ICLEHI 2015 57 Dondon

Level of Mastery of the Competencies on Fractions: Basis for the Proposed Intervention Program

Dondon B. Buensuceso
Don Bosco Technical Institute, Philippines

ABSTRACT

The purpose of this study was to determine the level of mastery of the competencies on fractions among grade six pupils of as basis for the preparation of intervention program. The researcher made use of the descriptive method. The data gathering instrument used was the developed knowledge test designed to determine the mastery and non-mastery of the learning competencies on fractions among grade six students. The intervention activities are prepared based on the result of the knowledge test administered to the respondents. It is also designed to extend the curriculum for Grade Six pupils who have not mastered the learning competencies on fractions and enrich the mastered learning competencies. In this regard, these intervention activities are made possible to allow pupils augment their learning competencies on fractions as they perform different exercises, brain booster activities and word problems through varied strategies. The cooperative and investigative approach in learning is provided in this program. Finally, the instructional planning chart is also student centered.

Introduction

Philippine education nowadays is facing various challenges and problems. Generally, there is much talk about the deteriorating quality of education. Results of the pupil's achievement tests and or post diagnostic test clearly point out that the quality of education is deteriorating. Educators in higher education keep on blaming results of low performance of students to the teachers in the basic education.

Effective teaching can be achieved if you carefully designed instructional decisions. A teacher must continually make decisions and act on those decisions. To do this effectively, the teacher must have knowledge in both theoretical knowledge about learning and human behavior and specific knowledge about the subject matter to be taught. A teacher also must possess a repertoire of teaching skills that are believed to facilitate student learning and must display attitudes that foster learning and genuine human relationships (Ryan and Cooper, 2010).

Teaching mathematics entails developing a personal knowledge of oneself, which can be used to improve the teaching of mathematical power of the students. For the students to know mathematics, they have to engage in a quest to understand and communicate it. A special form of language is needed to pursue the quest. The language of mathematics is quite abstract and difficult to comprehend. It is therefore the task of the teacher to provide a meaningful link between mathematical abstractions and the real world (Subida,2006).

In the NCTM (2006), effective mathematics teaching requires understanding what students know and need to learn and challenging and supporting them to learn it well. Students learn mathematics through experiences that teachers provide. Teacher must know and understand and be committed to their students as learners of mathematics. Students must learn mathematics actively by building knowledge from experiences and prior knowledge. Learning with understanding also helps the students become autonomous learners. It becomes better when they take responsibility for their own learning and when they are engaged in challenging situations. Students also become confident in their ability to tackle difficult problems, eager to figure things out on their own, flexible in exploring mathematical ideas and willing to persevere when activities are challenging.

The word fraction itself comes from the Latin word fraction, meaning 'a breaking'. Thus, fraction indicates the breaking of a unit or a number into parts. Children come to school with some basic knowledge of fractions. But since this knowledge is not recognized systematically in their minds-they cannot manipulate fractional concepts (finds ½ of 2/5) or carry out mathematical operations with (1/3 + 3/7). School

experiences should clarify the concept of a fraction as a numerical entity and incorporate it into the basic operations of arithmetic. A child's first learning experiences with fractions should be at the concrete level. In learning fractions, children should undertake many activities that involve folding, coloring and cutting figures into equal parts. Sometimes, it is found that a teacher uses only shape, for example circle, to illustrate fractional parts. In such cases, the children in the class may believe that all fractions are "pie-shaped" and become confused when presented with the concept of a square divided into four equal parts (Swetz, 2003).

The researcher being a mathematics teacher and at the same time the subject area head of the mathematics area, also experienced some difficulties in teaching mathematics specifically fractions. He was then interested in looking for a better way that would make the teaching of fractions more meaningful and interesting. For this reason, he sought to find out the mastered and non-mastered learning competencies on fractions in elementary mathematics six of his students to come up with enrichment activities to further enrich the mastered learning competencies and to find ways or solutions to the non-mastered learning competencies. It is in this premise that the researcher embarked on this study.

Statement of the Problem

The purpose of this study was to determine the level of mastery of the competencies on fractions among grade six pupils as basis for the preparation of intervention programs.

Specifically, this study sought to answer the following questions:

1. What are the mastered learning competencies on fractions among grade six students?
2. What are the non-mastered learning competencies on fractions among grade six students?
3. What programs can be designed to help improve pupils' academic performance on fractions among grade six students?

