

SOLUTION OF VERBAL PROBLEMS USING CONCEPT OF LEAST COMMON MULTIPLIER (LCM) AND GREATEST COMMON DIVISOR (GCD) IN PRIMARY SCHOOL MATHEMATICS AND MISCONCEPTIONS

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Abstract: In mathematics teaching, students' misunderstanding on acquiring some concepts and students' encountering difficulties on distinguishing and using knowledges are phenomena which are frequently happened. In this study, it is investigated students' strategies of solving verbal problems concerned with least common multiplier (lcm) and greatest common divisor (gcd) and misconceptions.

Research pattern was formed by 6th grade students from any private primary school in Eskişehir Turkey in academic year of 2000-01. This study was realized on 38 students.

Five levels were defined for measure of students' knowledges about research-theme and defining students' skills. First level: Definition of the concepts of (lcm) and (gcd). Second level: Finding of (lcm) and (gcd) of given numbers. Third level: Connection between the numbers whose (lcm) and gcd were given. Fourth level: Application of the concepts of (lcm) and (gcd) to real life-problems. Fifth level: Construction of problems concerned with the concepts of lcm and gcd

To evaluate obtained data "National Academy Press, Measuring Up.1993" is used as a main source.

According to conclusions of this research, students partially answered to the questions at first and second levels, and were inadequate on the questions at the others level.

Teaching archaic methods of problem solving to the students and unconnections among their knowledges and intuitive methods learned in real life and in other lectures could be reasons of this unsuccessful. So, the students could not learn the procedure of solving the verbal problems confidently.

INTRODUCTION

One of indicators documented the rank which mathematics education arrived, is problem construction and problem solving. Although mathematical concepts are known, difficulty that many students encountered in problem solving, appears in using of these concepts. Misunderstandings of the students in which mathematical concepts are acquired are the situations met frequently. Verbal problem solving concerned with the concepts of lcm and gcd is one of the subjects, which the students experience difficulties to achieve. The problem solving view means a dynamic, problem-driven view of mathematics as a continually expanding field of human creation and invention (Ernest, 1999). Problem solving is the primary mechanism by which advances in knowledge are made and provides a natural environment for learning. Success in problem solving appears success in learning. Student explores and uses power of mathematics by the method of problem solving. In problem solving, problems which are appropriate to Piaget's Disequilibrium Theory must be created. In such problems, there are the structures which seem in contradiction with student's present knowledge and experience. Thus, while the student solves the problem, the verification of his knowledges is tested, and he could get possibility of construction of new suggestions and hypothesis (Baki, 1994).

Problem solving based on learning is widely used in our schools. Besides, this situation provides an environment suited to learning concepts, but little value for problem solving procedure. It is necessary to know how to solve problem. Corte and Verschaffell (1991) studied on some of the problem structure and some factors effectual on student's solution strategies. To teach the student solutions of problems via different solving methods, is important from point of view of understanding the relationship among different and independent mathematical concepts (Baki, 1994). Archaic problem solving methods taught to students, contradict logical methods taught in real life and in other courses. From this consequence, the students couldn't safely learn the procedure of verbal problem solving. Traditional teaching emphasises practice in manipulating expressions and algorithms as a precursor to solving problems. It ignores the fact that knowledge often emerges from problems (Runesson, 1997). Clement (1982) indicated that teaching a student a standart method is no guarantee that the student's own intuitive method will not take over in a later problem-solving situation.

In the 1980s and in the early 1990s, there has been a demand for changing the mathematics education but this changing hasn't applied to problem solving. Precedent in problem solving is mostly to apply the procedure. Thinking procedures which form the base of problem solving, logical organization of knowledge used and misconceptions are omitted. One of the reason affected the success of problem solving is failure to use mathematical methods effectively on basic subjects. This failure causes to unsuccess to develop the easiness on mathematical methods.

In mathematics education, concepts known by the students are not enough for problem solving and incomplete due to misunderstandings in learning. The teacher must examine carefully misunderstandings by which learning will be inactive (Muth, Alvermann, 1999).

PROBLEM In this study, students' solution strategies on solution of verbal problems concerned with (lcm) and (gcd),and misconceptions were investigated.

METHOD The sample of this research was formed as 6th grade students of any private secondary school in Eski°ehir in academic year of 2000-2001.38 students were participated to this study.To measure the knowledge in the research subject and to discover the skills of students, an exam with 15 items was applied to the students.Students' answers were evaluated in five levels.

