DOCUMENT RESUME

ED 414 182 SE 060 902

AUTHOR Monroe, Eula Ewing; Pendergrass, Michelle R.
TITLE Effects of Mathematical Vocabulary Instruction on Fourth Grade Students.
PUB DATE 1997-00-00
NOTE 24p.; Major portions of this paper were published as "Effects of Mathematical Vocabulary Instruction on Fourth Grade Students" in the Fall 1997 issue of "Reading Improvement." Presented at the 1997 BYU Public School Partnership Symposium on Education.
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Concept Formation; *Content Area Reading; Discussion (Teaching Technique); Educational Strategies; Elementary School Students; Grade 4; Intermediate Grades; *Mathematical Vocabulary; *Mathematics Instruction; Measurement; Writing Across the Curriculum

ABSTRACT

This study compares the effects of two models of vocabulary instruction: (1) the integrated graphic organizer/discussion model; and (2) the definition-only model on the mathematical vocabulary use of fourth grade students. The integrated model combines a modified Concept of Definition (CD) graphic organizer with the Frayer discussion model. The definition-only model required students to write definitions of key terms after an oral review. Knowledge of measurement concepts in two groups of students was assessed through mathematical writing before and after two weeks of instruction. Results showed a larger number of mathematics concepts recorded by the group using the integrated CD-Frayer model. One major implication of this study is that the CD-Frayer model is an effective method for teaching mathematical vocabulary. (Contains 19 references). (DDR)

RUNNING HEAD: Mathematical Vocabulary

Effects of Mathematical Vocabulary Instruction on Fourth Grade Students

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Major portions of this paper were published as "Effects of mathematical vocabulary instruction on fourth grade students" in the 1997 Fall issue of Reading Improvement, 34 (3), p. 120-132. The research summarized here has also been presented at the 1997 BYU/Public School Partnership Symposium on Education.

Abstract

The purpose of this study was to compare effects of two models of vocabulary instruction – an integrated graphic organizer/discussion model and a definition-only model – on the mathematical vocabulary use of fourth grade students. The integrated model combined a modified Concept of Definition (CD) graphic organizer with the Frayer discussion model. The definition-only model required students to write definitions of mathematical vocabulary after oral review. Knowledge of measurement concepts in two groups of students was assessed through mathematical writing before and after two weeks of instruction. Results show a larger number of mathematics concepts recorded by the group using the integrated CD-Frayer model. A major implication of this study is that the CD-Frayer model is one effective method for teaching mathematical vocabulary.

Effects of Mathematical Vocabulary Instruction on Fourth Grade Students

Benjamin Whorf, a noted linguist, theorized that language is required for higher levels of thinking and that an individual's language structure molds his/her understanding of the world (Carroll, 1956). Vygotsky, a Russian cognitive psychologist, postulated that a child's development is dramatically affected by interaction with language (Vygotsky, 1962, 1978, cited in Reutzel & Cooter, 1996). The work of these and other scholars who explore the role of language in the development of thinking gives support to the mathematics education community in its movement to emphasize the development of mathematical communication among learners (NCTM, 1989, 1991).

In order for communication to be successful, the individuals who are communicating must share a common language. In mathematics, perhaps more than in any other field, the language is complex, content-specific, and notably abstract (Miller, 1993; Schell, 1982). Although students may learn and apply much of this language through rich experiences in mathematics, the most important vocabulary words "need to be taught directly and taught well" (Vacca & Vacca, 1996, p. 136).

With this information, one begins to consider: What is an effective way to teach mathematical vocabulary directly? One response might be: Teach to the brain's natural capacity for thinking and organizing information.

According to schema theory, when the brain encounters new information it either fits new information into existing thinking structures or it modifies its existing structure in order to fit "radically new or discordant information" (Readence et al., 1989, p. 21).

One aid that is closely aligned with schema theory is the graphic organizer (see Figure 1). A graphic organizer is a visual representation of how the brain organizes its information: The graphic organizer presents significant concepts and the attendant relationships (Moore & Readence, 1984). Research by Moore and Readence (1984, cited in Readence et al., 1989) indicates that graphic organizers are especially effective for teaching technical vocabulary. There is a limitation to the use of graphic organizers, however. Success with graphic organizers is dependent on existing schema in the mind of the learner for the vocabulary term being presented (Dunston, 1992). In other words, if students have never seen or used meters in measurement, a graphic organizer for meter will not help the student to build knowledge about that concept.