Significance of the Study

In line with the vision and mission of our institution the mathematics area of the grade school department aims that upon completion of the Grade School Curriculum in Mathematics each graduate has gained mastery of the learning competencies, these include interpreting quantitative information, estimating, performing calculations mentally, and validating measurements of physical quantities and geometric figures, to deal with everyday situations. Thus, the mathematics teachers of the grade six level aim to develop the learners' ability to solve problems. This ability requires translating words and phrases into Algebraic expressions and performing simple Algebraic manipulations by providing enrichment and intervention activities suited to the learners' level and capability.

This study can also become a vital source of information for the school administrators and mathematics subject area head as their basis in planning and implementing enrichment program that may reduce the non-mastery of fractions not only among grade six students but, of all the students in Don Bosco Technical Institute – Makati.

Likewise, this study may also serve as a useful basis for policy formulation for curriculum development. It may also be of great help to them to identify the needs of the teachers in providing the necessary instructional materials and planning the program for teachers training on how to conduct enrichment activities. Moreover, for the pupils to determine their mastered and non-mastered learning competencies on fractions so that they can focus their efforts on engaging themselves to the learning competencies that they did not master and do more enrichment activities to the learning competencies that they already mastered.

Finally, this study could also be of prime importance to the teachers in providing first-hand information and insight as to what kind of learners is to be catered by the program. It may also help the parents in monitoring the development of their children in order for them to provide the necessary support for their kids. If parents are aware of their children's non-mastered learning competencies then they can provide them with the materials and suitable environment conducive for learning.

For future researchers, this study may be of help in generating idea, studies, and other related parts of this study that may contribute to the success of teaching elementary mathematics.

Theoretical/Conceptual Framework

Our Institution, specifically Mathematics Area is trying its best to improve the quality of instruction to overcome the deficiencies observed such as lack of mastery of the basic facts, inability to solve word problems on fractions and lack of understanding of some mathematical concepts which are related to the methods of teaching which the teacher used in teaching mathematics.

Mathematics has been one of the essential or basic areas of the elementary curriculum from early Colonial days when it was called "ciphering" and "arithmetic". It has consistently been one of the three R's of the elementary curricular program and will continue to play an important role in the education of children in the twenty-first century. In an increasingly technological world, the average person is confronted with the need to utilize the principles of mathematics daily. Mathematics is an integral part of understanding credit and installment or tax tables, cost of living data, as well as the everyday procedures of budgeting and running a household or business. Mathematics is more than computation; it is a study of patterns and relationships; a tool to be used in daily life when interpreting data; a way of communicating; a way of thinking as students organize, analyze, and synthesize information; and even an art form with underlying orderliness and consistency (Reyes, Suydam, &Lindguist, 1995).

The teachers are tasked to find ways on how to solve problems affecting low pupils academic performance by discovering new methods or innovations that will guide them with the challenging and rewarding task of helping the children in developing ideas and relationships that make up mathematics. Children do not learn by remembering rules or mastering mechanical skills alone. The challenge for the teacher is to engage pupils in activities where they will develop their skill. Teaching mathematics should be an exciting adventure (Middleton, 1999).

Through the identification of the non-mastered learning competencies on fractions, the teachers will be able to come up with a better solution on how to solve problems about the non-mastery of some learning competencies on fractions. However, results of the mastered learning competencies will become useful in preparing enrichment activities that will lead to the thorough understanding of the concepts and further development of the mastered learning competencies.

Through the introduction of the enrichment activities, pupils are expected to learn to value mathematics, become confident in their inability to do mathematics activities, become mathematical problem solvers, learn to communicate mathematics and learn to reason out mathematically (Calisin, 2007).

Enrichment activities should help pupils understand and clarify mathematical concepts, relate to one another and teach skills that will allow them to make more effective use of these concepts. In addition, it will help pupils appreciate the usefulness of mathematics and the power it gives them to solve their problems. Thus, they learn and remember mathematics as something useful and enjoyable rather than as something unpleasant that is imposed upon them.

The researcher conceptualized that the determination of the mastered and non-mastered learning competencies on fractions could be of useful basis in designing intervention program that will enrich the pupil's understanding of the mastered and non-mastered learning competencies. If identified, the learner as the center of the conceptual framework which indicates that all factors surrounding him will surely be helped in the total development of the learning competencies required to be mastered. These factors are the enrichment activities which when adopted carefully will lead to the maximum mastery of the learning competencies that will help increase pupil's academic performance in mathematics.

