5-1-1986

Improving Inferential Comprehension Through Semantic Webbing

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by

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A Practicum Report
submitted to the Faculty of the Center for the Advancement of Education of Nova University in partial fulfillment of the requirements for the degree of Master of Science (or Educational Specialist).

The abstract of this report may be placed in the School of Practices Information Files for reference.

May/1986

AUTHORSHIP STATEMENT

I hereby testify that this paper and the work it reports are entirely my own. Where it has been necessary to draw from the work of others, published or unpublished, I have acknowledged such work in accordance with accepted scholarly and editorial practice. I give this testimony freely, out of respect for the scholarship of other workers in the field and in the hope that my own work, presented here, will earn similar respect.

ABSTRACT

Improving Inferential Comprehension through Semantic Webbing.
Hines, Virginia P., 1986: Practicum Report, Nova University, Center for the Advancement of Education
Descriptors: Comprehension/Disabled Readers/Inferential Comprehension/Reading/Reading Strategies/Remedial Skills

The author identified a key strategy for teaching inferential comprehension as implemented in a 7th grade classroom of students who were, at least, one year below grade in reading. The purpose was to improve the students' inferential comprehension skills.

The implementation began with a diagnostic reading test followed by several weeks of introducing different forms of semantic webbing to help clarify basal reader stories and other activities. After a mid-point teacher-made exam showed good results, the author implemented a few more weeks of webbing before a final diagnostic reading test was given to monitor progress. A comparison of the beginning and ending test scores indicated 33 percent of the students showed a 5 point increase in percentile rank. Results indicate semantic webbing to be an effective tool for improving the inferential comprehension of many students.

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Purpose

The educational setting of this study was a middle school located in a small rural community. The school serves 454 fifth through eighth grade students who come from low to middle income families. Forty-six percent of the students rode the bus daily; 38% of them received free or reduced lunch.

The school faculty/staff consisted of 20 teachers, a principal, an assistant principal, a guidance counselor, a speech therapist, a school nurse, and a part-time psychologist. This author has taught in this setting for nine years.

Students received a varied educational experience through an integrated curriculum. In addition to the basic subjects, they were exposed to the exploration of art, music, business, agriculture, and home economics.

The school population was divided into three units to encourage team spirit and unity within smaller groups. Since the school population consisted of four grades, this facilitated having two grade combinations in the units. The classes were cross-graded. Most teachers taught within one unit, but due to the shortage of teachers, some of them were required to cross-team teach.

Even though the school was designed for open classroom concept and most classes were taught in this kind of setting, the classroom for this particular study group was self-contained.

The majority of the children targeted for this study came from families in which both parents were working in occupations that would be considered blue-collar. Of the 21 seventh grade students involved in this study, only one-fourth had parents who indicated an interest in their child's reading progress.

The group chosen for this study consisted of 21 seventh grade students who were at least one year below grade level in reading. Cumulative records indicated that most of them had been behind since fifth grade or were repeating sixth grade reading. According to the 1984 and 1985 Metropolitan Achievement Test scores, all but 2 of the 21 students were below the 50th percentile in the fifth and sixth grades.

Seventy-six percent of these 21 students were below the 50th percentile in inferential comprehension as indicated on the Stanford Diagnostic Reading Test (1976), which was administered at the beginning of the 1985-86 school year.

Comprehension is essential to reading. Frank Smith (1975) defines "comprehension" as "understanding" and "understanding" as "comprehension."

Inferential comprehension is involved in almost all reading tasks. Pitts and Thompson (1984) note Page and Thomas' definition of inferential as "... the process of obtaining logical judgement (regarding implicit test information) from a given premise or from observed data" (p. 427).

Low test scores and repeated grade retainment indicated that the students who were involved in this study lacked ability in this area. Teacher observation also noted obvious frustration and lack of self-esteem on the part of the students.

The author felt that children can be taught to infer. There was a need for a systematic intervention to teach this skill. A fresh approach was needed because how one learns, as well as what one learns, is significant. If students are taught a systematic procedure, they will be able to apply it in different situations. The author felt that intervention would make a difference in comprehension, in test scores, and in the overall self-concept of the student.

The reading students involved were below the 50th percentile in inferential comprehension. The writer hoped that with this intervention, progress could be made. Therefore, the following objectives were established to monitor progress:

1. identify a key strategy for teaching inferential comprehension successfully;
2. at mid-point of a 10-week implementation period, 50% of the class will be able to answer correctly 6 out of 10 inferential comprehension questions on a teacher-made test; and,
3. at the end of the 10-week implementation period, 50% of the selected seventh grade students will increase, at least five percentile points on the Stanford Diagnostic Reading Test (1975) in inferential comprehension.

Research

At one time, little effort was made to teach the actual process of reading comprehension. Early analysis of reading seemed to assume that once readers could decode accurately, comprehension would automatically

follow. Even when this assumption was found to be false, efforts to improve comprehension focused more on product than on process. Pupils were asked questions about directly stated facts and to infer answers from written material without considering how to achieve such understanding. Students were rarely given instruction in how to comprehend.

Process-Approach

John D. McNeil (1984) outlined an approach for teaching students to process the text-making inferences, activating appropriate concepts, relating new information to old, creating picture images, and reducing the information in a text to a main idea.

Four assumptions underling the process approach are:

1. what pupils already know affects what they will learn from reading;
2. both concept-driven and data-driven processes are necessary in comprehending the text;
3. the deeper a person processes the text, the more he or she will remember and understand it; and,
4. the context in which reading occurs influences what will be recalled.

McNeil feels reading comprehension as process involves actively constructing meaning among the parts of the text and between the text and personal experiences.

Schema Theory

McNeil (1984) strongly feels the schema theory has special relevance for teachers of reading comprehension in that it questions the conventional view that pupils should learn to reproduce the statements found in the text.

World Book (1979) dictionary defines schema as a "... diagram, plan or scheme."

