How A Realistic Mathematics Educational Approach Affect Students’ Activities In Primary Schools?

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Abstract

The learning and teaching of Mathematics in Aceh, Indonesia has always been teacher-centred, mechanistic and conventionally practiced. This paper reports on how the Indonesian Realistic Mathematics Education (IRME) approach activate students activities in Mathematics classroom. This study observed the students’ Mathematics activities involved in the IRME approach in the classroom. In this IRME approach students were observed three times which takes five weeks during the Mathematics class, based on IRME. This study showed that Mathematics activities for those who were taught using IRME are higher than for those using the conventional approach. The results showed that IRME approach is being practised in Aceh, but not completely. The higher percentage of activities suggests that the Aceh Education Office expands the implementation of IRME in all primary schools so that learning of Mathematics is more effective.

1. Introduction

Indonesian Realistic Mathematics Education (IRME) was first developed in Holland in 1971. IRME was aimed to make learning Mathematics more interesting and meaningful for students by introducing teaching this subject through contextual problems where the problems were in the students’ knowledge and experience. IRME combined the views of what is Mathematics and how to teach and learn Mathematics (Sutarto Hadi, 2005). IRME is a learning and teaching approach which uses reality as the starting point in the learning and teaching process that aims to support students in building and re-inventing Mathematics through interactive contextual problems (Gravemeijer, 2010). The classroom instruction of IRME started with the contextual problems which are familiar to the students.

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or in other words are within students’ experience and knowledge. Students are then facilitated to solve the contextual problems presented. Contextual problem solving is known to have a positive influence towards students’ ability to understand Mathematics (Bonotto, 2008). Learning Mathematics is best done by giving students actively solve contextual problems. Students dealt with Mathematical problems in their daily lives. Teachers can use these informal daily activities that are known to the students to help them identify mathematical situations. Based on IRME, learning Mathematics is a part of students’ activity; like learning Physics and other disciplines that involve mental, emotional and intelligence. Learning Mathematics is more effective if students work towards processing and transforming information, actively. IRME stresses that teaching and learning aids should be related to students’ daily lives and experiences. This is the principle of being realistic in IRME (van Den Heuvel-Panhuizen, 2003). Realistic refers to imaginable questions posed to students (Wijdeveld, 1980), followed by the students solving the Mathematical problems (Treffers, 1987). IRME instructions are students-centered and that students learn by practising hands-on. Students’ activities are done through a lot of interaction and this will build the interest to learn Mathematics in the students (Ahmad, Slettenhaar & Plomp, 2002). The learning and teaching of Mathematics in Indonesia has always been teacher-centered, mechanistic and conventionally practiced. The main aim of the instruction was just memorizing facts, concepts and formulas. Classroom instructions did not give students the opportunity to build their own understanding and thus, students became passive learners and did not participate in the learning process. Students could not understand the importance of learning algorithms and just memorized formulas without understanding the mechanics of it despite knowing that they have to first grasp the concept and usage before memorizing them. Students were instructed to memorize a lot of facts and they should be able to regurgitate them during examinations (Morina, Darmiati, Ibrahim & Su’id, 2009; Ahmad, 2002).

2. Literature Review

The teaching and learning Mathematics in primary schools will be more effective if done through group activities (Sutarto, 2005). Assigning activities during classroom sessions is one of the factors that determine the achievement in learning Mathematics. But, the scenario back then was, the students felt that the activities were burdensome, so they lose interest and finally they give up on learning mathematics (Tsai & Chang, 2009). Majority of the students in Indonesia dislike and get anxious when they have to attend mathematics class. This situation has caused low achievements in mathematics among students (Keuper-Makkink, 2010). The IRME principle follows closely RME which is based on Freudenthal Perceptual, but the contexts used in the teaching and learning Mathematics must be parallel to the students’ environment and life experience. The context used in IRME has to be realistic in such a way that questions or problems posed to the students have to be locally based. Context familiarity is an important factor in IRME (Sutarto, 2002). The students’ culture and their practices which is closer to them aids teachers to develop a more meaningful learning situation for the students (Bonoto, 2008). IRME instructions consist of six principles; activity, realistic, hierarchy, inter-related, interaction and guided discovery (Yenni & Heck, 2003). PMRI is a special teaching and learning theory that is suitable and depends on the application of the real world. The instructions start from students’ own experience, therefore, students get to participate in the learning activities and this makes the Mathematics lessons more meaningful. Posing real questions will be more meaningful utilizing interactive instructions. This allow explanation and permit possible solutions understood by other students by expressing whether they agree or disagree by questioning the alternatives and reflection (Cobb, 1994). IRME instructions give students opportunity to develop their own understanding of Mathematical concepts through the manipulation of objects and equipment. Students will be able to develop a cognitive structural design which will help them to systemise their thinking in order to interpret the new experience through active exploration (Piaget, 1985).