This study was based on the concept that the child is the center of the educative process; hence, teaching must be centered on the child. Modern education recognizes the child as the center of educative process and all his innate tendencies are utilized as drives or motives toward learning. Thus, determining the mastery level of the pupils will greatly help the teacher to adjust the subject matter and his teaching to the learning potential of the child.

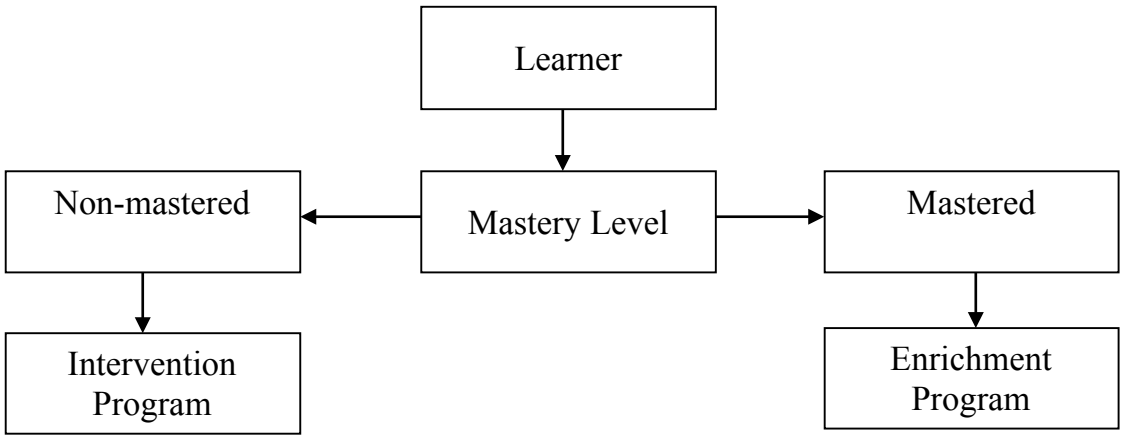

Figure 1: Research Paradigm

Research Design

The research design used in this study was descriptive. Descriptive method focuses on the present condition. The purpose is to find new truth (Calmorin, 1994). The study was descriptive because it signifies the gathering of data regarding present conditions. The determination of the mastered and non-mastered learning competencies on fractions among grade six students were the researcher's primary foci.

The Data Gathering Instrument

The research instrument that was used to gather pertinent data in this study is the developed knowledge test on fractions. The test was developed based on the learning competency (LC) used in the school. The test consisted of 40 items. In developing the test, four stages were followed carefully.

Stage 1 Developing a Knowledge Test
- Step 1. Preparation of the Knowledge Test
- Step 2. The first draft was presented to the researcher's adviser for comments and suggestions

Stage 2. First Validation
- Step 1. First Validation
- Step 2. Revision of the Knowledge Test
- Step 3. Administration of the Preliminary Try Out
- Step 4. Administration of the First Try Out

Stage 3. Second Validation
- Step 1. Second Validation
- Step 2. Revision of the Knowledge Test

Stage 4. Utilization of the Knowledge Test on Fractions for Grade Six Students

Analysis of the Knowledge Test Results

The results of the mastery test were organized into tables, after which the data were statistical treated, analyzed and interpreted to provide pertinent data for the study. Criterion reference tests was used to determine the learners' mastery of a skill, knowledge or any subject matter taught to them with reference to a criterion established which is usually an absolute standard. The performance of an individual learner in the test is compared with the standard set to ascertain whether he passes or fails. The status of the individual learner's scores is not dependent upon the scores of other individual learners who take the same test, but it is dependent upon the established standard or criterion.

Statistical Treatment of Data

To ensure validity and reliability of the data, results were analyzed with the use of descriptive method. The data, as the results of knowledge test were tested using the following statistical computations based.

Mean Percentage Score (MPS)-The mean percentage score was used to determine the mastery level of the pupil in a particular learning competency in mathematics grade six. The mean percentage score was computed by finding the total number of respondents who got the item correctly divided by the total number of respondents who took the test, multiplied by 100 to get the percentage.

The formula is $\mathrm{MPS} = \frac{n}{N} x100$

Where n = total number of the respondents who got the item correctly

N = total number of respondents

To categorize the level of mastery level of the skills, in the mastery test, as revealed by the results of the mean percentage score, the scale below was used.