McNeil sees the schema theory as being able to permit inferential elaboration, as helping to separate important from less important ideas, and as an aid in memory. The interpretation of what we read is stored in our memory. Thus, with this theory, it is the interpretation rather than the text itself that we will recall.

One of the most effective ways of applying the schema theory is the semantic map, an arrangement of vocabulary (or concepts) about a topic. These concepts are categorized in some way. The semantic map is a procedure for building a bridge between the known and

the new and can be used to link the pupils' basic concept of the topics to both abstract schema and concrete examples.

Retelling

According to Gambrello, Wilson, and Pfeiffer (1985), retelling is a highly potent learning strategy that has direct beneficial consequences on children's processing of text information. They conducted a study in which subjects were assigned to one of two treatment conditions, retelling or illustrating, after silent reading. The subjects in the retelling group were instructed to retell all the important ideas from the story while the illustrating group was instructed to illustrate the ideas. The students in the retelling group reflected upon their ideas orally before answering questions on a chart which asks important ideas and supporting details.

The primary purpose of the study was to investigate the effects of retelling upon the reading comprehension of children. Children in the retelling treatment group were expected to be able to recall more literal and inferential information from the text than children in the illustrating treatment group.

Questions

Eeds (1981) reports from various research that teacher-constructed questions facilitate learning from prose. The effects are greater when the questions come after the reading and when students respond freely rather than in multiple choice format. Questions requiring only the recall of facts generally produce recall level responses, while higher level questions produce both higher level responses and greater student achievements. Also, when poor readers were asked higher level questions after reading, they remembered significantly more than when they were asked rote-level questions. Research indicates that high level questioning is of most benefit to poor comprehenders who have minimal decoding and vocabulary problems.

Visualizing

Fox (1979) discussed a study where one group of readers was asked simply to read a story while another group was asked to read the same story and imagine a picture to correspond with each sentence. The group that was asked to "imagine" scored more than 40% higher in comprehension than the read-only group. It was hypothesized that exercises requiring visual imagining would develop the organizational strategies.

Semantic Webbing

The semantic web is an alternative to the traditional basal reading lesson. It is a technique used to help students organize information from reading selections. It is a teaching procedure through which students are guided in constructing visual displays to represent relationships between, and among, concepts as these relationships are presented in stories and articles. Freedman and Reynolds (1980) provide a basic model for constructing a web. It consists of the web's core question, the web strands, the strand supports, and the strand ties. Further descriptors include the following:

1. The core question is the focus of the web and the purpose of the inquiry; it is chosen by the teacher. All the information and ideas generated for the web by the students are related in some way to the core question.
2. Web strands are the answers which students give to the core question.
3. Strand supports are facts, inferences, and generalizations that students take from the story to give clarity and validity to the strands and to differentiate one strand from another.

4. Strand ties are the relationships strands have with each other.

In developing a semantic web, concepts or categories are represented as phrases. Each phrase is recorded on the blackboard and is enclosed in a circle or oval. As students identify relationships between recorded concepts, lines are drawn to connect the concepts being related. A question designed by the teacher serves as a focus for the generation of a semantic web. (See Appendix A for example of a basic web.)

Focus questions are designed to involve students in a particular type of reading reasoning strategy. Most of the strategies that will be used are synthetic in nature, because the students will be directed to generate predictions, draw conclusions, and identify the author's purpose(s).

The following are steps to use in teaching this technique.

1. Decide on the reading/thinking strategy which you wish to help students develop.
2. Give the students a purpose for reading.
3. Record the question which reflects the purpose as the core for your semantic web.

4. Accept students' answers to this question and record those answers within circles which surround the core question Show the relationships between the core question and suggested answers by drawing lines connecting the encircled core question to each of the encircled responses.
5. Help students identify facts and generate inferences related to their answers. Record this information within circles which surround the related answer. To illustrate these relationships, draw lines connecting these circles.
6. Consider whether these facts and inferences are related to other student answers. Draw dotted lines to connect these facts and inferences to other answers when relationships are noted by students.

Method

Inferential comprehension is more difficult to teach than literal comprehension. Semantic webbing is unique for teaching inferential comprehension because the students can "see" the story as they try to comprehend it. Webbing, which is already a beneficial

learning strategy, can be used in combination with other strategies such as retelling, questions, and visualizing.

Webbing is versatile because it can be used to teach many skills such as sequence, prediction, comparison, main idea, and supporting details.

For the teacher, the success of semantic webbing depends entirely on how much he or she values the process of thinking for students. A semantic web is constructed by the students, with the teacher as a guide, to add meaning to a story. It is not constructed to reinforce prior concepts and thinking of the teacher. The teacher encourages the students to contribute, appropriate or not, for discussion and evaluation. The students and teachers together decide what will be added to the webb. Together they decide when the web is completed. Webbing is enrichment for the basal reader. It demonstrates, in a concrete way, the process of comprehending print.

Studies reported by Fox (1979) noted that successful reading requires integration of both hemispheres of the brain. The left hemisphere is specialized for the syntactic, logical, ordered aspects of language. Imagery and metaphors encourage right brain processing. The majority of our teaching

strategies are left-brain oriented. For example, using dictionary definitions to introduce new words asking objective (and many subjective) questions, outlining and summarizing are examples of left-brain exercises. Some children have genetic preference for right hemisphere; and, many researchers have the viewpoint that the right-brain is necessary for creative thinking. How do children fare when traditional methods of learning to read are left-brained? Present emphasis on the logical mode can produce only imitators, not innovators.

When we talk about a right or left hemispheric person, we are talking about learning preferences based on the functional differences between the hemispheres. All of us use both hemispheres of the brain, but we may use one side more than the other.

People who can visualize very well usually are processing in the right hemisphere; their comprehension takes place by seeing pictures. They are called visual learners.

