Concept Maps: Making Learning Meaningful
Proc. of Fourth Int. Conference on Concept Mapping
Viña del Mar, Chile, 2010

CONCEPT MAPPING PROFESSIONAL LEARNING: MAKING A DIFFERENCE IN PREKINDERGARTEN CLASSROOMS

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Abstract. The purpose of this paper is to report on the strategies used in a six-session professional learning series on the topic of concept mapping and the impact of the strategies on prekindergarten teachers' use of concept mapping in their classrooms. A group of 23 prekindergarten teachers participated in the six-session series, 17 of which completed the Stages of Concern Questionnaire (SoCQ) along with a survey to self-report their use of concept mapping. Respondents ranked six training activities based on their usefulness and reported how often they use concept mapping for instruction, planning, and assessment. Based on the findings of the SoCQ, fourteen of the respondents are non-users but according to the self-report all of the teachers use concept mapping at least once a month in their classrooms. Of the six training activities, the two involving printed pictures of concepts to include on a concept map were ranked the highest while the construction of a concept map during a training session was ranked the lowest.

1 Background: Why Are We Here?

A research institution housed at an American state university partnered with a local education agency (LEA) on an initiative to improve the transitions for students from prekindergarten through third grade. The overarching goal of the initiative was to develop a well-coordinated system to improve children's achievement with an emphasis on both horizontal and vertical alignment of curriculum (Florida Institute of Education, 2009). One activity that supports the goal was to design and implement a series of professional learning opportunities for teachers, the first of which involved prekindergarten teachers. To implement effective professional learning with teachers it is necessary to first identify a clear area where improvement is needed (Guskey, 2000). Thus before embarking, a team of university researchers conducted 60 classroom observations (18 prekindergarten and 42 kindergarten) using the Classroom Assessment Scoring System (CLASS: Pianta, La Paro, & Hamre, 2008). The CLASS is an observational tool specifically created to assess the quality of early childhood classrooms, and it consists of three measured domains: Emotional Support, Classroom Organization, and Instructional Support.

1.1 CLASS Results

CLASS results (FIE, 2009) indicated that, on average, prekindergarten teachers scored 6.1 out of 7 possible points for both Emotional Support and Classroom Organization domains, which are considered high quality. Conversely, the prekindergarten teachers, on average, scored 3.6 (out of 7) in the domain of Instructional Support. This is considered slightly below average in quality. Based on the CLASS results, we determined that Instructional Support would be the focus for professional learning opportunities for prekindergarten teachers.

1.2 Curriculum

A secondary finding was that the prekindergarten teachers did not use a curriculum, determined by the LEA, and in fact, teachers often used piecemeal curricula rather than a standards-based curriculum. Evident curriculum issues resulted in a lack of connection between the students' experiences in prekindergarten and their upcoming experiences in kindergarten. Relative to this finding, a new reading curriculum was adopted for use in prekindergarten. The selected reading series, Houghton Mifflin, is the K-3 reading curriculum. Simultaneous of the adoption of a new literacy curriculum, a new supervisor was assigned to the prekindergarten teachers.

2 Developing the Plan

Fullan, Cuttress, and Kilcher (2009) state that changes are not expected to go smoothly in the early stages of implementation and resistance is expected. In fact, Fullan et al. report that the change is much more complex when there are many individuals involved at the same time. Therefore, any plan for professional learning needed to take into consideration the number of changes that were impacting this group of teachers at one time.

The domain of Instructional Support is designed to emphasize how teachers promote students' higher-order thinking skills, extend students' learning, and facilitate and encourage students' language (Pianta, La Paro, & Hamre, 2008). Emphasis on Instructional Support requires consideration of its three dimensions: Concept Development (analysis and reasoning, creating, integration, connections to the real world), Quality of Feedback (scaffolding, feedback loops, prompting through processing, providing information, encouragement and affirmation), and Language Modeling (frequent conversations, open-ended questions, repetition and extension, self- and parallel talk, advanced language).

An instructional strategy that teachers can use to address the quality of the Instructional Support is concept mapping. Cassata-Widera (2008) used concept mapping as an instructional tool in an early childhood classroom and reported that it successfully facilitated the learning of several emergent literacy components. Goudy, Fountain, and Ossi (2008) also analyzed the use of concept mapping in prekindergarten classrooms with an emphasis on the connections children can make between concepts. Their results indicated that children benefited from the concept mapping experience.