MPS	Category
75-100	Mastered
74 and below	Non-mastered

The scale of 75 – 100 used for mastered learning competencies was based on the 75% passing average on the criterion level of knowledge test. The scale used was based on the guidelines provided by the department of education for evaluating the mastery level of the students for a particular learning competency in different subjects and for the purpose of evaluating pupil's performance.

Ranking.This was used to determine the hierarchy of items on students' mastery and non-mastery.

International Conference on Language, Education, Humanities & Innovation

Presentation, Analysis and Interpretation of Data

Part A

Part A presents the analysis and interpretation of the data gathered from the results of the mastery test administered to the 277 respondents. Data and information gathered were summarized and or tabulated in corresponding tables, analyzed and interpreted in the foregoing paragraphs in order and with reference to the basic questions raised**.**

Question #1: What are the mastered learning competencies on fraction among grade six students?

The first research question was answered by analyzing the result of the knowledge test administered to 277 grade six pupils. The list of mastered and non-mastered learning competencies on fractions among grade six students in elementary mathematics is an important aspect of the study. The information obtained along this line provided insights in the development of the enrichment and intervention programs.

The data gathered were ranked from the most mastered learning competency on fraction to the least mastered learning competency.

Percentage of Students Mastery and Non-Mastery

The table below shows the percentage of the mastery and non-mastery on fractions among grade six students based on the 75% mastery level set by the department of education (See Appendix J).

Table 1
Percentage Of Mastery and Non-Mastery

Score	Percentage	Remarks
30-40	**34.30%**	**Mastery**
∠ 30	**65.70%**	**Non-Mastery**

Out of 277 students who took the test that consists of 40 items, 95 students got 30-40 correct responses and 182 students got below 30 correct responses in the 40-item test (Table 2).This reveals that teachers have to give more time in teaching fractions among grade six students and give more activities or exercises in order for the students to master learning competencies on fractions.

Table 2. Percentage distribution of Scores
(Table 2 not presented)

Mastered Learning Competencies

Table 2 presents the mastered learning competencies on fractions among grade six students of DBTI Makati. The lists of mastered learning competencies ranked from the most mastered competency to the least mastered competency. This indicates the picture of the easiest topic for the students. This will also help teachers determine that least effort will be needed in discussing the competency being identified as the mastered competencies.

International Conference
on Language, Education,
Humanities & Innovation

Table 3
Percentage Distribution of Mastered Learning Competencies on Fractions Among Grade Six Students

Learning Competencies Tested	Item No./s	Percent (%) of Mastery	Rank
Differentiating proper from improper fractions	9	84.12%	3
Determining fractions equivalent to a given fraction	8	84.84%	2
Computing for the LCD of a given set of fractions	5	88.45%	1

Question # 2: What are the non-mastered learning competencies on fraction among grade six students?

The data on Table 3 shows the list of non-mastered learning competencies on fraction in mathematics 6.

Out of 31 learning competencies tested, 28 competencies were identified as non-mastered skills. Out of these competencies, solving 2 step problems involving subtraction and multiplication of fractions have the lowest percentage of mastery level which is of 23.83% followed by adding similar fractions without regrouping in the sum. The table also shows that out of 28 non-mastered learning competencies on fractions 9 learning competencies were about solving word problems. This means that one of the most difficult learning competencies on fractions is solving word problems. It can be interpreted further that non-mastered learning competencies listed therein need to be enriched and to be given more time in the teaching and learning process in order to master these learning competencies.

Question #3: What programs can be designed to help improve Students' academic performance on fractions among grade six students?

The intervention program on fractions was designed to augment the learning competencies on fractions as they perform different exercises, brain booster activities and word problems through varied strategies. These activities develop the pupil's logical and or mathematical reasoning and critical thinking skills as they practice different techniques in solving word problems on fractions.

Intervention Program on Fractions for Grade Six Students

Rationale

Education is the process of growth and formation of values and skills that are fostered in all aspects of the learner's life. The Grade School of Don Bosco Technical Institute-Makati Department as an academic institution recognizes the fact that each pupil is brilliant with different character and learning styles and abilities. The Mathematics Department also believes that every child is an image of God endowed with potentialities and gifts which should be tapped to the fullest. In the desire to continuously improve the quality of basic education and to improve the pupil's academic performance particularly in Mathematics, the researcher designed these enrichment activities on fractions for grade six students in considerations with the individual differences and needs of the learners.

