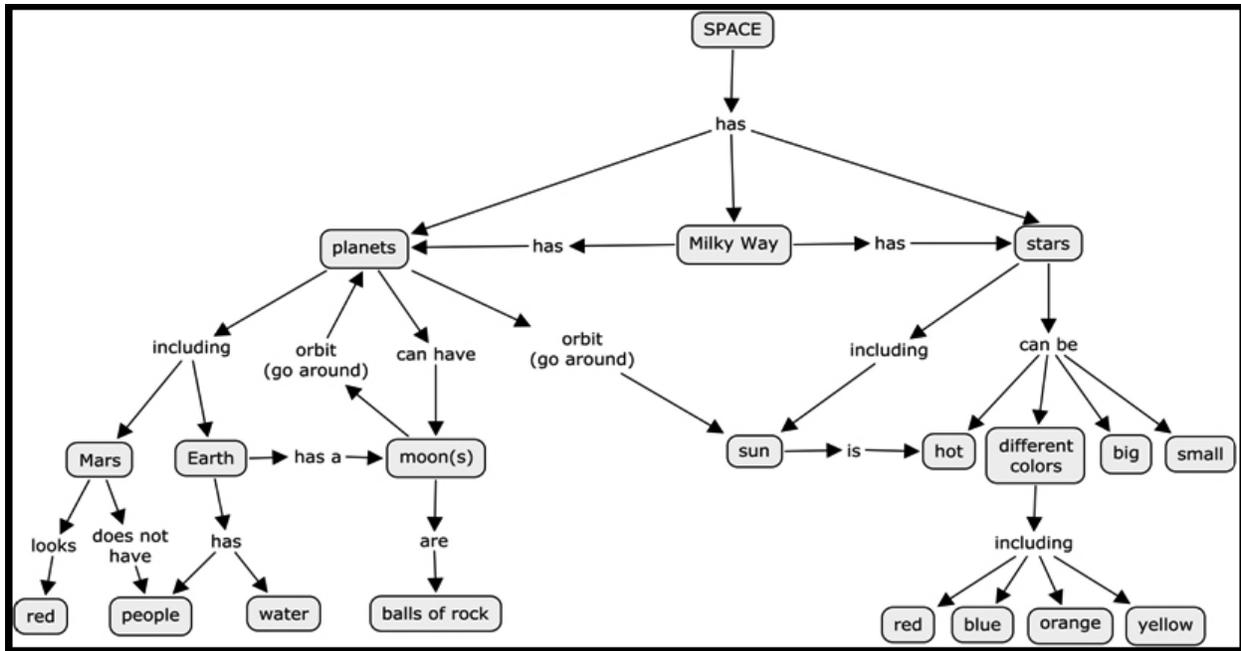


Figure 1. Computer-generated concept map provided January 27, 2010

### 3.2 Provide Pictures to Make a Concept Map

The second most frequently used professional development strategy was providing the participants with color pictures to use in making concept maps with their students. As many of the students in kindergarten are non-readers, they are better able to understand and learn from the classroom concept maps if they contain pictures as visual tools (Cassatta-Widera, 2008). Pictures matching one of the current instructional themes (Figure 2) were provided as handouts in seven of the nine sessions to encourage the creation of concept maps with children.

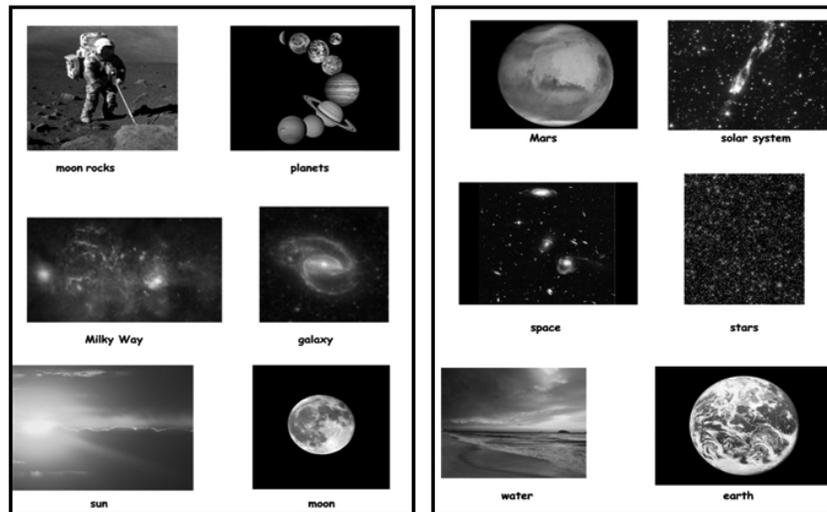


Figure 2. Pictures to make a concept map provided January 27, 2010

### 3.3 Present Slide Show on Concept Mapping

To prepare themselves to provide participants with a solid understanding of concept mapping, the research team met with Dr. Nancy Romance, a professor at Florida Atlantic University in Boca Raton, Florida, to develop their own understandings of concept mapping. After this meeting, the team designed a slide show presentation for the kindergarten teachers' second day of training. This presentation contained information explaining what a concept map is and how concept mapping can be used by teachers as a tool for planning, instruction, and assessment. A sample slide from this presentation is shown in Figure 3. The strategy of presenting a slide show presentation on concept mapping was used on the second day of training in February, and was used a second time at the full training day in April to review what the teachers had been learning about concept mapping. Figure 4 shows a sample slide from this review on April 27, 2010, with sample responses from teachers included.

