

International Journal of Human Sciences Research

THE USE OF MATERIAL RESOURCES: A POSSIBILITY OF TEACHING FRACTIONS

Danielle Aparecida da Silva

Undergraduate student of the
Mathematics Course – Degree at UFS

Deidiane Santos de Andrade

Undergraduate student of the
Mathematics Course – Degree at UFS

Teresa Cristina Etcheverria

Mathematics Teaching Professor of
the Mathematics Course – UFS

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Abstract: In the present work, we seek to present results of an experience carried out with students of the 7th year of Elementary School of a private school in the municipality of Malhador - SE. The accomplishment of the same is part of the proposal developed in the discipline of Laboratory of Teaching of Mathematics, of the Course of Degree in Mathematics of the UFS. It aimed to verify whether the use of manipulable material resources enables a better understanding of the concepts related to Fractions content. To this end, we developed activities that rely on the use of material resources to provide opportunities for understanding the notion of fractions and, in particular, the equivalence of fractions. The analysis of the students' performance in the activities revealed that the use of material resources contributed to the understanding of the subject and made the class more attractive.

Keywords: Elementary Education, Material Resources, Fractions.

INTRODUCTION

This work is part of a proposal developed in the discipline of Mathematics Teaching Laboratory, of the Degree in Mathematics at "Universidade Federal de Sergipe". Its general objective was to provide students with a better understanding of Fractions content through the use of manipulable materials.

The Fractions content was chosen as the central theme, because it is usually not presented in a way that facilitates the understanding of the concepts and, therefore, for the student it becomes difficult to understand it. Through this proposal, we seek to develop a different form of teaching from the usual one based on the use of blackboard and chalk, with the aim that students understand the concepts involved in the content and share and discuss learning and difficulties.

The purpose of this work is to discuss the

data obtained by applying the instruments in a particular context, referring to students in the 7th year of Elementary School at a private school in the municipality of Malhador - SE. To this end, we have organized the text into four parts. In the first, we present some ideas that support the use of material resources in teaching fractions. In the second part, we describe the procedures related to the execution of the proposal. The third part will refer to the analysis of the pre- and post-test results and the activities carried out. Finally, we present some considerations about the lived experience.

THE USE OF MATERIAL RESOURCES IN THE TEACHING OF FRACTIONS

The PCN point out that for the various didactic resources to play an important role in the teaching and learning process, there must be an interaction with the content addressed, as they can lead to the exercise of analysis and reflection. It is believed that this way students develop consistent and meaningful learning. (BRAZIL, 1998)

In order to exercise analysis and reflection, the use of the material requires planning with a view to the goals to be achieved. It is notorious that the teaching of fractions, in fact, of all mathematics, for some teachers is restricted to the use of blackboard and chalk. This reality is linked to the difficulty that some students have in assimilating mathematical content. In view of this fact, the need to adopt alternative methodologies is evident, in which the student learns from concrete experiences.

Change, in education, does not depend only on revolutionary theories or the effectiveness of new methods. Unlike other fields of professional activity, no substantive transformation in this area does without the involvement of educators. For this very reason, any change in education means, first of all, a change in attitude... (ROSA, 1996)

A change in attitude requires continuous improvement from the teacher in order to be able to innovate and overcome the challenges that plague the teaching of mathematics. The topic of fractions, as it is a content in which students tend to have difficulties, requires teachers to change their pedagogical action so that traditional teaching, based on memorizing rules, is abandoned and students are given the opportunity to handle of material resources, thus enabling a better understanding of the concepts.

Currently, there are numerous suggestions for material resources that allow us to work, in a fun way, with concepts involving the content of fractions. For this, it is necessary that the teacher dedicates himself to the preparation of classes that introduce new ways of teaching, transmitting the subject, opening space for further discussions and enabling satisfactory results (CAVALIERRI. 2005). It is believed that this way, the manipulable material helps the student to participate with more interest in the knowledge acquisition process and to better understand the concepts involved.

METHODOLOGY

The activities were developed in a 7th grade class of elementary school in a private school in the city of Malhador - SE. We approach the content of fractions from the use of material resources, seeking to bring about changes aimed at improving the understanding of the concepts involved. We believe that learning these concepts will serve as support for subjects that will be worked on later.

The work was carried out in four classes. In the first, so that we had an idea of the students' knowledge on the subject, we applied a pre-test containing two questions involving the identification of the representation of fractions operations and the calculation to find equivalent fractions, which were solved individually. According to Fiorentini and

Lorenzato (2006, p.117), "the questionnaires can serve as a complementary source of information, especially in the initial and exploratory phase of the research. In addition, they can help to characterize and describe the study subjects." In this case, the application of this instrument served to elaborate a diagnosis on the knowledge of the subjects involved.

In other classes, we worked on some basic concepts about fractions and equivalence of fractions. For this, we made use of resources such as folding and painting on strips of paper. And, to reinforce the worked concepts, a game called Fraction Race was applied.