Appendix B shows a table indicating those skills which are associated with the left and right hemisphere. Barbara Vitale in her book Unicorns are Real (1982) states that in the classroom we stress reading,language, and phonics; we ask for details; we insist upon

directions being followed; and mostly, we talk at children. In short, our curriculum is left-brained. We teach to the student who has a dominant left hemisphere. She emphasizes

> This does not indicate that I do not believe in left-hemispheric approaches. It does indicate that I believe there already are enough left-hemispheric approaches in today's curriculum.

Fox (1979) stated that by using pictures and encouraging mental imagining, the teacher can stimulate right-brain processing. When children learn to construct a pictorial framework for new words, concepts, and stories, recall and comprehension are improved.

The author began the 10-week implementation period by administering Form A of the Standard Diagnostic Reading Test (1976). The test showed that 76% of the 21 seventh graders were below the 50th percentile in inferential comprehension.

The webbing technique was used twice a week, once with a basal reader story and once in an activity or story of the teacher's choice.

Various types of webs were used. They are as follows (see Appendix C for examples):

1. Episodal--This web deals with episodes and tells events in the story. One begins with a question and then asks what happens next.

2. Emotional--This web deals with episodes that cause feelings.
3. Sequential--This web puts events in order, clockwise, around a question. It is good with kids who have problems in sequence, because they can follow easily.
4. Inductive--Nothing is put in the core circle. The students induce from the story and conclude what to put there.
5. Comparison and Contrast--Similarities are listed in the middle with a webb of differences on either side.
6. Cause and Effect--The effect is put in a circle; then a line is drawn from the circle which lists a cause.
6. Prediction--Read just a portion of a story, ask questions and anticipate. Repeat the procedures several times before ending the story.

Mid-point in the implementation period, the students' progress was evaluated with a teacher-made test. A Reader's Digest children's story was used and questions were designed to test both literal and inferential comprehension. There were 10 questions

which included 6 inferential and 4 literal. It was anticipated that 50% of the class would be able to answer 4 out of the 6 inferential questions correctly.

The final evaluation was Form B of the Standard Diagnostic Reading Test (1976).

Following is the schedule, including the types of webs, the author used.

Week One--The author administered Form A, Standard Diagnostic Reading Test (1976).

Week Two--The episodal web was used with a basal reader story. The prediction web was used with the story "Open Window."

Week Three--A comparison web was used to depict the likes and differences of characteristics in two textbook stories.

The students read stories in groups, and then worked on an episodal web using construction paper and magic markers. A spokesperson explained each webb.

Week Four--The teacher read the book The Biggest Bear. A sequence web was used on this and the basal reader story.

Week Five--A basic web using a color and a prediction webb illustrating the textbook story were demonstrated this week.

Week Six--The author administered the mid-point teacher-made test.

Week Seven--With a text book story, an emotional webb was used and after an extra story was read, a web on drawing conclusions was developed.

Week Eight--An inductive web was used with both the basal reader story and an extra story read to the students.

Week Nine--A cause and effect web was used with a text book story and a comparison webb was used to compare two people in stories the students had read.

Week Ten--Form B of the Standard Diagnostic Reading Test (1976) was administered.

Results

The author feels the study's first objective was met, for semantic webbing is an effective tool in teaching comprehension, especially inferential comprehension. Employing a right-brained technique, like webbing, along with the usual left-brained activities, can increase comprehension in some children. Like other complex symbolic activities, reading requires both right and left cerebral hemispheres. Integration

of both modes will elevate children from reading students to readers.

The second objective concerned a mid-point evaluation. The author had planned to incorporate 10 inferential questions into the test and had expected 50% of the 21 students to answer 6 of the 10 correctly. However, it was the author's opinion that 10 total questions were sufficient. Included in the test were six inferential and four literal questions. It is best to have some simpler generalizations along with the more difficult ones. It was anticipated that 50% of the class would be able to answer 4 out of the 6 inferential questions. The objective was met because 19 of the 20 students present on the day of the test answered 4 or more of the inferential questions correctly. The totals were:

Ratio	Number of Students
3 out of 6	1
4 out of 6	4
5 out of 6	6
6 out of 6	9

At this point, the author saw no reason to extend the implementation period. The students appeared to have an accurate concept of webbing.

The final evaluation was Form B of the Stanford Diagnostic Reading Test (1976). Expecting 50% of the selected students to increase 5 percentile points may have been an unrealistic objective. Thirty-three percent of the students did show an increase. The average increase for those students who did improve was 28 percentile points.

Even though the final objective was not reached for 50% of the students, the author feels the 33% who did increase in percentile points showed remarkable improvement. Some students showed an increase of 2 or 3 percentile points, while some of those who showed no increase were not in attendance for any significant amount of time during the implementation period. (See Appendix D, Final Comparison Chart.)

The students became highly motivated and showed an interest in webbing. They caught on quickly, identifying the different types of webs and adapting easily to each new approach. The students showed creativeness when they developed their own webs. Semantic webbing became a familiar technique in the classroom.

The author believes this technique could best benefit students by using it every two or three

weeks, once the basic steps are introduced. If used too often, webbing could become less effective. But, implemented into a reading program at appropriate times, webbing can be a beneficial and rewarding tool.

Recommendations

The Report of the Commission on Reading (1985) stated that teachers should devote more time to comprehension instruction. It also stated that it is essential for teachers to have career-long opportunities for growth, renewal, and access to new information.

The techniques of semantic webbing, as outlined in this paper,is a new approach and should be beneficial to teachers of reading and to those who teach reading in the content areas.

Therefore, it is recommended that this new intervention be presented by the author and/or a district-level reading specialist in the form of an inservice for teachers.