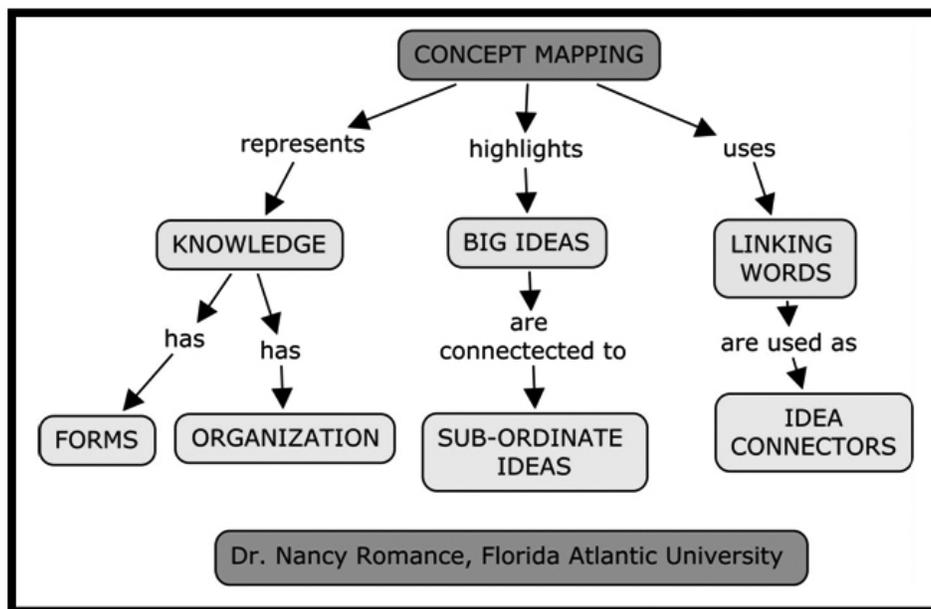


Figure 3. Concept map of concept mapping provided February 16, 2010

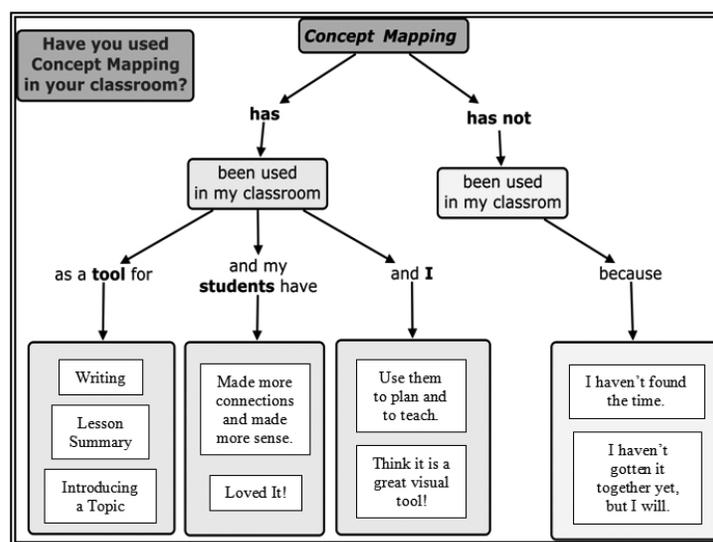


Figure 4. Concept map reflection activity from April 27, 2010

### 3.4 Display Concept Map Using Pictures

Starting on the second day of training, displaying a concept map using pictures became a strategy that the research team implemented at each professional development session. On the first day of training the team noticed the teachers' preoccupation with the software needed to create computer-generated maps. Even though pictures were provided to the teachers at the January meeting, along with an explanation of how to use these pictures to create a map with the students on chart paper, the research team decided that having a visual model would be beneficial to the teachers. Figure 5 shows a concept map using pictures that was displayed at the training on March 31, 2010.