Concept of Definition (CD) is a graphic organizer that follows currently accepted theory about how the brain processes a word or concept (Schwartz, 1988, cited in Vacca & Vacca, 1996; Schwartz & Raphael, 1985, cited in Vacca & Vacca, 1996) (see Figure 2). CD includes examples, important attributes, the class or category of the concept, and a comparison of that concept to others within the same category (Vacca & Vacca, 1996).

Another model of vocabulary instruction that appears to follow schema theory is the Frayer model (See Figure 3). The use of the Frayer model teaches students a way to analyze and acquire new concepts (Reutzel & Cooter, 1992). As reported by the International Reading

Association (1988), the following are the important parts of the Frayer model: "relevant and irrelevant attributes," "examples and nonexamples," and "supraordinate, coordinate, and subordinate aspects of concepts" (p. 18).

When combined, the Frayer model and Concept of Definition seem to complement each other (see Figure 4). When completing the Category or Definition portion of the integrated CD-Frayer model, the students are guided to think about supraordinate terms. While filling out Attributes, they explore both relevant and irrelevant attributes. The CD-Frayer model expands the use of examples to include both Examples and Nonexamples. During discussion of Examples and Nonexamples, subordinate and coordinate terms are incorporated. The Comparison portion of the CD was omitted in order to follow the Frayer model more closely. Also, in the study presented in this paper, more attention was given to discussing relevant attributes than irrelevant attributes on the Attribute portion of the model.

One major reason the CD and Frayer model were combined for this study was to ensure both visual and discussion components to mathematical instruction. Effective mathematical vocabulary instruction must include discussion, both oral and written (Monroe & Panchyshyn, 1995/96; Miller, 1993). By involving both a graphic organizer and a model for discussing mathematical vocabulary, both written and oral communication are taking place during mathematical instruction.

The other method of direct vocabulary instruction considered in this study is the definition-only method. Definition-only vocabulary instruction is the method typically used by teachers who provide instruction in vocabulary (Nagy, 1988). In this instruction, students obtain the definition of a word from a dictionary or the teacher, write the definition, and memorize it. For any vocabulary, and mathematical vocabulary in particular, this method has been found to be ineffective (Irvin, 1990). In the words of Vacca and Vacca (1996), "Students shouldn't be left to their own devices or subjected to the vagaries of a look-up-and-define strategy as their only access to the long-term acquisition of the language of an academic discipline" (p. 136).

Method

Two classes of fourth graders (N=58) at an elementary school in a rural area of a Western state were selected for this study. The population of the area is primarily middle class and Caucasian. Fourth graders were selected for the study since there appears to be a "vocabulary explosion" at the fourth grade level as students begin to read in the content areas more frequently (Blachowicz, 1987, p. 133, as quoted in Summers, 1991, pp. 15-16).

Each of the 59 students was randomly assigned to one of two groups: one group using the definition-only method and the other group using the CD-Frayer model. The original definition-only group consisted of 29 students, while the CD-Frayer group included 30 students. One student changed schools in the middle of the experiment, reducing the number in the definition-only group to 28.

The morning schedule for the fourth grade consisted of two periods of instruction, one for mathematics and the other for language arts, separated by a 15-minute period for physical education. Class periods ranged from 55 to 60 minutes. Students remained in assigned groups for the morning schedule only. These groups alternated mathematics periods on a two-day cycle. The purpose for alternating the periods was to control for differences in teaching that might favor the second group because of the teacher-researcher's experience in the first group (e.g., how capacity was taught to the second group might be influenced by the teacher's experience with the first group).

During the time instruction was taking place, another teacher observed and scripted each lesson. Scripts from instruction served as a record for verifying that the same mathematics concepts were taught in both classes.

The teacher-researcher taught a Measurement unit consisting of 10 lessons in the standard system, the metric system, area, and perimeter as the curriculum for this experiment. Prior to this unit, neither class had received instruction in measurement during the fourth grade. Also, the usual method for instruction in mathematical vocabulary for both groups was either definition-only or nonexistent.