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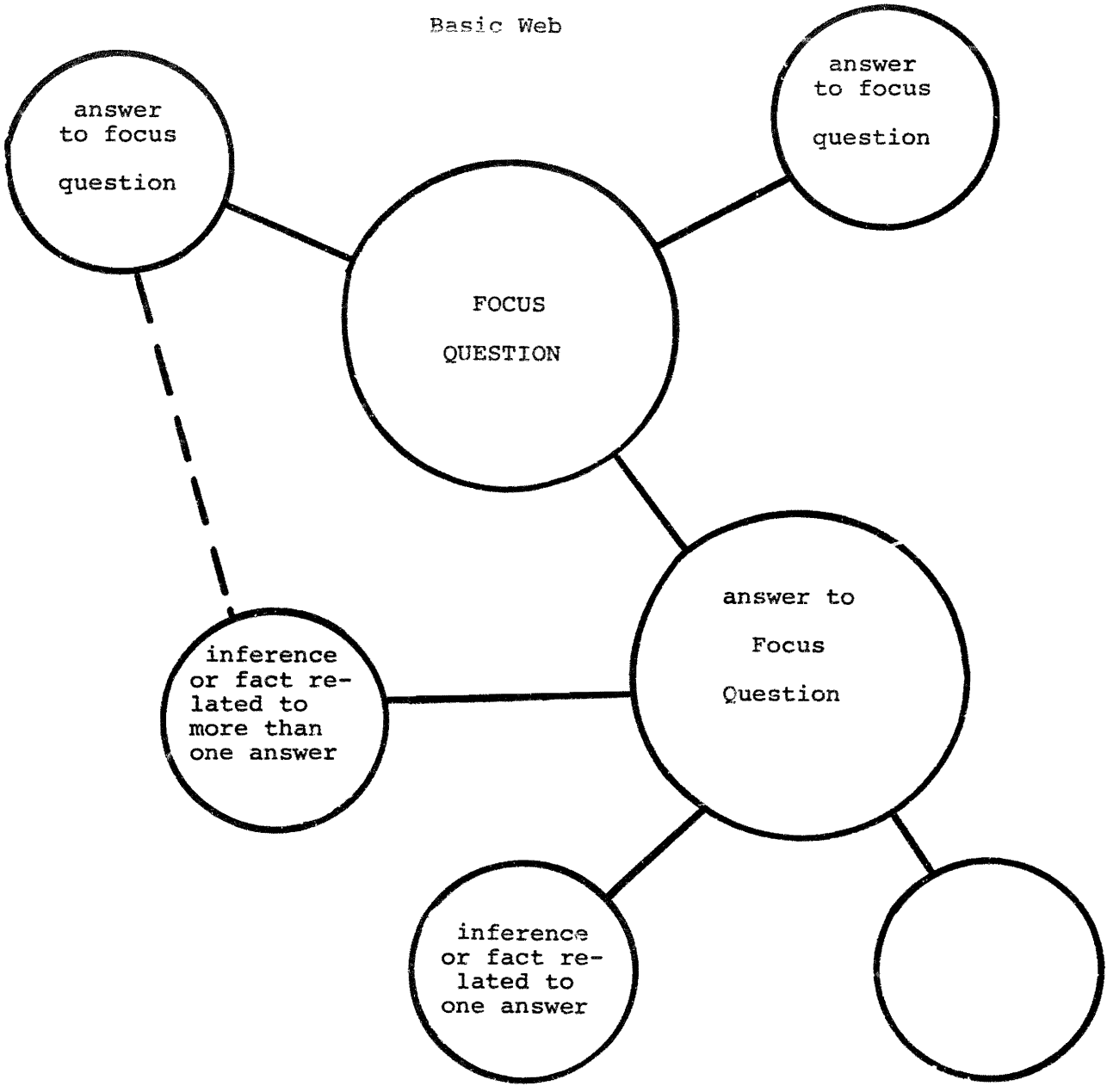
Appendix A