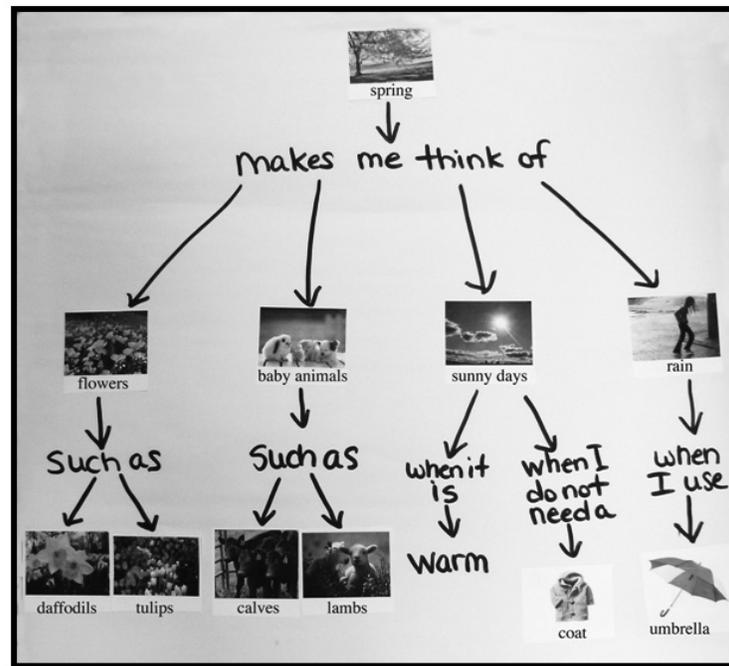


Figure 5. Concept map using pictures displayed March 31, 2010

### 3.5 Show Video Clips of a Class Making a Concept Map

To allow participants to observe a teacher creating a concept map with a class of pre-readers, a lesson was video-taped and edited into clips. The first clip focused on the teacher asking the class the focus question, “What do you know about birthdays?” The second clip showed the teacher adding new concepts that the children named to the map using pictures that she had printed before the lesson. If a child named a concept that the teacher did not have the picture to match, the teacher wrote the idea on a sticky to print a picture later. There were a total of six video clips shown. The final clip showed the teacher reviewing the entire map with the children. She then ended her lesson with an explanation of the purpose of creating a concept map to the children as helping them organize and remember everything they were learning. During the all day training on February 16, 2010, the kindergarten teachers watched each of these clips, engaging in discussion questions between each clip. This professional development strategy was only used during the one training session in February, with 87 participants in attendance.

### 3.6 Engage Participants in Creating a Concept Map

Based upon the meeting with Dr. Romance from Florida Atlantic University, the research team decided that one useful strategy for learning about concept mapping is to work in small groups to create maps. The team engaged the teachers in creating their own maps on the second day of training. Providing time for the teachers to work together to use their newly learned knowledge about concept mapping to create their own maps did appear to be useful to the teachers. Un-

fortunately, this strategy took a great deal of time. Due to time constraints, this strategy was only implemented during each of the two all day training sessions.

## 4 Assessment

Most professional development sessions begin and end with an evaluation of individuals' reactions to the workshop. This typically provides very little useful information for planning future professional development (Guskey, 2000). During the final session of the fifth professional development training day on April 27, 2010, teachers were asked to fill out a survey and a questionnaire. Of the 81 participants present this day, 39 consented to participate in this study. Information was gathered from these participants with the goal of answering the following research question: How can professional development best be designed and delivered to maximize kindergarten teachers' use of concept mapping?

### 4.1 *Teacher Survey*

A 10 item survey was used to gather information about the participants and the effectiveness of different training strategies in relation to teachers' use of concept mapping. Participants included 36 females and 3 males. The participants had an average of 11 years teaching at the kindergarten level, with years of experience ranging from 2 to 41. Along with demographic information, the survey provided information on how often and in what ways teachers were using concept mapping in their classrooms. Of the 39 participants, 11 had never used concept mapping, 10 used it once a month, 15 used it twice a month, and 3 used it weekly. More participants use concept mapping for instructional purposes, 28, than for planning purposes, 22.

Aside from learning how and how often teachers were using concept mapping, the research team asked questions to identify the professional development strategies that were most useful in helping participants understand and use concept mapping in their classrooms. Teachers reported the following professional development strategies as most useful in helping them understand concept mapping: Seeing examples (14 responses), making concept maps during training (6), watching video clips of a concept mapping lesson (3), and the slide show presentations on concept mapping (2). Teachers each listed the training activity that most encouraged the use of concept mapping in the classroom: Receiving color pictures (12 responses), seeing examples (7), creating maps at training (3), and watching video clips (2). Several individual responses included benefits to children such as increased vocabulary, enhanced concept development, and that they serve as visual tools for writing. One survey question asked participants to rank training activities from the different professional development sessions from highest to lowest based upon their usefulness in helping a teacher use concept mapping in the classroom. All six of the professional development strategies described in section 3 of this paper were ranked as the highest and the lowest by at least two teachers. Participants ranked watching video clips of a teacher using concept mapping (13 responses), receiving printed pictures to match concepts in a book (12), and seeing examples of concept maps that are created with pictures (10) to be the three most useful strategies for encouraging the use of concept mapping in their classrooms. The Least effective strategy reported was experiencing a PowerPoint presentation on the topic of concept mapping (22), despite the fact that two participants listed that as the most helpful professional development strategy.