3 Professional Learning Implementation

The prekindergarten teachers (all teachers of 4-year-old children) were involved in monthly professional learning workshops during the 2009-2010 school year. The workshops, each 90 minutes, were conducted during regularly scheduled professional learning sessions on early dismissal days for students. The content of each professional learning workshop focused on implementation of the newly adopted Houghton Mifflin curriculum with inclusion of instructional support strategies emphasizing concept mapping. Throughout the course of the professional learning series, six strategies were implemented with the prekindergarten teachers.

3.1 Strategy One: Creating Concept Maps with Post-it Notes

Novak's (2010) experiences with using concept mapping in lecture-type situations indicated the importance of the learner having experienced the construction of their own concept maps to better understand how the organizational structure presents the big picture of the content. With this in mind, the first two professional learning sessions were designed to provide participants the opportunity to create their own concept maps using chart paper and Post-it Notes. Participants were given a focus question at each workshop (i.e., What do we want children to learn about the five senses? and What do we know about the seasons?). The teachers worked in small groups and wrote down concepts to answer the questions on Post-it Notes. During the first session, participants were asked to use the current theme's curriculum guide to identify concepts, and during the second session participants were asked to use selections of children's literature to identify concepts. For each of these experiences, the participants were given a blank piece of chart paper and Post-it Notes to construct a concept map. They were not given a concept map structure to develop the map.

3.2 Strategy Two: Providing Computer-Generated Concept Maps

Following the completion of the initial strategy of concept map construction, teachers were given a computer-generated concept map (Figure 1) that had been designed by the researchers as a model of how concept maps can be used for planning purposes. These concept maps demonstrated how to organize and arrange the concepts in a hierarchical

fashion to form a concept map with the larger concepts at the top and the more detailed concepts at the bottom. The teachers were then asked to consider if their concept maps (with Post-it Notes) needed to be rearranged based on the provided model.

Computer-generated concept maps were distributed to teachers during five of the six professional learning sessions summarizing the content of their curricular themes. Additional computer-generated concept maps were also given in support of other strategies as described below.

3.2.1 Results of Strategy One and Two

The first two strategies were used during sessions one and two. During session two, teachers were asked to bring in an example of a concept map created in their classrooms. These first attempts at constructing concept maps resembled webs more than concept maps in that the maps did not represent a hierarchy nor did they include linking phrases. At this point teachers appeared to have incomplete knowledge of concept maps. Teachers understood the idea behind a concept map of connecting concepts but did not grasp the importance of the linking phrases and the flow from the top to the bottom. Because there seemed to be a missing link with the teachers, additional strategies were identified and implemented.

3.3 Strategy Three: Watching Video of Concept Mapping in a Prekindergarten Classroom

The third session began with a 7-minute video of a prekindergarten teacher creating a concept map with children. In the video, the teacher presented students with a focus question (What do you know about birthdays?), used pre-printed pictures to include in the concept map (i.e., birthday cake, candles, presents), asked guiding questions to lead the students in an anticipated direction (i.e., what do you see on the cake?), and included student-generated ideas on index cards if a pre-printed picture was not available. As the teachers watched the 7-minute video they observed a teacher creating a concept map with a group of 4-year-old children from start to finish. Following the video, the teachers were provided a copy of the computer-generated concept map created by the 4-year-olds in the video.

A second video clip experience occurred during session six. The video clips, which were used to demonstrate Language Modeling, were taken from a lesson on concept mapping. So, the Prekindergarten teachers observed a teacher engaging her students in frequent conversations, asking open-ended questions, modeling repetition and extension, practicing self- and parallel talk, and modeling advanced language while she was working on a concept map with her students. Additional emphasis was placed on concept mapping during the discussion on advanced language. Advanced language (Pianta, La Paro, & Hamre, 2008) is observed when a teacher uses a variety of words or makes connections to familiar words and/or ideas. A concept map is a strong tool for promoting advanced language because it is a graphic organizer that shows connections between concepts.