Basic Web

Appendix A

Basic Web



Appendix B

Left-Brained Right-Brained Skills

Appendix B

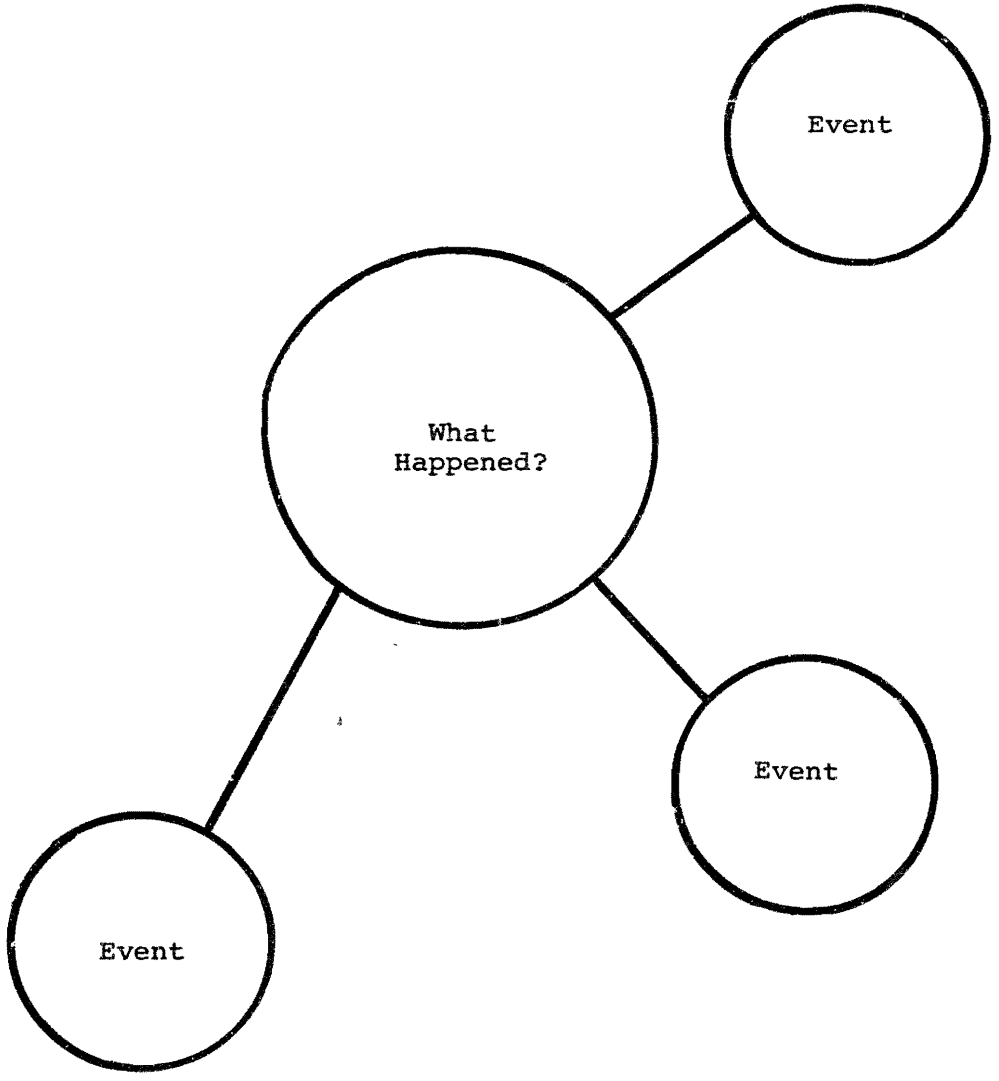
Left-Brained Right-Brained Skills

LEFT HEMISPHERE	RIGHT HEMISPHERE
handwriting	haptic awareness
symbols	spatial relationships
language	shapes and patterns
reading	mathematical computation
phonics	color sensitivity
locating details and facts	signing and music
talking and reciting	art expression
following directions	creativity
listening	visualization
auditory association	feelings and emotions