ANALYSIS

ANALYSIS OF STUDENT PERFORMANCE IN THE PRE AND POST-TEST

As previously mentioned, these two questions were applied before and after carrying out the activities on fractions with the use of material resources. Twelve (12) 7th grade students who were attending Mathematics recovery classes participated in them. The answers given to the two questions were categorized as right or wrong.

Below we present the questions and the results of the students' performance in these two questions.

In the 1st question, we asked students to observe four drawings (described below due to non-acceptance of drawings in the format proposed by the event) and identify the fraction that the painted part represented in each of them.

- a) drawing of a circle divided into 8 parts, with one part painted;
- b) drawing of a hexagon divided into 6 parts, with 5 parts painted;
- c) drawing of a circle divided into 12 parts, with 9 parts painted;

d) drawing of a square divided into 4 parts, with the 4 parts painted.

This question aimed to analyze whether students were able to identify a fraction as part of a figure or object. Table 1 below presents the results of student performance in this question.

Number of hits	Pre-test		Post test	
	Number of students	%	Number of students	%
0	1	8.3	0	0
1	1	8.3	0	0
2	2	16.7	0	0
3	5	41.7	2	16.7
4	3	25	10	83.3
answer in blank	0	0	0	0
Total	12	100	12	100

Table 1: Student performance in the 1st question of the instrument

The data in the table reveal that in the pre-test, only three (03) students, which corresponds to 25% of the class, got the four answers right and four (41.7%) got three answers right. Considering the school year in question, this result was not expected.

It is important to highlight that the figure in which the students had more doubts and, consequently, in which there was a lower number of correct answers, was in item “c”. In our understanding, this was due to the fact that they were not sure that the denominator represents the whole or the whole, since the most common error in this item was to indicate the number of unpainted parts in the denominator.

In the post-test, ten (10) students got the four answers right, which corresponds to more than 80% of the class. For us, this is the appropriate result for a 7th grade class.

In the 2nd question, we asked the students to determine the missing term for the fractions to be equivalent. We present three sentences,

described below: a) $2/3 = /15$; b) $1/2 = 6/$ and c) $/4 = 15/12$.

This question aimed to know if the students knew how to find the fraction equivalent to a given fraction. Table 2 below presents the results of student performance in this question.

Number of hits	Pre-test		Post test	
	number of students	%	Number of students	%
0	3	25	0	0
1	0	0	0	0
2	2	16.7	1	8.3
3	0	0	11	91.7
answer in blank	7	58.3	0	0
Total	12	100	12	100

Table 2: Students' performance in the 2nd question of the instrument

In this question, we observed, in the pre-test, that in addition to those that were blank (58.3%), many answers were incorrect. Although the students had already studied this content, they were unable to remember how to proceed to find the equivalent fraction. This difficulty was already evident at the time of application of the instrument with the questions, because at all times they requested our presence in search of help. These doubts revealed conceptual and procedural difficulties, such as: in the letter “a” a student multiplied the numerator by the denominator (2×3) and completed it with the number 6. This student reveals that he still does not understand the concept of equivalence and has not mastered the operative process that facilitates the calculation to find an equivalent fraction. Another student, in the letter “c”, added the numerator and denominator of the known fraction. Likewise, this student shows that he also does not master the concept of equivalent fraction nor the calculation necessary to find an equivalent fraction.

Although we expected that these students, as they were in the 7th year, would perform better in the pre-test, it was important to make this observation so that we could redirect the planning of activities and provide opportunities for them to expand the knowledge they already had in relation to the representation of fractions and the Calculation to find the equivalent fraction. We used this information to give students the opportunity to rethink their mistakes and, at the same time, feel free to express their results, as “it is important that children have the freedom to make mistakes, to be able to invent and discuss rules and even change and can say what they are thinking (CAVALIERRI. 2005).”

This pedagogical action contributed to the satisfactory result presented in the post-test, in which eleven (11) students, which corresponds to 91.7%, answered all the items in this question correctly. This good performance was already evident from the moment of the application, since the students did not have doubts during the resolution of the questions, a fact that happened frequently in the application of the pre-test. It is worth mentioning that analyzing the students' performance in the pre-test contributed a lot in the planning of activities and in the way of conducting work in the classroom.

ANALYSIS OF ACTIVITIES APPLIED TO STUDENTS

After correcting the pre-test, aware of the students' most frequent doubts, mainly regarding the identification of equivalent fractions, we started the planned activity, which involved representing fractions and equivalences.

The first activity aimed to provide students with an opportunity to understand what equivalent fractions are. For this, we proposed the exploration of manipulable material resources, such as folding and painting on

strips of paper. This activity consisted of folding the strip in half and painting a part, then representing the fraction corresponding to the painted part. Then, with the same strip still folded, it was folded again. The figures, as well as their corresponding fractions, were recorded on the blackboard. This way, the students began to understand that the fractions represented the same painted part and that, therefore, they were equivalent. From the questions made by us, they realized that by multiplying the numerator and denominator by the same number, an equivalent fraction is obtained. The procedure with the material was performed other times, changing only the number of folds.