These intervention activities on fractions are designed to extend the curriculum for Grade Six pupils who have not mastered the learning competencies on fractions while the enrichment activities are designed to enrich the mastered learning competencies on fractions. In this regard, these enrichment and intervention activities are made possible to allow pupils augment their learning competencies on fractions as they perform different exercises, brain booster activities, blended learning activities, and word problems through varied strategies. These activities attempt to develop the pupil's logical and or mathematical reasoning and critical thinking skills as they practice different techniques in solving word problems on fractions.

Situation

Based on the result of thirty-one (31) learning competencies on fractions for grade six which were tested, only three (3) competencies were mastered while twenty-eight (28) of these skills were non-mastered. The number of non-mastered learning competencies clearly points out that there is a need to provide an intervention and enrichment program for the students to master the non-mastered learning competencies on fractions for grade six students and enrich the mastered learning competencies.

Purpose

The Grade School Department Intervention Program ought to augment pupils' mathematical abilities. Specifically, this intervention program seeks to help each pupil

a. to be analytical, critical and confident in solving word problems on fractions
b. practice speed, accuracy and mastery of learning competencies on fractions
c. develop self-confidence on mastering the non-mastered learning competencies on fractions and to enrich their understanding of the mastered learning competencies.
d. offer pupils opportunity to work independently or group in order to master the learning competencies on fractions for grade six students.

Implementing Guidelines:

The intervention program is offered to grade six students in order to develop their learning competencies on fractions and to provide opportunities to share talents and skills with their classmates.

The intervention activities prepared are based on the non-mastered learning competencies will be conducted in the classroom setting.

The intervention activities on fractions will be provided to all pupils who need mediation. These pupils will be identified by conducting a pre-diagnostic test using the developed Knowledge Test on Fractions. The pupils who did not master the learning competencies will undergo the intervention program.

Use the Instructional Planning Chart when conducting the intervention program then the prepared worksheets for every lesson.The intervention program instructional planning chart and worksheets are shown in the next pages.

The Materials and Activities:

Materials. The teacher should provide varied activities on fractions. Some useful materials that the teacher could use are PowerPoint Presentations and other references; such as books which provide varied exercises on computational and problem solving skills regarding fractions, mathematical games, cut-outs, charts, concrete objects and worksheets for individual learning and blended learning such as online learning for the students.

Activities. Drills on fractions with speed and accuracy, non-routine problems, mathematical tricks, games and puzzles, and worksheets of varied exercises on fractions.

General Guidelines for Enrichment or Intervention Program

i. It is conducted every quarter.
ii. It is administered twice a week, every Tuesday and Wednesday for one hour.
iii. Pupils who did not master the learning competencies on fractions will undergo the intervention program.
iv. Letters will be sent to the parents of pupils who will be given the intervention program.
v. A pupil who is included in the program is required to finish the whole session.

Conclusions

In view of the foregoing findings, the following conclusions are drawn:

i. Use the intervention programs, so that the learners would be able to master the learning competencies and improve their academic performance in mathematics.
ii. Through various interesting activities and pictures as well as fraction models in the enrichment activities the teachers will make learners more competent, work independently and also work with groups effectively.
iii. The enrichment program will make use of varied strategies and techniques in teaching the mastered learning competencies on fractions.
iv. A lot more time in teaching fractions for elementary students.
v. The determination of the non-mastered learning competencies on fractions can serve as the primary grounds to careful engineering of mathematics curriculum to ensure better performance of the students on fractions. Through this study, teachers and all persons concerned will have a clear direction of what to do to improve the non-mastery of the learning competencies on fractions. The result of this study may also serve as the basis of evaluation of how the present techniques and strategies used by the teachers in the instructions have been effective for possible improvement and modifications.

Recommendations

On the basis of the findings and conclusions drawn from the study, the following recommendations are given:

i. The enrichment and intervention programs of this study should be subjected to expert validation.

ii. The teachers with close supervision of the school administrators should adopt the enrichment and intervention programs.
iii. A continuous evaluation of the pupils' academic performance on fractions should be done by the teachers.
iv. The findings of this study should be disseminated to school administrators so that they should develop similar programs
    a. that are geared towards the mastery of the learning competencies not only in mathematics but also in subject areas.
v. An independent and comprehensive evaluation study of the effectiveness of the designed enrichment and intervention programs be undertaken in order to validate the results of this study.
vi. In view of the poor performance of the students, there is a need to review the mathematics curriculum.

iclehi
International Conference
on Language, Education,
Humanities & Innovation