Appendix C

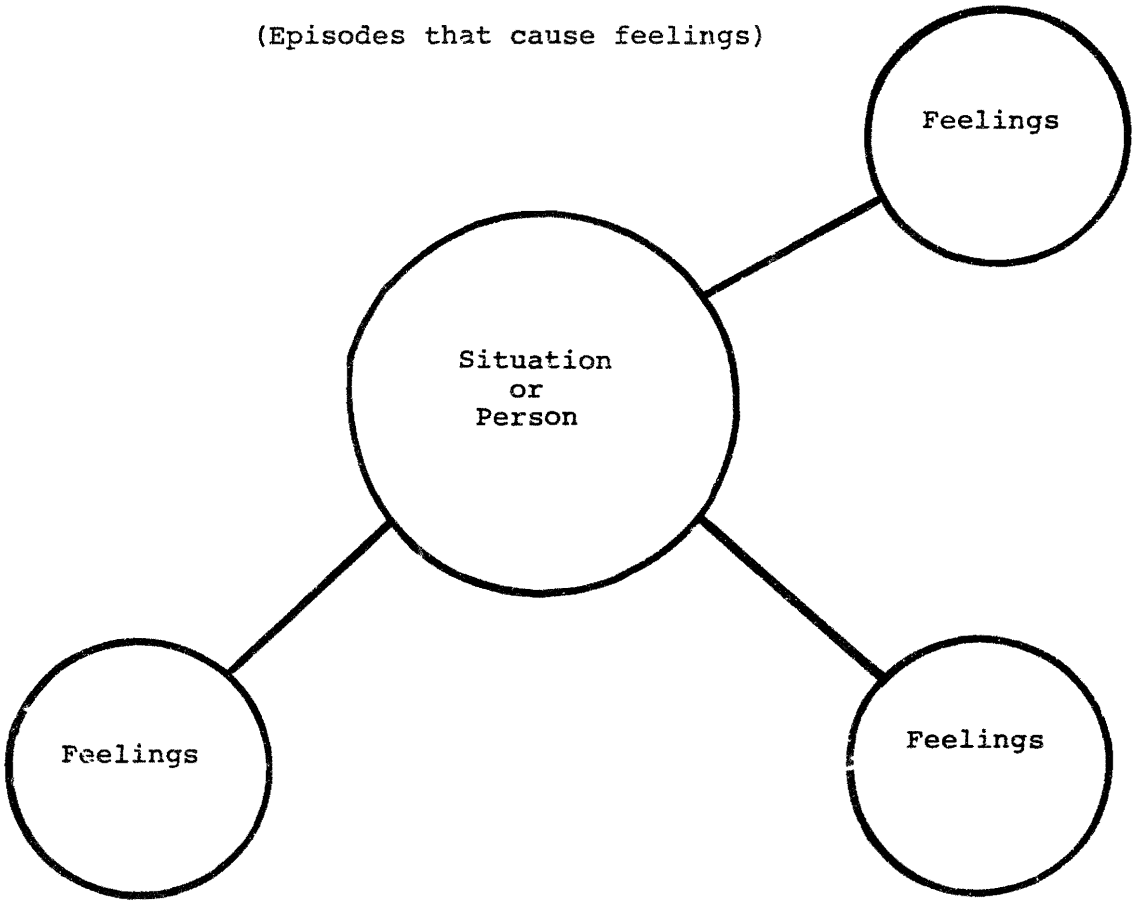
Seven Types of Webbing

Episodal Web

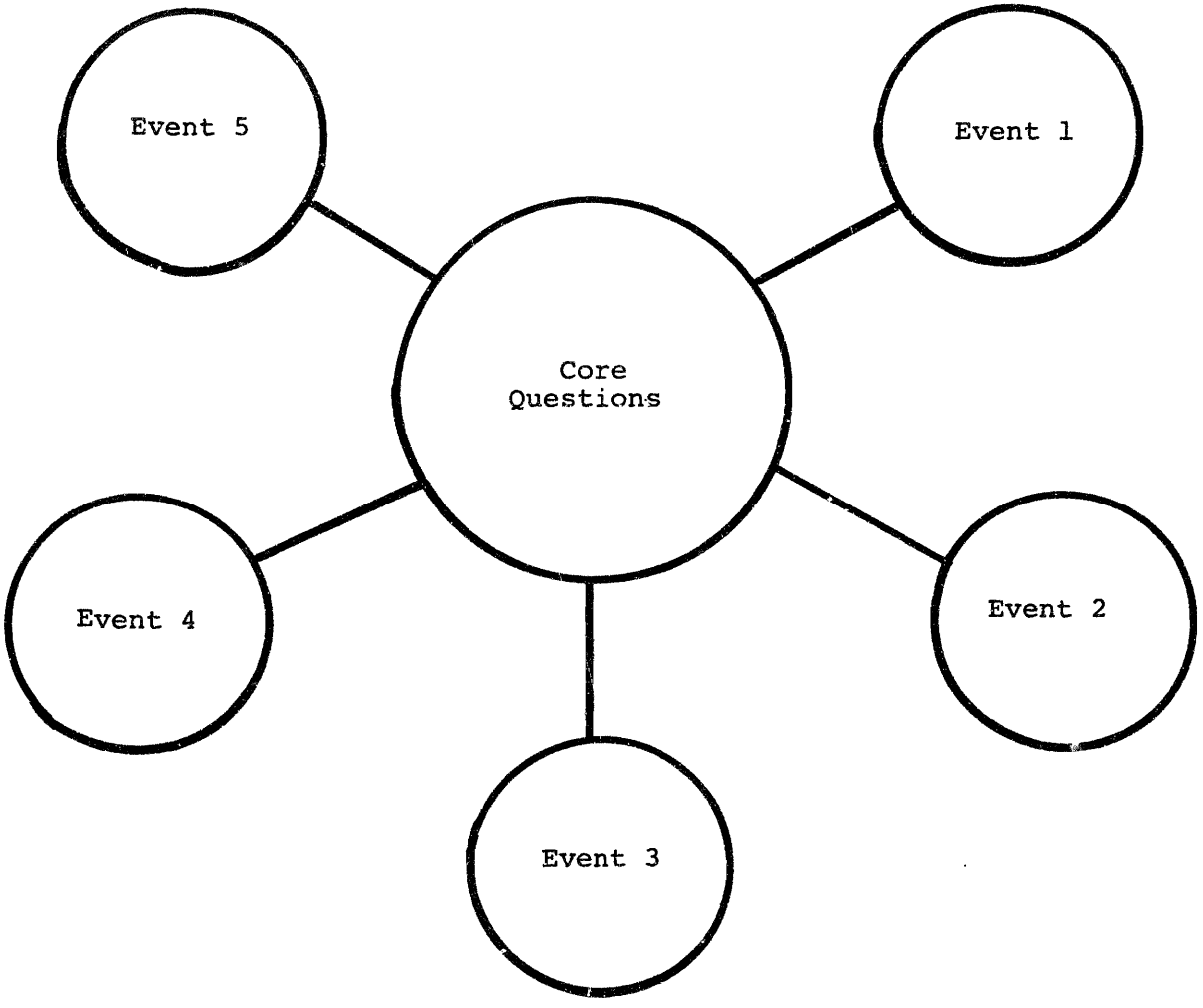


Emotional Web

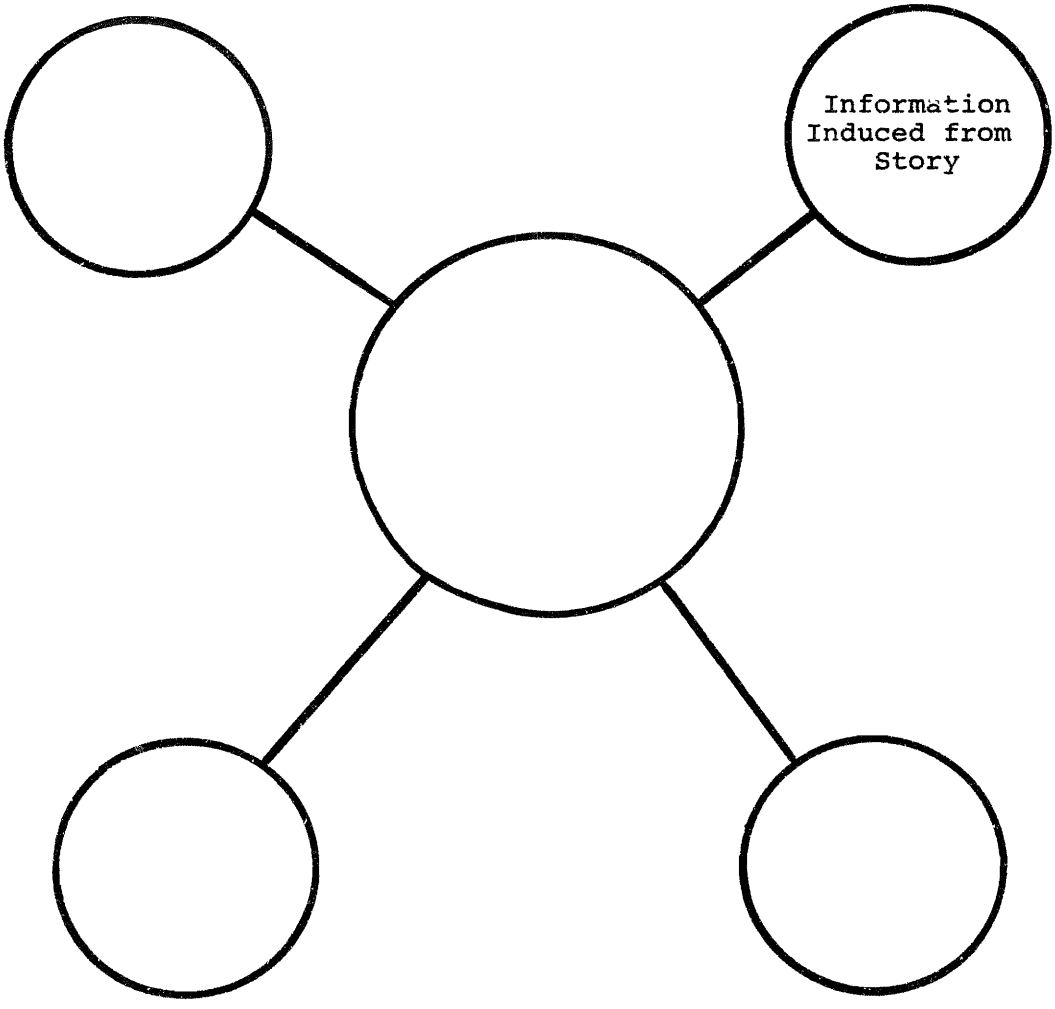
(Episodes that cause feelings)