Mathematical vocabulary words for this unit were selected prior to instruction. The words targeted during vocabulary instruction were those that were deemed by the teacher-researcher to be most important for communication about measurement in the mathematics classroom and in the real world.

An existing schema is necessary for the use of the graphic organizer in the integrated CD-Frayer model. Therefore, vocabulary instruction for each lesson took place after classroom experiences with measurement so that students would have opportunities to build schema for the target vocabulary.

At the end of each instructional period for the CD-Frayer group, students were guided in summarizing definitions of target measurement vocabulary using the integrated CD-Frayer model. Student comments were recorded on a large sheet of butcher paper with the modified CD structure drawn on it. On some occasions, the entire class participated in an oral discussion of the vocabulary as the teacher recorded their comments. On other occasions, the teacher-researcher asked individual students during mathematics activities to respond orally to specific components of the integrated CD-Frayer model; then, at the end of the lesson the class discussed what had been recorded on the chart and made additions or corrections. Approximately five to ten minutes were allotted for instruction with the integrated CD-Frayer model.

The definition-only group, on the other hand, received definition-only vocabulary instruction. In vocabulary journals, students copied definitions and important attributes of key measurement vocabulary terms after the teacher wrote them on the chalkboard and discussed the definitions. For 3 to 4 days during the study, however, teacher and students composed definitions and attributes of key vocabulary together. Approximately five to ten minutes were allocated for the definition-only instruction method.

The length of this study was 10 school days. Research studies with graphic organizers report wide variation in length of study. The longest study lasted 14 days with 25 minutes of instruction, while the shortest lasted one class period (Dunston, 1992). In order to test the integrated CD-Frayer model, the researchers decided to utilize the entire 10-day period available for instruction.

The authors chose to assess student growth in mathematics concepts through student journal writing. Assessing mathematics through writing has been found to be a valid means for measuring student understanding of concepts taught (NCTM, 1989; Cross & Hynes, 1994; Smith, Kuhs, & Ryan, 1993). Prior to the Measurement unit, the students had experience in writing in mathematics journals during a Geometry unit.

During this study, both groups were required to write in a journal about selected mathematics concepts that had been taught during vocabulary instruction. Writing prompts took the form of simple questions that required the students to describe what they knew about these concepts (e.g., "What are liters and milliliters?"). Students were given 5 to 10 minutes both at the beginning and at the end of the instructional period for journal writing.

On Day 1 of the experiment, students responded to the question, "Tell me everything you know about measurement." Students were asked to respond to the same question in a final journal entry on Day 10 of the experiment. These prewriting and postwriting responses (journal entries for Day 1 and Day 10) were the entries selected for analysis.

Each of these entries was coded according to number of measurement concepts mentioned, number of concepts with measurement content, number of accurate concepts, number of measurement applications, and number of additional concepts mentioned but not taught explicitly during instruction.[1] Data for these measures were examined using the Multiple

Analysis of Variance (MANOVA) test (Statistical Package for the Social Sciences, 1990). The level of significance for results was set at $p < .05$.

Number of measurement concepts mentioned tallied the number of mathematics concepts relating to measurement that were taught during the unit. Number of measurement concepts mentioned differs from the category of number of concepts with measurement content in that measurement content includes only those concepts mentioned by a student that were mathematically relevant to measurement. For example, if a student wrote that 'feet measure length,' this sentence would receive a score of '2,' since both feet and length have mathematical content; if a student said, 'I like measurement,' this sentence would receive a score of '0,' since the student expressed no mathematical content for measurement. Number of accurate concepts includes any measurement concept mentioned that was accompanied by a correct definition or attribute. The category of number of measurement applications includes the number of uses the student mentioned for a particular concept (e.g., when students wrote 'a ruler is for measuring length,' this was considered a mathematics application). Number of additional concepts mentioned but not explicitly taught during instruction includes those concepts that were only briefly mentioned during class. Concepts taught during the unit included those highlighted during vocabulary instruction and any additional concepts important to the study of measurement that students experienced during instruction.