First level: Definition of the concepts of lcm and gcd

Second level: Finding of lcm and gcd of given numbers

Third level: Connection between the numbers whose lcm and gcd were given

Forth level: Application of the concepts of lcm and gcd to real life-problems

Fifth level: Construction of problems concerned with the concepts of lcm and gcd

To evaluate obtained data "National Academy Press, Measuring Up.1993" was used as a source (Jenkins, 1997)

FINDINGS

According to this evaluation, the students were answered items in first and second levels, partially.Lets examine some answers to these items:

Q1. What do you understand? The greatest common divisor (gcd) of number a and number b. The number of students who answered right to this question is 12.

Q3. Find the greatest common divisor (gcd) of 12 and 26. The number of students who answered right to this question is 27.

Q4. If the least common multiplier (lcm) of number a and number b is number c, what is the relationship among number a, number b with number c? The number of students who answered right to this question is 7.

Q6. If the least common multiplier (lcm) of 6 and 22 is 66, what is the relationship among number 6, number 22 with number 66. The number of students who answered right to this question is 28.

Forth level-questions is about application of concept of (lcm) and (gcd) to real life problems.Lets consider an example in forth level:

Q8.If number17 is divided by any number, remain is 2,number 33 is divided by this number, remain is 3.How could you solve this problem? Please explain. The number of students who answered right to this question is only 5.Generally answer given is that: I find the least common multiplier of the number.

Q9.If the students in a classroom sit in desk two each, three each and five each, there wouldn't be any student remained standing.

a) How many students are there in this classroom at least?

b) Is there unique answer to this question?

24 students found right the number of students and 24 students wrote down that there is unique answer to this question.

Fifth level-question are about construction of problems concerned with the concepts of (lcm) and (gcd).9 students wrote down right answer to this question.

Q11: Please construct any problem in concerned with (lcm).

Table 1. The Comparison of the Numbers of the Answers to Questions 4 and 6.

| n=38 | | Q4 | | | Total |
|-------|-----------|-----------|-------|---------|-------|
| | | no answer | wrong | correct | |
| Q6 | no answer | - | 1 | 6 | 7 |
| | wrong | 2 | 1 | - | 3 |
| | correct | 20 | 7 | 1 | 28 |
| total | | 22 | 9 | 7 | 38 |

Table 2. The Comparison of the Numbers of the Answers to Questions 9 and 11.

| Q9 | Q11 |
|-----------------------------|--------------------------|
| understanding problem 30 | no effort 29 |
| approach to solution 28 | approach to problem 5 |
| finding solution 24 | writing problem 4 |

SUGGESTIONS

According to conclusions of this study the students aren't successful in manipulations of the problems with data which are letters, symbols, and construction of problems. In problem solving, it was seen the difficulties of comprehension and conversion to the symbolic form. The most important reasons of these mistakes are inadequate usage of definitions and concepts given in problems, and not to make inference with any inspection, and not to use mathematical language.

To succeed these difficulties, the teacher must select the targets and give instructional techniques overcome difficulties. Thus, the teacher must teach to the students to use mathematical language and to comprehend basic principles, formulas, manipulation methods. Due to consecutiveness of mathematics and property of construction of mathematical knowledges on each other, today's mathematical problems are yesterday's mathematical problems.

REFERENCES

1. Ernest, P., *The Philosophy of Mathematics Education*, Farmer Press, London, 1991.
2. Baki, A., *Okul Matematiğinde Ne Öğretelim, Nasıl Öğretelim, Milli Eğitim*, No130, 72-76, 1996.
3. Clement, J., *Algebra Word Problem Solutions*, *Journal for Research in Mathematics* 13, 1, 16-30, 1982.
4. Corte de E. and Verschaffel, L. *Some Factors Influencing the Solution of Addition and Subtraction Word Problems*, *Language in Mathematical Education*, Philadelphia: Open University Press, 1991.
5. Jenkins, L., *Sınıflarda Öğrenmenin Yayılmaması*, Ek C, BY asqc, 1997.
6. Muth, D.K., Alvermann, D.E., *Teaching and Learning in the Middle Grades*, Allyn and Bacon, 1999.
7. Runesson, U., *Learning by Exploration in Mathematics Courses: a programme for student teachers*, *European Journal of Teacher Education*, 20, 2, 1997.