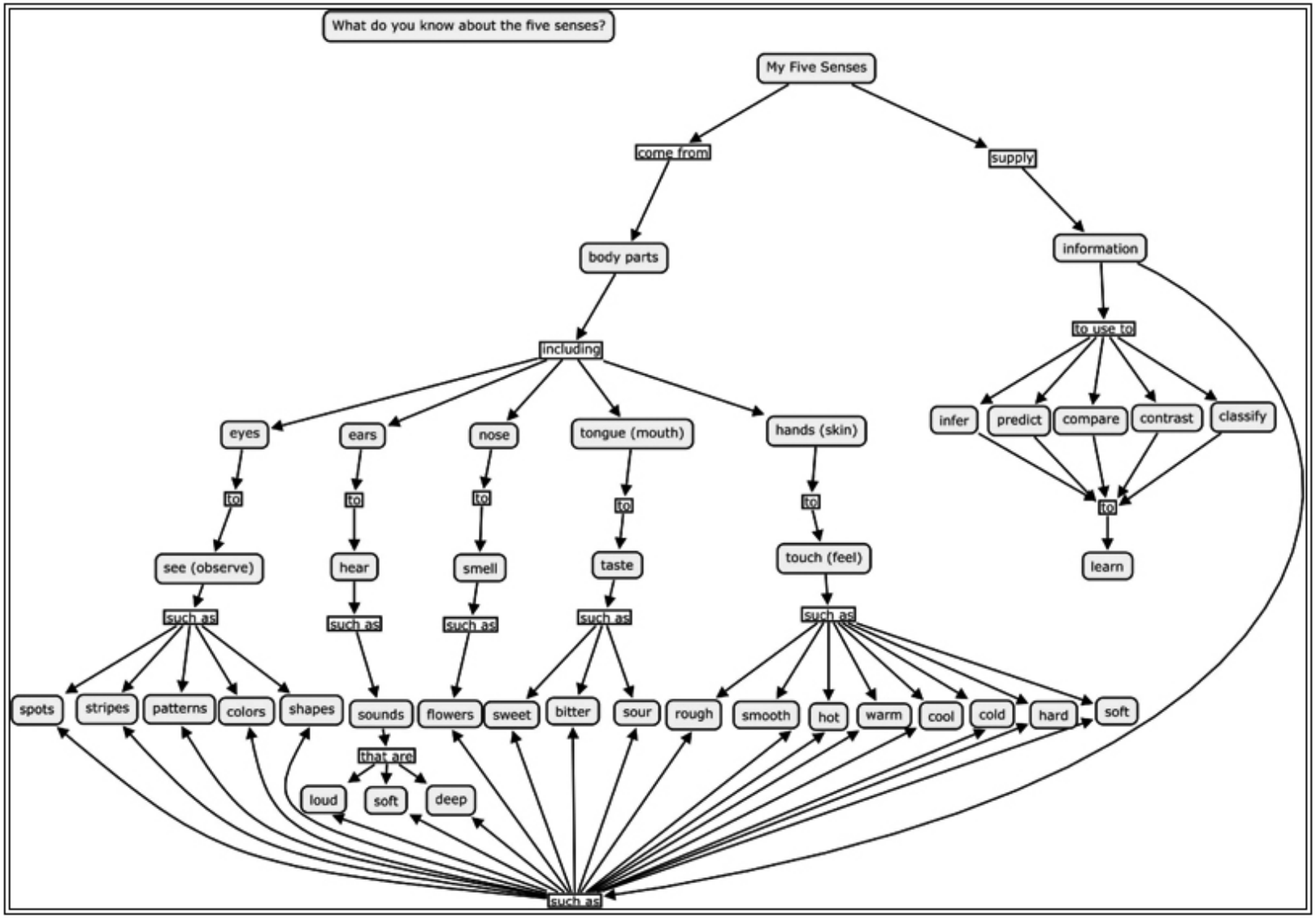

Figure 1. Computer-Generated Concept Map

3.4 Strategy Four: Turning Interactive and Shared Writing Activities into Concept Maps

Following the video activity in session three, concept mapping was applied to a lesson from the teachers' literacy curriculum. The activity suggested that teachers ask students which animals can be pets and then create a list of the students' responses using the format of 'A _____ can be a pet.' This activity could easily be a concept map instead of a list. Teachers were given an envelope containing 12 pictures and three linking phrases (Figure 2). They were also given a piece of chart paper with a concept map structure to be filled in with the provided pictures (concepts) and linking phrases.