Results and Discussion

A statistically significant difference was found for number of concepts with measurement content (see Table 1). The mean for number of concepts for the definition-only group was 8.444 with a standard deviation of 5.989. The CD-Frayer group, on the other hand, had a mean of 12.857 with a standard deviation of 10.543. Difference in means was significant, $p < .041$. Measurement content is the variable with which this research is most concerned; this difference indicates that the vocabulary instruction using the integrated CD-Frayer model was effective in increasing student use of mathematical vocabulary.

The other variable that showed statistical significance is number of mathematics applications. For this variable, the CD-Frayer group had a mean of .179 with a standard deviation of .390, while the definition-only group had a mean of .444 with a standard deviation of 1.219. The difference in means was significant, $p < .390$. However, since the number of mathematics applications for both groups was minimal, the results may be irrelevant.

The MANOVA revealed no statistically significant differences between the groups on each of the following variables: number of accurate concepts and number of additional concepts mentioned but not taught explicitly during instruction. These findings may have been affected by the limitations of the study. If more time had been given for journal entries or more explicit instructions given to the students about their writing, these variables may have shown significance.

Number of measurement concepts mentioned, however, did approach statistical significance ($p < .051$). The CD-Frayer group had a mean of 12.893 with a standard deviation of 10.532, while the definition-only group had a mean of 8.481 with a standard deviation of 5.938.

One limitation of this experiment was the time available. As described previously, there was only a 60-minute period available to teach a lesson, with about 10 minutes of this period allocated for journal writing. The ideal may have been to give the students unlimited writing time for their journals. In this way, the quality and content of their writing may have differed. Time constraints prevented in-class discussion of what students wrote in their individual journals or a class comparison of how postwriting and prewriting differed.

Further, there was limited time available to the teacher-researcher for the Measurement unit. During the weeks prior to the experiment, students were involved in a Geometry unit, while the weeks following the Measurement unit were needed to prepare the students for state standardized testing. As a result, a two-week window was the only time available for the study.

A potential limitation to this study may have been the method used in selecting the subjects for the different groups. The possibility existed that the language and mathematics abilities of the two groups might be unbalanced, despite the random selection.

Finally, the teacher-researcher was a novice teacher. An experienced teacher may have been more attentive to student involvement in writing, especially during the final postwriting. The researcher received several blank and "I don't remember" entries on Day 10 of the study. In addition, the limited experience of the teacher- researcher may have affected the clarity of instruction. Both the CD-Frayer and definition-only groups as a whole may have internalized some concepts better with more adept instruction.

The findings of this study indicate that the integrated CD-Frayer model may be effective in increasing the use of mathematical vocabulary in fourth grade student writing. One implication of this finding in combination with previous research is that the integrated CD-Frayer model may be effective for teaching mathematical vocabulary in the upper grades. The authors tentatively qualify the use of the integrated CD-Frayer model for older children. A graphic organizer is a somewhat abstract representation of concepts. The integrated CD-Frayer model may not be effective with younger children because of their difficulty in dealing with abstractions. In using the CD-Frayer model with older students, however, teachers can guide their students in constructing meaning for the vocabulary of mathematics. If the findings of this project can be generalized, changes need to be made in the way teachers typically teach mathematical vocabulary.

Additionally, the integrated CD-Frayer model could improve affective learning of mathematical vocabulary. Students receiving the definition-only vocabulary instruction did not seem to enjoy writing definitions or seeing them on the board. Often these students would express their disappointment vocally when they were instructed to open their vocabulary journals. Those students who were taught mathematical vocabulary using the integrated CD-Frayer model appeared to welcome vocabulary instruction. The CD-Frayer group participated actively in discussing attributes, examples, and nonexamples for key vocabulary terms. Holding the attention of the class seemed easier when vocabulary discussions were taking place.

Not only did children seem to enjoy the use of the integrated CD-Frayer model, teachers also find benefits from using the graphic organizer. Indeed, teachers who use graphic organizers to teach content during instruction are likely to feel better prepared and more organized (Moore & Readence, 1984). During this study, the teacher-researcher experienced a feeling of improved organization and preparedness when using the graphic organizer as compared with definition-only instruction.

As indicated, the integrated CD-Frayer model appeared to be effective in teaching mathematical vocabulary. Therefore, it is possible that this methodology would be effective in teaching the technical vocabulary of other content areas, such as science, where there is a high percentage of words that might be a barrier to student understanding.