Sequential Web



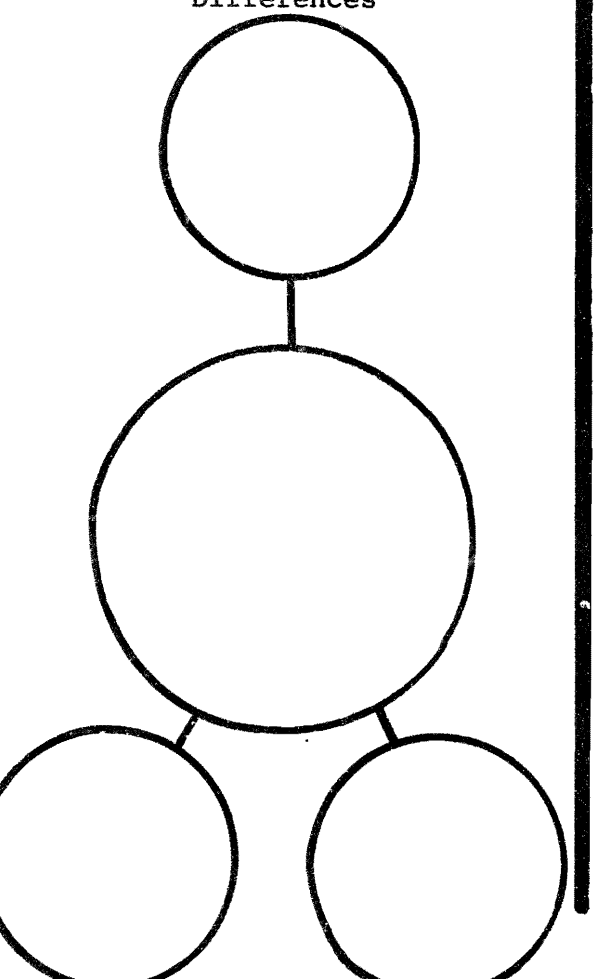
Inductive Web



Eventually draw conclusion and put in core

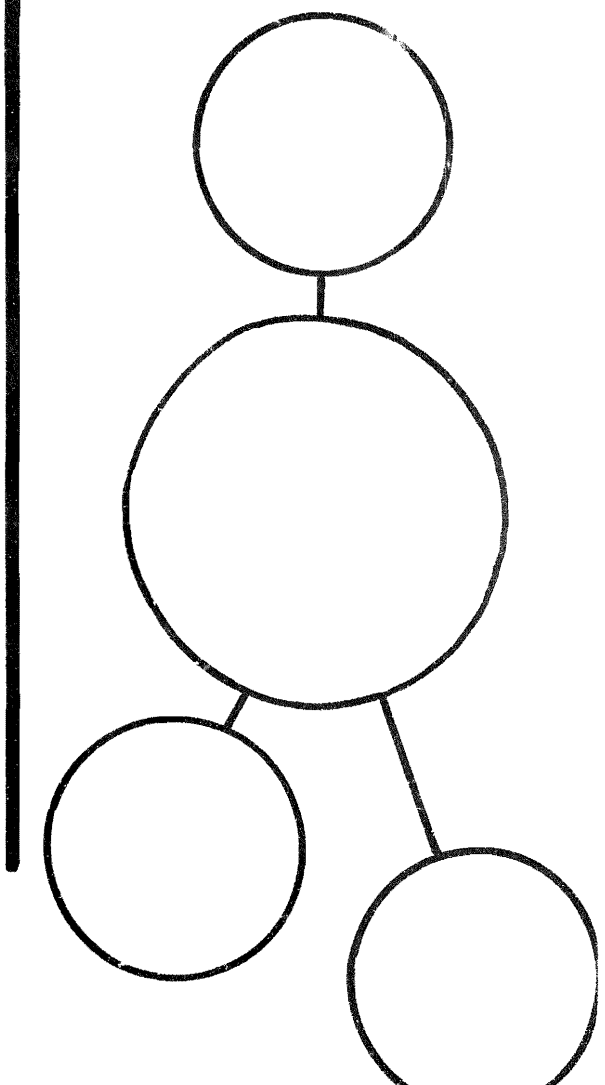
Compare/Contrast

Differences

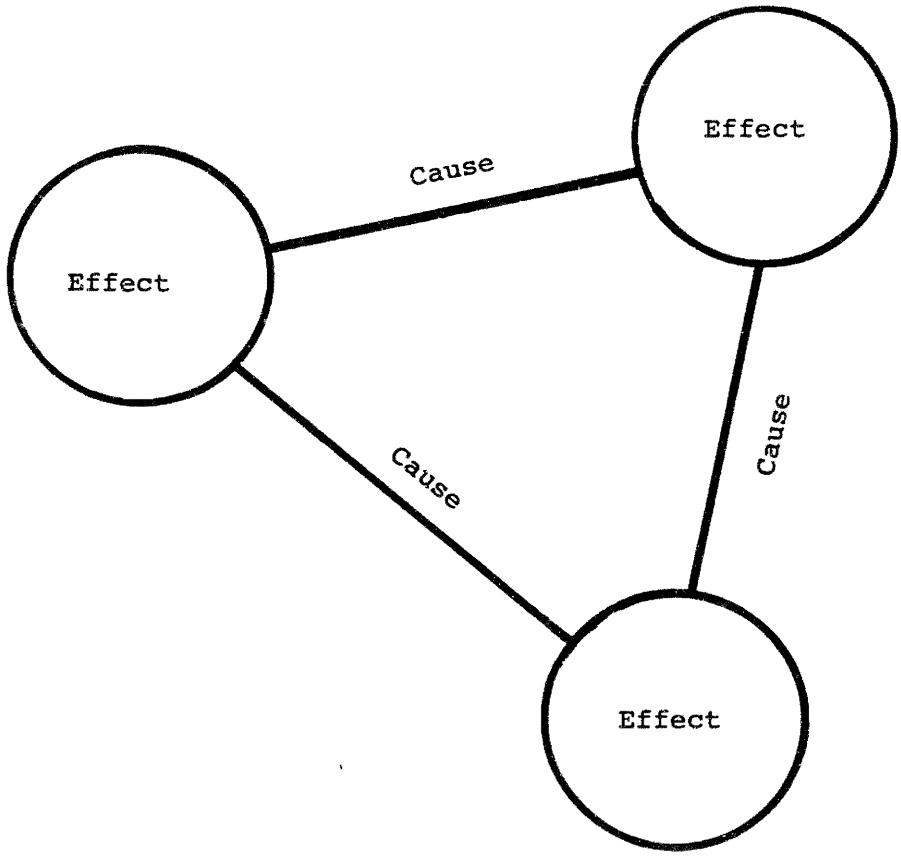


Similarities

Differences

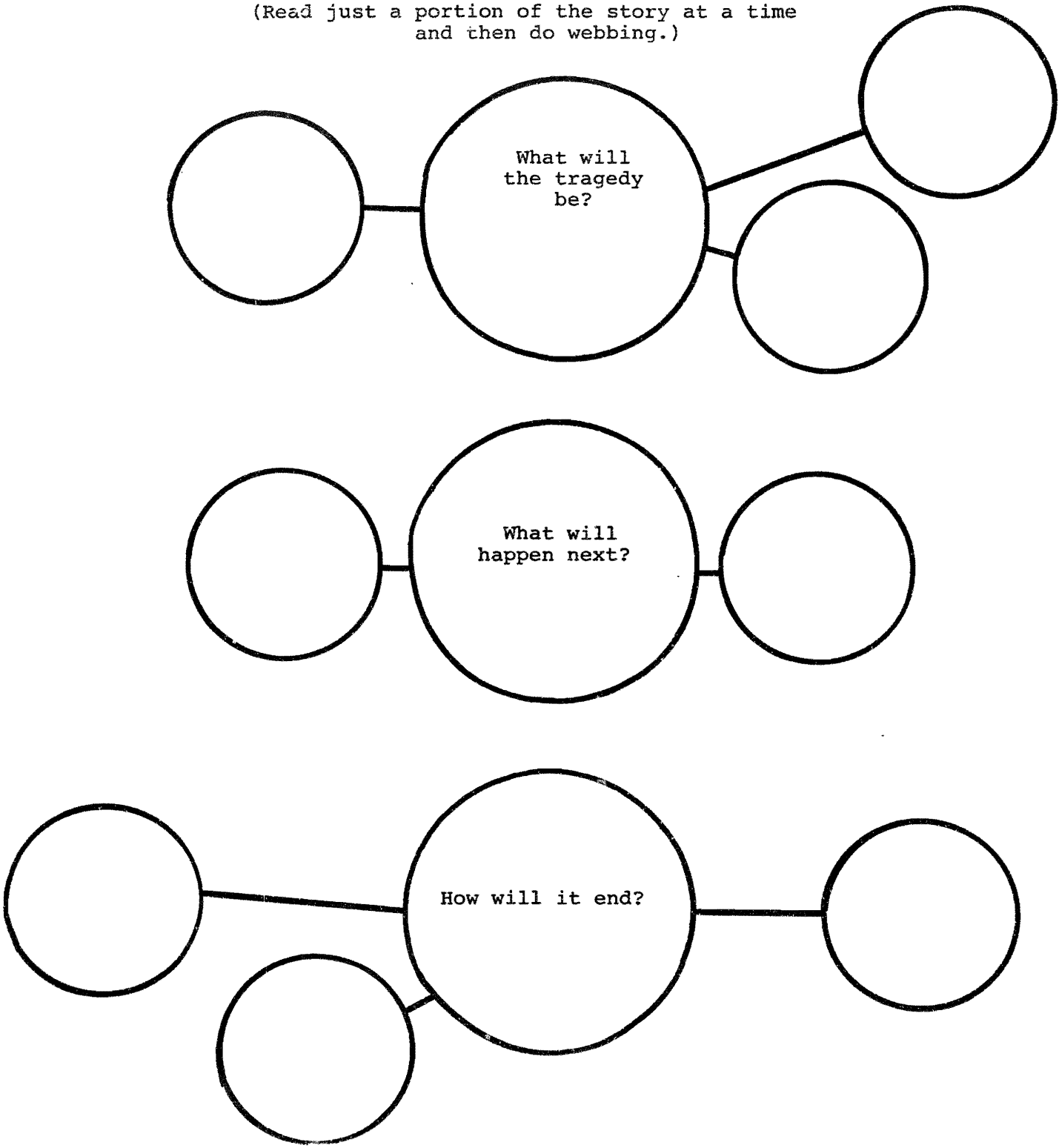


Cause and Effect Web



Prediction Web

(Read just a portion of the story at a time and then do webbing.)



Appendix D

Final Comparison

APPENDIX D
INFERENTIAL COMPREHENSION

Seventh Grade--Final Comparison

Name	Percentile Rank	
	October 10	April 8
Student 1	49	34
Student 2	27	51
Student 3	38	61
Student 4	20	23
Student 5	49	28
Student 6	32	51
Student 7	45	23
Student 8	20	42
Student 9	54	56
Student 10	41	28
Student 11	38	23
Student 12	49	28
Student 13	69	38
Student 14	29	28
Student 15	32	34
Student 16	29	61
Student 17	54	34
Student 18	24	73
Student 19	27	26
Student 20	54	46
Student 21	63	89