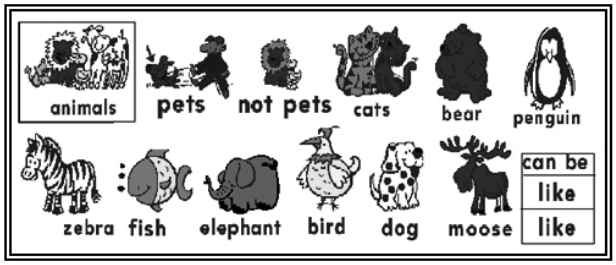

Figure 2. Picture and Linking Phrases

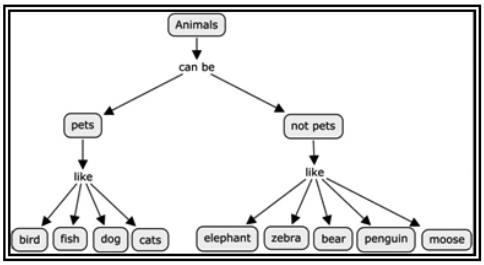

Figure 3. Animals Can Be Pets Concept Map

Teachers were asked to use the cutout pictures and linking phrases to fill in the concept map. The expected result is shown in Figure 3. These specific animals were selected for use in the map because the pictures were provided in the curriculum materials.

The teachers then looked at a different lesson in their curriculum guide. The lesson suggested that the teacher engage children in a more in-depth conversation about pets, add pets to the list from earlier in the day, and talk about who owned each pet. The lesson format was again changed to a concept mapping activity by adding more animals to the concept map created earlier and adding another level with the linking phrase 'owned by' as appropriate (i.e., Animals can be pets like (a) dog owned by Savannah).

Scaffolding was used for the third and final example of this strategy using another lesson from the curriculum. The lesson suggested that teachers engage students in a discussion to make a list of useful tools. In the training session, teachers were given a piece of paper and asked to sketch a possible concept map that could be developed with students instead of simply making a list. Teachers were given a piece of paper on which to construct a concept map but were not given a pre-determined structure as was done previously.

3.5 Strategy Five: Using Pictures in Concept Maps

Results of research conducted by Cassata-Widera (2008) indicated that photographs, used in addition to text with pre-readers, gave a visual tool for creating, manipulating, sharing, and interacting with language in a meaningful way. During each session on concept mapping, Prekindergarten teachers were encouraged to use pictures and words in the concept maps they create with students. After session two, the use of pictures in concept mapping was modeled for teacher in workshop activities, through videos, and provision of computer-generated concept maps. For example, teachers created their own concept maps, as suggested by Novak (2008), using pictures when they engaged in the activity (mentioned above) of animals that can be pets or not pets. Finally, the sample tools concept map, shown to the teachers after they created their own tools concept map, was created using pictures.

3.6 Strategy Six: Receiving Printed Pictures for Classroom Concept-Map Creation

Following the activities in which teachers created concept maps using pictures of animals and tools, they received a printed copy of the pictures. Teachers' reacted very positively to the pictures so during the final two professional

learning sessions, the teachers received a page of printed pictures matching the concepts on their curriculum's theme-based concept maps.

4 Results: What Did We Learn?

During the final professional learning session, the teachers were asked to complete a survey concerning the concept mapping professional learning. Seventeen of the 23 participating teachers provided feedback on their level of use of concept mapping in their classrooms, their reactions to the experiences in the professional learning session, and their suggestions for future professional learning planning.

4.1 Reported Level of Use

The teachers were asked how often they used concept mapping for instruction, planning, or assessment. Ten teachers reported using concept mapping for instruction at least once a week, 8 teachers reported using concept mapping for planning at least once a week, and 9 teachers reported that they never use concept mapping for assessment (Table 1).

Use	Two or more times a week	Once a week	Two or more times a month	Once a Month	Never
Instruction	5	5	3	4	0
Planning	2	6	4	3	2
Assessment	1	2	1	4	9

Table 1. Reported Level of Use (n=17)

4.2 Reaction to Training Activities

Teachers were asked to rank six training activities in order of usefulness (Table 2). On average, responding teachers ranked being given printed pictures to use for creating concept maps highest overall and being shown concept maps that used pictures and words as the second most useful activity. Ten of the 17 respondents listed one of these two picture-related activities as the specific activities in training that have encouraged them to use concept mapping. The activities that involved receiving computer-generated concept maps averaged as the third useful activity and received the greatest variation in rankings. Nine individuals ranked it in their bottom three while six individuals ranked it in their top three.