The finding that the integrated CD-Frayer model of vocabulary instruction may be effective in teaching measurement vocabulary has been presented. Research to test the efficacy of this model in teaching other mathematical content is needed. As Benjamin Whorf theorized, an individual's understanding of the world is molded by interaction with language. Further research in the area of mathematical vocabulary instruction is needed to bridge the gap between language and children's understanding of mathematics in the elementary classroom.

References

Carroll, J. B. (Ed.). (1956). Language, thought, and reality: Selected writings of Benjamin Lee Whorf New York: Technology Press of Massachusetts Institute of Technology, John Wiley & Sons.

Cross, L., & Hynes, M. C. (1994). Assessing mathematics learning for students with learning differences. Arithmetic Teacher, 41(7), 371-77.

Dunston, P. J. (1992). A critique of graphic organizer research. Reading Research and Instruction, 31(2), 57-65.

International Reading Association. (1988). New directions in reading instruction. Newark, DE: Author.

Irvin, J. L. (1990). Vocabulary knowledge: Guidelines for instruction. Washington, D.C.: National Education Association.

Miller, D. L. (1993). Making the connection with language. Arithmetic Teacher, 40(6), 311-316.

Monroe, E. E., & Panchyshyn, R. (1995/96). Vocabulary considerations for teaching mathematics. Childhood Education, 72(2), 80-83.

Moore, D. W., & Readence, J. E. (1984). A quantitative and qualitative review of graphic organizer research. Journal of Educational Research, 78(1), 11-17.

National Council of Teachers of Mathematics. (1989). Curriculum and evaluation standards of school mathematics. Reston, VA: Author.

National Council of Teachers of Mathematics. (1991). Professional standards for teaching mathematics. Reston, VA: Author.

Nagy, W. E. (1988). Teaching vocabulary to improve reading comprehension. USA: ERIC Clearinghouse on Reading and Communication Skills, National Council of Teachers of English, & International Reading Association.

Readence, J. E., Bean, T. W., & Baldwin, R. S. (1989). Content area reading: An integrated approach (3rd ed.). Dubuque, IA: Kendall/Hunt.

Reutzel, D. R., & Cooter, R. B., Jr. (1996). Teaching children to read: From basals to books (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Schell, V. J. (1982). Learning partners: Reading and mathematics. Reading Teacher, 35(5), 544-548.

Smith, L. M., Kuhs, T. M., & Ryan, J. M. (1993). Assessment of student learning in mathematics. Columbia, SC: South Carolina University, South Carolina Center for Excellence in the Assessment of Student Learning. (ERIC Document Reproduction Service No. ED 348 161)

Statistical Package for the Social Sciences for Macintosh 4.0 (SPSS) [Computer software]. (1990). Chicago, IL: Language Systems.

Summers, S. (1991). Improving fourth grade students' word meaning vocabularies in the content areas through an eclectic approach. Nova University, Center for the Advancement of Education. (ERIC Document Reproduction Service No. ED 343 079)

Vacca, R. T., & A. L. Vacca. (1996). Content area reading (5th ed.). New York: Harper Collins College.

Vygotsky, L. S. (1962). Thought and language (E. Hanfmann & G. Vakar, Eds. and Trans.). Cambridge: M. I. T. Press.

Footnote

[1]In the initial examination of these data, other categories for coding the data were also used but were found to be irrelevant because of the nature of the data.