While carrying out this activity, we were all the time circulating in the room, observing the work of each student, questioning and provoking reflections on the doubts that arose. It was possible to perceive that the use of material resources and our questioning posture favored that everyone worked with interest, interacted with colleagues by socializing as they had done with folding and painting. They also interacted with us by asking questions about the subject and presenting their results.

Because we believe that mathematics is an area of study considered difficult for many students, it is necessary that certain contents, including fractions, be worked on in a more interactive way with the use of concrete materials, including the use of games. Based on this, we proposed a game called “Corrida das Frações” to the students, with the aim of stimulating interest and reinforcing the content.

The game consists of a track, which was mounted on the floor of the room, a rectangle divided into six equal parts, which was placed in the center of the track, and two dice with particular characteristics: one with the numbers 1, 2, and 3, corresponding to the

numerators of the fraction and another with numbers 2, 3 and 6, corresponding to the denominators.

To carry out the game, the class was divided into groups of four students. Each group threw the two dice at the same time, thus forming a fraction. In order for the students to know the number of houses they must walk, they needed to determine the fraction equivalent to the one drawn and with a denominator six, since each house on the trail corresponded to one of the parts that the rectangle was divided into, that is, $1/6$. Thus, to advance in the game, it was necessary for students to know how to determine equivalent fractions.

During the game, an organization among the students was proposed, so that everyone had the opportunity to play the dice. During the moves they observed that the move that advanced the most was the one when the numerator and denominator were drawn the same, however this was only advantageous at the beginning of the trail, because in the end as everyone needed to move only one space, they knew that the only option accepted was if $1/6$ came out on the dice.

We noticed that the activity with the game caused a lot of euphoria, making the room quite agitated. Although this happened, it was possible to notice that the game encouraged questioning and clarifying doubts. We observed that participating in it provided a better understanding of the proposed content, in addition to the fact that they were able to talk about what their greatest difficulties were during this activity.

FINAL CONSIDERATIONS

Based on the results of the students' performance in the pre- and post-retest and the observations made during the development of the activities when the students raised their own hypotheses and tested the solutions, we verified that the use of manipulable material

contributes positively in the learning of the fractions, because in the post-test more than 80% of the class got all the items of the two questions right. We cannot say that there was significant and possibly lasting learning, but we are convinced that we managed to bring about a small change in the learning of fractions.

As for the use of the game, Corrida das Frações, we realized that it is an attractive resource with several potentialities, as it involves the development of skills such as: group work, logical reasoning and insight. It also contributed to reinforce the concepts related to the content being worked on, in addition to giving students the opportunity to experience different teaching proposals.

The results of this work gave us the opportunity to perceive the students' difficulties in learning fractions, a fact that we relate to the way it is being approached, with little or no use of material resources in the activities proposed by the teachers.

We, as future mathematics teachers, understand the importance of acting as mediators between the student and knowledge, and also the importance of using manipulable materials as a support for teaching. Thus, this work will serve as a basis for future experiences, as it made it possible for us to have contact with the school reality.

We conclude by stating that we believe that our involvement in planning and providing opportunities for a change of attitude both in our proposal, by moving away from a chalkboard-and-chalk class format, and in the students' posture by assuming an active attitude, signals the possibility of transformation highlighted by Rosa (1996).

REFERENCES

DANTE, Luiz Roberto. Tudo é matemática/Luiz Roberto Dante. 3. Ed. São Paulo: Ática, 2009.

CAVALIERI, Leandro. O ensino das frações. Disponível em [HTTP://www.educadores.diaadia.pr.gov/modules/](http://www.educadores.diaadia.pr.gov/modules/)

PAGANOTTI, Ivan. Dividir as dúvidas para compreender frações. Disponível em [HTTP://www.revistaescola.abril.com.br](http://www.revistaescola.abril.com.br)

ROSA, Sanny S. da. Construtivismo e Mudança. 4ª. Edição. São Paulo: Editora Cortez, 1996.

BRASIL. Secretaria de Educação Fundamental. Parâmetros curriculares nacionais : Matemática /Secretaria de Educação Fundamental. . Brasília : MEC /SEF, 1998.148 p.

BENETÃO, Marilene Batista da Cunha. Jogos matemáticos como recurso didático. Disponível em [HTTP://www.teoleokohler.seed.pr.gov.br/redeescola/.../Projeto%207G.pdf](http://www.teoleokohler.seed.pr.gov.br/redeescola/.../Projeto%207G.pdf)

FIORENTINI, Dario; LORENZATO, Sergio. Investigação em Educação Matemática: Recursos teóricos emetodológicos. Campinas. SP. Autores associados, 2006.