IndoMS. J.M.E
Vol. 2 No. 2 July 2011, pp. 127-146

Spatial Visualization Tasks To Support Students' Spatial Structuring In Learning Volume Measurement

Shintia Revina, Zulkardi, Darmawijoyo, Frans van Galen

Abstract

Many prior researches found that most of students in grade five tended to have difficulty in fully grasping the concept of volume measurement because they have to build their competence in spatial structuring. The unit of volume "packing" measurement must be integrated and coordinated in three-dimension. On the other hand, it is revealed the errors that students made on the volume measurement tasks with three dimensional cube arrays are related to some aspects of spatial visualization, such as the skill to "read off" two-dimensional representation of solid objects. For those reasons, this research is aimed to develop classroom activities with the use of spatial visualization tasks to support students' spatial structuring in learning volume measurement. Consequently, design research was chosen as an appropriate means to achieve this research goal. In this research, a sequence of instructional activities is designed and developed based on the hypothesis of students' learning processes. This research was conducted in grade 5 of SD Pupuk Sriwijaya Palembang, Indonesia.

Keywords: volume measurement, spatial structuring, spatial visualization, design research.

Abstrak

Banyak peneliti terdahulu menemukan bahwa siswa kelas 5 sekolah dasar memiliki kesulitan dalam memahami konsep pengukuran volume, karena mereka harus memiliki kompetensi spatial structuring. Unit dalam pengukuran volume harus diintegrasikan dan dikoordinasikan dalam tiga dimensi. Di sisi lainnya, hasil penelitian-penelitian tersebut antara lain menyebutkan bahwa kesalahan yang dilakukan siswa dalam menyelesaikan tugas yang berkaitan dengan susunan kubus satuan berhubungan dengan aspek visualisasi spasial, seperti kemampuan untuk membaca gambar dua dimensi dari benda padat Oleh karena itu, serangkaian aktivitas di desain untuk membantu siswa menghubungkan kemampuan visualisasi spasial mereka dengan bagaimana mereka memahami struktur dari susunan kubus satuan. Penelitian ini bertujuan untuk mengembangkan kegiatan pembelajaran dengan menggunakan kegiatan yang berhubungan dengan kemapuan visualisasi spasial untuk mendukung kemampuan strukturisasi spasial siswa dalam belajar mengenai pengukuran volume. Dalam penelitian ini, design research dipilih sebagai jenis penelitian yang tepat untuk mencapai tujuan tersebut. Dalam penelitian ini, serangkaian instruksi pembelajaran di desain dan dikembangkan berdasarkan hipotesis proses pembelajaran siswa, dan pendekatan pemelajaran yang diguanakan adalah Pendidikan

Matematika Realistik. Penelitian ini dilaksanakan di kelas 5 SD Pusri Palembang, Indonesia.

Kata Kunci: pengukuran volume, strukturisasi spasial, visualisasi spasial, design research, pendidikan matematika realistik.

Introduction

The students in grade 5 often have difficulty in fully grasping the concept of volume. In those grades is the transition period from primary to secondary education when more abstract methods for measuring volume are introduced. It was revealed that what makes a measure of volume difficult is that it requires students to build their competence in spatial structuring, because the cubic unit in volume must be defined, coordinated and integrated in three-dimension. In particular, Ben – Haim et al. (1985) indicated the errors that students in grades 5-8 made on the volume measurement tasks with three dimensional cube arrays are related to some aspects of spatial visualization, such as the skill to "read" two-dimensional representation of solid objects. In that study, the answers students gave to solve the task tended to only count to either the number of faces, or the number of visible small cubes. The students seem not consider about the interior part of the object. It indicates that the students need to practice with concrete tasks in which they can well perceive the constructed views of the organization of a three dimensional rectangular array made of unit cubes before engaging with its pictorial representation.

Considering the important of that domain and realizing that lack of research about this domain in Indonesia, we designed a study to develop classroom activities, which RME underlies its design, with the use of spatial visualization tasks to support students' spatial structuring in learning volume measurement in grade 5 elementary school of Indonesia. This report discusses an experimental study in which we aimed to better understanding the emergence of the relationship between spatial visualization and spatial structuring in learning volume measurement during students' activities. Therefore, this study pose a question: How can spatial visualization tasks support students' spatial structuring in learning volume measurement in grade 5?

Theoretical Framework

Literature was studied to find out what former studies have shown about the