Table 1

Mean Number of Concepts with Measurement Content

	Mean	Standard Deviation
Definition-only	8.444	5.989
CD-Frayer	12.857	10.543

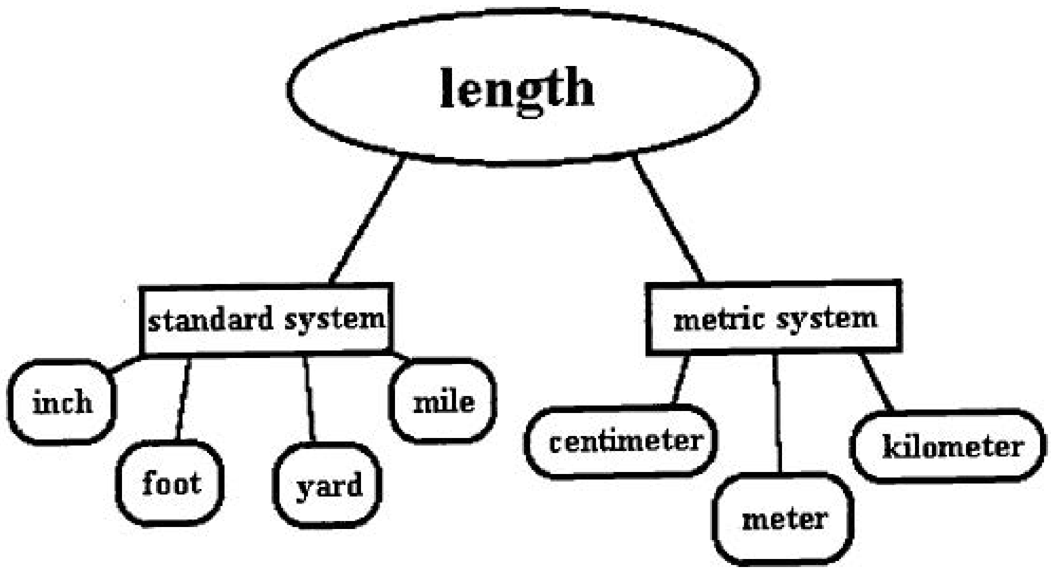

Figure 1. A graphic organizer featuring length.

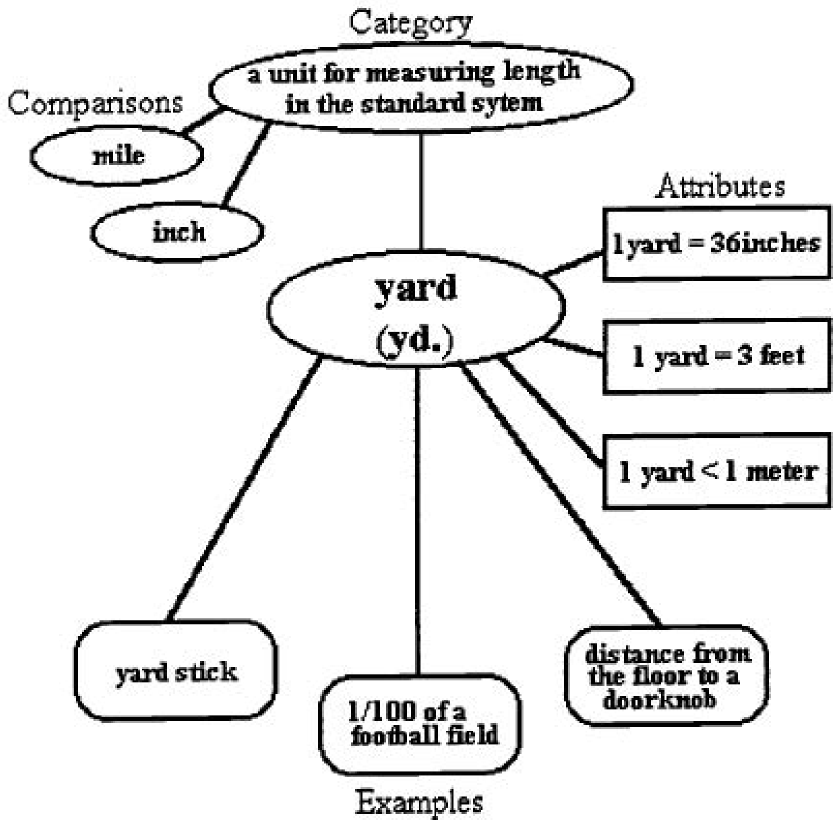

Figure 2. Concept of Definition featuring yard.

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yard (yd.)

Relevant and irrelevant attributes:

Relevant:	*Irrelevant:*
1 yard = 36 inches	yard sticks must be brown
1 yard = 3 feet	a yard can only measure a straight line
1 yard < 1 meter	

Examples and nonexamples:

Examples:	*Nonexamples:*
yard stick	the lawn around your house
1/100 of a foot ball field	foot
length from floor to doorknob	meter

Supraordinate, coordinate, and subordinate aspects of concepts:

Supraordinate:	*Coordinate:*	*Subordinate:*
mile	meter (1 yard is a little less than a meter)	foot, inch

Figure 3. Frayer model featuring yard.