On average, responding teachers ranked watching a video as the fourth useful activity out of the 6 activities. The videos received the most last place votes (7 of 17) but also the most first place votes (5 of 17). The video of a teacher creating a concept map with children was shown in the third professional learning session. One teacher reported that she wished we had shown the video earlier because it helped her see how to implement concept mapping. In the same survey teachers ranked activities using concept mapping in interactive and shared writing activities as the fifth useful activity, but six individuals ranked it in the top three. One individual specifically listed the activities for making interactive and shared writing into concept maps as the activity that left her confused about concept mapping. The activity ranked as the least useful was creating concept maps with Post-it Notes. While the Post-it notes activities received low ranking, only one individual listed it as the specific activity in training that left them confused about concept mapping.

Rank	Training Activity
1st	Receiving printed pictures to match concepts in a book
2nd	Seeing examples of concept maps that are created with pictures
3rd	Receiving examples of computer-generated concept maps
4th	Watching video clips of a teacher using concept mapping
5th	Learning how to make interactive and shared writing activities from curriculum into concept mapping lessons
6th	Creating a concept map using Post-it notes and index cards

Table 2. Ranking of Training Activities

4.3 Stages of Concern

When individuals are introduced to a new innovation, it is expected that they will respond to the innovation in a variety of ways. The Stages of Concern Questionnaire (SoCQ: George, Hall, & Stiegelbauer, 2006) is an instrument that was developed to determine an individual's reaction to and use of a new innovation. The SoCQ is made up of 35 questions representing seven stages of concern (five questions per stage). Stage 0, Stage 1, and Stage 2 fall into the category of "Self" emphasizing, "How will this affect me?" Stage 0, Unconcerned, indicates an individual's lack of concern or use of the innovation. Stage 1, Informational, is the level of knowledge the individual has about the innovation. Stage 2, Personal, gives insight into the individual's concerns about what would be required of them in order to make the innovation work. The second category, "Task," is made up of only Stage 3, Management, and emphasizes an individual's concerns with the organization and management, or logistical issues related to the innovation and how much time it would require. The final category, "Impact," includes Stage 4, Stage 5, and Stage 6 and emphasizes, "How is this affecting those around me and is there a more effective strategy that could be used?" Stage 4, Consequence, indicates a shift in focus from self to students. Stage 5, Collaboration, reveals an emphasis on involvement with others concerning the innovation. Finally, Stage 6, Refocusing, brings to light an exploration of other possibilities other than the innovation or making changes to the innovation to bring about the same results.

4.3.1 Peak Stage Score Interpretation

Table 3. Peak Stage Scores

The first possibility for analyzing SoCQ results is to examine the highest stage score for each individual, which is called Peak Stage Score Interpretation. The 17 respondents fall into three categories based on their Peak Stage Scores (Table 3). Group one consists of 13 respondents who had peak scores in Stage 0, Unconcerned. High scores in Stage 0 do not indicate someone's level of use but there are other tasks taking priority for the individual. Four of the individuals in Group One had tying peak scores in Stage 3, Management. These individuals would appear to be making something else their priority while also expressing concern about time required to implement concept mapping. Group Two includes two individuals who had peak scores in Stage 1, Informational, which indicates that they would like to continue learning more about concept mapping. One of these individuals also had a high score in Stage 2, Personal, and Stage 5, Collaboration. Group Three consisted of two other individuals, one of whom peaked on Stage 2, Personal, and Stage 5, Collaboration. This individual seems to be concerned about how concept mapping will impact her directly along with the collaboration it will require. The final participant in Group Three had tying peak scores in three stages: Stage 2, Personal, Stage 3, Management, and Stage 6, Refocusing. These results indicate that the individual is concerned with how implementing concept mapping will impact her, how she will find time to manage the implementation of concept mapping, and whether or not there is a better way to accomplish the same results.

	Group One	Group Two	Group Three
Participants	**13**	**2**	**2**
Stage 0: Unconcerned			
Stage 1: Informational			
Stage 2: Personal			
Stage 3: Management			
Stage 4: Consequence			
Stage 5: Collaboration			
Stage 6: Refocusing			

Table 3. Peak Stage Scores

4.3.2 First and Second Highest Stage Score Interpretation

A second possibility for analysis is to examine both the highest and second highest stage scores. It is expected that the highest and second highest scores will be adjacent stages (George, Hall, & Stiegelbauer, 2006). This expectation proves true for 12 of the 17 respondents of this study (Table 4). Four of these 12 respondents scored highest in Stage 0 and second highest in Stage 1. These high scores indicate that these four individuals have other things to worry about and do not know enough about the innovation to use it. Another group of four out of these 12 respondents had highest scores in Stage 0 and Stage 3 and they all had a second highest score in Stage 2. These high scores indicate that these four individuals are concerned with how concept mapping will impact them (self) and their time (management). The other four individuals whose highest and second highest scores were in adjacent stages had high scores in Stage 1, Stage 2, or Stage 3. These individuals clearly have concerns with how the innovation will impact them and their time restraints.

Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stage 0: Unconcerned																	
Stage 1: Informational																	
Stage 2: Personal																	
Stage 3: Management																	
Stage 4: Consequence																	
Stage 5: Collaboration																	
Stage 6: Refocusing																	

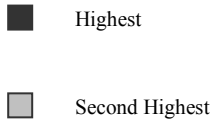

Table 4. First and Second Highest Stage Scores

The five respondents whose highest and second highest scores were not adjacent stages all had highest scores in Stage 0. Their second highest scores were in Stage 2 (one respondent), Stage 3 (three respondents), and Stage 6 (one respondent). The first four within this group still show concerns for how the innovation will impact themselves (Personal) and their time constraints (Management). The individual whose second highest stage was Stage 6 is suspect. A high score in Stage 0 indicates that the individual has other things to think about but a high score in Stage 6 indicates that the individual has ideas for how to change the innovation or use another strategy. Perhaps this individual is not concerned with concept mapping because she has an idea she thinks would be more effective.

4.3.3 Profile Interpretation

The third method for analyzing SoCQ results is a Profile Interpretation, which looks at the relationships and patterns among all seven stages of concern. As stated by George, Hall, & Stiegelbauer (2006) the nonuser profile is the most obvious to see. Nonusers tend to have higher scores on Stages 0, 1, and 2 and lower scores on Stages 4, 5, and 6. Of the 17 respondents in the present study on concept mapping, 14 would be described as nonusers. The other three participants do not easily fit into the "non-user" category because they had high scores in Stage 5 and Stage 6.

As described by George, Hall, & Stiegelbauer (2006), variations in the Stage 0 scores among nonusers are not as important as the variations between the scores in Stage 1 and Stage 2. If the Stage 1 and Stage 2 scores are very different, the individual results are explained as having a one-two split, which can be positive or negative. When Stage 1 is higher than Stage 2, it is a positive one-two split and the individual could be said to be a willing and interested party when it comes to the innovation. When the Stage 2 scores are higher than Stage 1 scores it is a negative one-two split and the individual will most likely have some level of doubt about the intervention and will likely be resistant to its implementation.

Based on the SoCQ results for the present study, five "non-users" have a one-two split. These five individuals more than likely have a positive, proactive perspective, with little concern for how the innovation will impact them personally. They would be referred to as willing and interested parties in the area of concept mapping but for some reason they are not yet using the tool. Four of the "non-users" have a negative one-two split indicating that they have some level of doubt about the intervention and will likely be resistant to its implementation.

4.3.4 Comparisons

According to the SoCQ results, 14 of the responding teachers could be considered "non-users" of concept mapping. However, on the self-reporting portion of the survey all of the teachers reported using concept mapping for instruction at least once a month and ten of the teachers reported using concept mapping at least once a week. There is a contradiction in these findings that will be interesting to pursue.

5 Implications: What Are the Next Steps?

It is expected that change will take time. The professional learning series analyzed through this study took place during one school year. The same participating teachers will continue with additional follow-up sessions covering the use of concept mapping in their prekindergarten classrooms. Based on the findings of this study, future concept mapping professional learning sessions with this group of teachers will need to focus on three strategies: the use of printed pictures in concept mapping, modeling the construction of a concept map based on lessons, and making connections between curricular lessons and the use of concept mapping.

Printed pictures were ranked as the most useful training strategy so continuing the use of printed pictures makes sense. The printed pictures are what helped the teachers see concept mapping as something they could do with their children but apparently not enough to make them use concept mapping on a regular basis. A strategy that needs to be strengthened in training sessions is the modeling of concept map construction. Quite a few of the teachers repor-

ted being confused about what they were supposed to do with concept mapping so infusing more modeling into the sessions will help. When the modeling is implemented it will need to be done with the prekindergarten teachers' literacy curriculum lessons in mind. It seems as though the current participating teachers saw concept mapping as an activity that they learned about in professional learning sessions but did not make the transition for implementing it into their lessons. Hopefully by seeing concept mapping activities using curricular lessons and printed pictures in training sessions the teacher will begin to make the shift towards accepting and implementing concept mapping into their classrooms.

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