### 4.2 *Stages of Concern*

When adults are faced with change, they display many different reactions. The Stages of Concern Questionnaire was given to the participants to assess their concerns about the use of the innovation of concept mapping in their classrooms (George, Hall, & Stiegelbauer, 2006). Stage 0 demonstrates awareness concerns, and there is typically little involvement with the innovation at this stage. Stage 1 demonstrates information concerns where the individual needs specific details about the innovation. Stage 2 demonstrates personal concerns on how the innovation will affect the individual and his/her job. Stage 3 demonstrates management concerns typically dealing with the organization of time and materials needed to implement the innovation. Stage 4 demonstrates consequence concerns showing worry over the impact of the innovation on the students. Stage 5 demonstrates collaboration concerns where individuals want to work with others to implement the innovation. Stage 6 demonstrates refocusing concerns where individuals modify

innovation implementation for overall improvement (Hall, George, & Rutherford, 1986). Teachers' apprehensions towards the change process typically reflect levels of concern about their abilities to implement the new innovation (George, Hall, & Stiegelbauer, 2006). Identification of the stages of concern will assist the research team in planning future training sessions tailored to meet the needs of teachers at each of the stages.

#### 4.2.1 Peak Stage Score Interpretation

Of the many ways to analyze the scores on the Stages of Concern Questionnaire, the research team selected the Peak Score Interpretation. The highest stage score for each individual is identified. If a second stage scores within two percentile points, both stages are noted. Of the 39 participants, 31 had peak scores in Stage 0 showing them to be at the awareness stage of this innovation. The higher the Stage 0 score, the more the person is indicating that they are facing other tasks of great concern. Of the 31 Stage 0 peak scores, 23 had a score of 90 percentile points or higher. Six of the 31 individuals with Stage 0 peak scores had a second score within two percentile points. Three individuals scored high in Stage 1 showing a desire to learn more about concept mapping. One individual scored high in both Stages 2 and 3, showing both personal and management concerns with concept mapping. The final two scores to double peak with the Stage 0 scores were both high at Stage 6. This tailing up at Stage 6 can be interpreted as resistance to the innovation.

Five participants had a peak score in Stage 1 showing a desire for more information about concept mapping. Two participants peaked at Stage 2 showing concern for how concept mapping might affect their job status. One individual double peaked at Stages 1 and 2 showing the desire for more information while still maintaining personal concerns. The final participant double peaked at Stages 4 and 5 showing concern for the students and the collaboration required with concept mapping. The group profile peaks at Stage 0 with a score of 81. This shows awareness concerns with the innovation, while also indicating that there are other tasks taking priority over concept mapping at this time.

## 5 Conclusions

The data gathered during this study provided the research team with information to use when planning training for next year. Based upon the Stages of Concern Questionnaire, it is evident that the teachers need more information and exposure to concept mapping. The more this innovation can be tied to things taking priority in the teachers' lives, the better the implementation of concept mapping should go. To do this the team will review other initiatives occurring in the county to tie concept mapping closely with these. If a survey is given to the teachers next year, the research team will not wait until the end of the year because the teachers were so overwhelmed with issues relating to closing out the school year that it may have affected their input.

In planning individual training activities concerning concept mapping, the research team discovered that presentations on concept mapping are not the most effective professional development strategy. Mixing a variety of training strategies throughout the sessions appears to be a positive plan as all of the strategies were identified by different individuals as being the most useful. Several training sessions will include displaying examples of concept maps using pictures, making concept maps with the teachers, and providing participants with pictures, as these were the three most frequently identified strategies by participants for encouraging the use of concept mapping in their classrooms. It is important to remember that participants in this study included the 39 teachers of the 81 present at the training on April 27 that volunteered to be a part of this research. It is likely that these teachers are the ones with the more positive attitudes towards concept mapping. Keeping that in mind, the research team was still encouraged by the fact that the majority of the participants were using concepts maps in their classrooms regularly, and planned to continue doing so in the future.

An idea for extending this study into the next school year is to focus more on the use of concept mapping as an assessment tool with this group of teachers. The concentration this year was on teaching how to use concept maps to plan units of instruction, and as an instructional tool to help children visualize and organize the information they were learning. The research team spent very little time this year talking with participants about using concept maps as assessment tools, so this might be a natural follow-up study to this project. By looking at the concerns identified from the participants' questionnaires and using their survey responses to select the most promising professional de-

velopment strategies, the research team looks forward to an even more productive year of concept mapping with this group of teachers.

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