

Introduction

Fraction is an important topic in school math curriculum. The study of fraction not only enables students to perform computations but it also provides a foundation for later work such as decimals, ratio, and percent (Son, 2011). However, most students' believe that fraction is a very difficult concept to understand. One of the underlying reasons for this belief could be the instructional strategies because normally teachers focus on drill-and-practice approach rather than emphasizing conceptual understanding of fraction. One way to make learning-fraction more meaningful is by integrating math manipulatives. The usage of manipulatives is expected to help students to understand primarily conceptual understanding of fraction. In this study, instructor utilized manipulatives including other instructional strategies to teach fraction concepts in mathed322 during Fall 2015.

Purpose and Research Questions

Due to various benefits, usages of manipulatives has been significantly increased in teaching and learning mathematics. Suh, Johnston, & Douds (2008) identified various benefits of manipulatives. Some of them are to (1) provide immediate feedback to learners so that they avoid misconception, (2) provide connection and visualization between numeric and visual representation, (3) help mathematizing, and (4) offer opportunities to teach in and represent mathematical ideas in nontraditional ways. Thus, this study is designed to investigate students' beliefs regarding the learning and understanding fraction concept. It is also aimed at finding the role of manipulatives helping students' change their belief and understanding fraction. The following research questions have been set for this study:

- ❑ What are students' belief regarding learning and teaching fraction concept?
- ❑ Can manipulatives help to reshape students' beliefs regarding concept of learning and teaching fraction?
- ❑ Do manipulatives help to understand fraction concept better than other tools?

Research Methodology

Participants: The participants were students majoring in elementary education enrolled in a mathed322 course during Fall 2015.

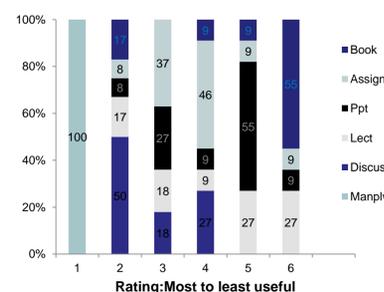
Instrument: A standard math attitude survey along with a survey designed by the instructor was used to collect data. The survey contained 21 Likert scale questions and three open-ended question. However, the post survey included seven open-ended questions including three from the pre-survey. The 21 Likert-scale questions were designed to cover various aspects of the nature of math content.

Pre-Post Survey Design: Right before teaching fraction concepts, a survey was used to collect data. The fraction concepts taught for two weeks (four classes) and the post survey was used to collect data. Students were allowed take the survey at home and were asked to return once they completed it.



Results and Findings

- ❑ Most of the participants believed that learning and teaching fraction concepts is difficult.
- ❑ Most of the participants did not change their belief regarding learning and teaching fraction concepts in most of the Likert-scale questions.
- ❑ Half of the participants changed their belief from non-confident to confident in teaching fraction concepts after the intervention.
- ❑ All participants rated manipulative as the most useful tool to learn and understand fraction concepts as well as fraction computation. Students' ratings for different instructional tools are as shown below.



Results and Findings

- ❑ One of the students states that "I loved 'fraction kit' with the paper torn into different pieces."
- ❑ Almost half of the participants believed that they could not explain fraction concepts as well as computation before the intervention. One student mentioned that "it is easier to explain how I got an answer because I can see what I am doing, as opposed to quick tricks that are abstract and more difficult to explain without having built the knowledge concretely."
- ❑ The majority of participants stated that fractions are difficult because of the many rules and the ideas of whole and parts. However, many of them also explained after the intervention that learning fraction concepts were easier with the help of manipulatives.

Conclusions

- ❑ The study suggested that students' beliefs regarding fraction concepts did not change after the intervention. However, many students changed their beliefs for specific questions.
- ❑ Some participants changed their belief for some Likert scale questions after the intervention. Many of them mentioned that they feel more comfortable in teaching fraction concepts after the intervention.
- ❑ The fraction kit was found to be the most useful manipulatives to learn and understand fraction concepts.
- ❑ The population size of this study is not large enough to find whether there was significant difference in students' belief in fraction concepts before and after the intervention. Thus, a similar study with a larger population size would support more concrete conclusions.

References

- Son, J.W. (2011). A global look at maths instruction. *Teaching Children Mathematics*, 17(6), 36-370
- Suh, J. M., Johnston, C. J., & Douds, J. (2008). Enhancing mathematical learning in a technological-rich environment. *Teaching Children Mathematics*, 15(4), 235-241.