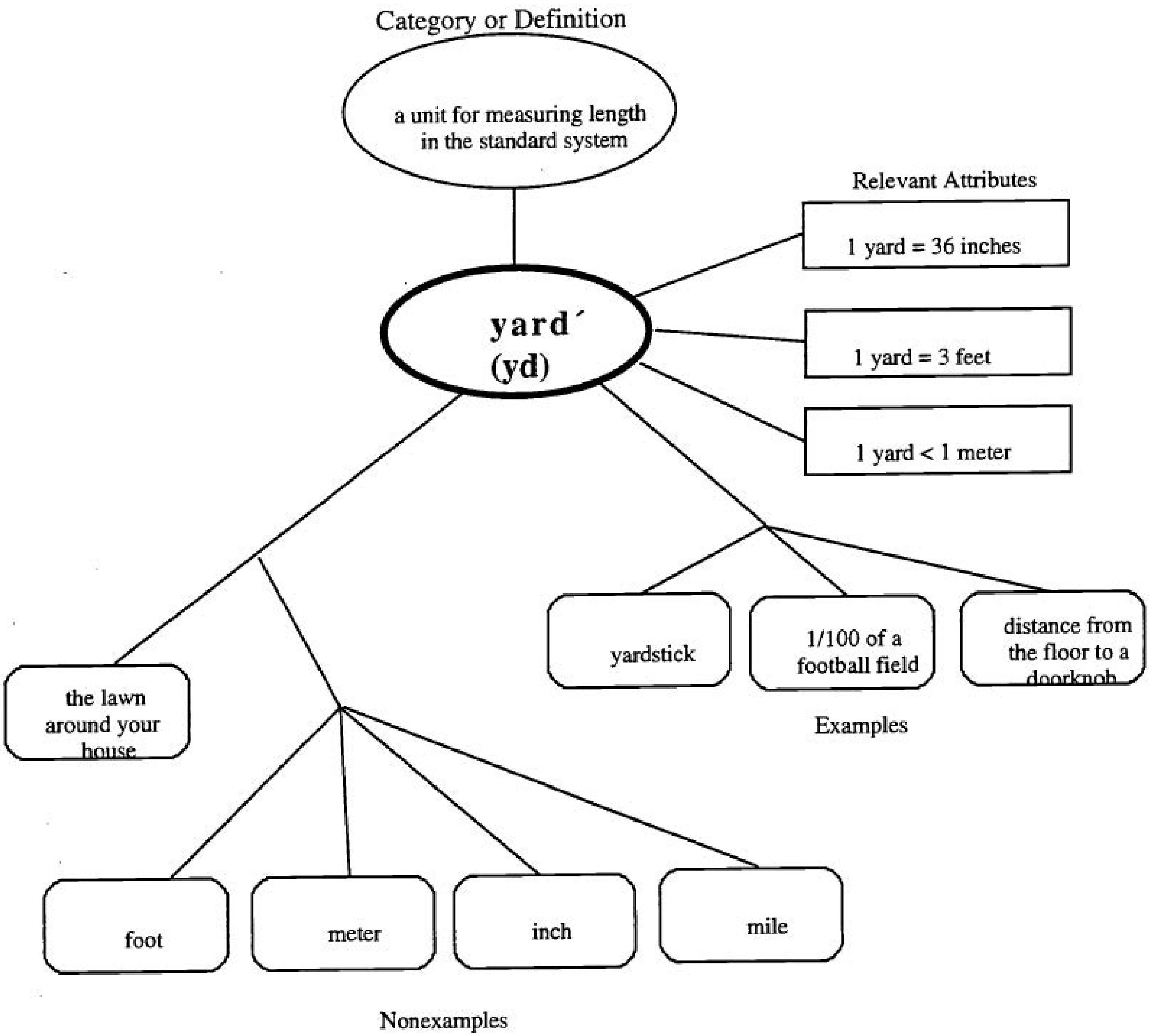

Figure 4. Integrated CD-Frayer model featuring yard.

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