3. Methodology

A total of 25 standard five students of Sekolah Dasar Negeri 03, Kota Banda Aceh, which practices IRME in their Mathematics lessons (experimental group) and 25 students who do not practices IRME (control group). The data is collected through observation using a check list. Ten (10) aspects of students’ activities were being observed; activity 1 (giving attention to teacher’s and peer’s explanation), activity 2 (reading and understanding contextual problems), activity 3 (giving response towards contextual problems), activity 4 (giving ideas to solve the
problems), activity 5 (discussing the solutions among group members), activity 6 (completing the group task), activity 7 (presenting solutions and justifications among groups in the classroom), activity 8 (drawing conclusions about certain concepts and procedures), activity 9 (completing the task individually) and activity 10 (engaging in activities which are not related to the lesson). The observation list for students’ activities is checked based on the video-taped lessons done for Mathematics instructions using IRME approach only. The observation was done in two lessons, recorded as Lesson A and Lesson B. Students’ observation was done every 5 minutes, following Borich (2004), who said that students’ observation should only be done every 5 minutes. Since the duration for Lesson A was 105 minutes, the number of students’ activities was 21, whereas there were only 14 students’ activities in Lesson B within the duration of 70 minutes. The data was analysed using frequency table.

4. Findings

The findings showed that from the lessons A and B, the use of IRME in Mathematics lesson has not been implemented totally. This can be seen from the observation done (Table 1). There were some students activities expected to occur but did not occur. In fact, Activity 1 which is giving attention to teacher’s and peer’s explanation for both lessons which was expected to happen frequently, only occurred minimally; 15.24%. This means that students only use 15.24% of the lesson to give attention to teacher’s and peer’s explanations. This explains why the students were passive and took such a long time to complete the task given, which should be at the minimal usage of IRME approach. Nevertheless, Activity 6 which is to complete the group task occurred highly; 17.39% and discussing answers in groups (Activity 5) occurred at 14.22%. From the ten activities eight students’ activities are expected to occur that are activities from 1 – 8. Activities 1 and 9 are expected to occur minimally because if activity 2 (reading and understanding contextual problems) occurs frequently it means that the students are not active and if activity 9 occurs frequently, it shows that there are less student to student interaction. Meanwhile, activity 10 is not expected to happen at all in IRME instructions. All the students completed the task individually (Activity 9). Table 1 shows the students activities that took place during Lesson A and B using IRME approach. The activities were performed as expected except for Activity 2. Students’ activities occurred in various frequencies. During Lesson A, 8 types of students’ activities (95.25%) occurred when using IRME approach in Mathematics classroom. All the expected activities occurred except Activity 2. Different students’ activities occurred at different frequency. Eight types of expected students’ activities (92.58%) occurred during Lesson B. Based on the observation, students did not perform Activity 2 which is reading and understanding the contextual problem during Lessons A and B because the teacher had asked the questions verbally. The teacher did so to arouse the students’ interest and motivate them on the importance of the topic, area and volume (Jaring-jaring Kubus & Balok). During Lesson A, the teacher gave less attention to assigning contextual problems, which is the main characteristic of IRME approach.

<table>
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<tr>
<th>Type of activities</th>
<th>Lesson A Number</th>
<th>Percentage</th>
<th>Lesson B Number</th>
<th>Percentage</th>
<th>Average Number</th>
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<td>13.6</td>
<td>19.43</td>
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<td>7</td>
<td>10</td>
<td>9.6</td>
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<td>70</td>
<td>100</td>
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</table>
5. Discussion and Implications

The findings showed that from the observation of the two lessons A and B, the use of IRME in Mathematics lesson has not been implemented totally. There were some students activities expected to occur but did not occur. In fact, Activity 1 which is giving attention to teacher’s and peer’s explanation for both lessons which was expected to happen frequently, only occurred at the minimal rate. This means that the students only give attention to teacher’s and peer’s explanations. This explains why the students were passive and took such a long time to complete the task given, which should be minimal using IRME approach. Nevertheless, Activity 6 which is to complete the group task occurred highly and discussing answer in groups (Activity 5). This occurrence is similar to the findings of Sutarto (2002). The study conducted by Ahmad, Slettenhaar and Plomp (2002) also showed that in IRME, the students were actively thinking. Heck (2003), showed that during IRME, students performed various activities. Students were actively giving suggestions and responding to their peers’ opinions. This finding is in tandem with the findings by Ahmad (2002), which showed that learning and teaching using IRME makes students active participants. This findings also showed students did not perform Activity 2 (read and understand the contextual problem) because the teacher had asked the questions verbally. The teacher did so to arouse the students’ interest and motivate them on the importance of the topic. During the Mathematics lesson, the teacher gave less attention to assigning contextual problems, which is the main characteristic of IRME approach. Bonoto (2008), also showed that the contextual problem solving took place during IRME made students actively explore, inquire and develop Mathematical ideas and concepts. This study showed that the implementation of IRME gave opportunities for students to actively build their own understanding of the Mathematical teaching aids. Teachers must invent students’ expected activities in Mathematics lesson using the IRME approach so that whatever activities that the students undergo will be meaningful and they will develop to become formal learners from informal learners. Thus, teachers must provide proper learning guidance in clear stages which can assist students’ learning outcome. The findings of this study also showed that not all the expected students’ activities listed out will occur when using IRME. This shows that teacher’s ability to invent activities or contextual problem solving sessions still need to be increased or polished. It is hoped that there will be maximum involvement in the implementation of PMRI namely the principals, head of panel, the District Education Office and the “Lembaga Penjaminan Mutu Pendidikan” of Indonesia (LPMP). The implication of this study suggests that “Dinas Pendidikan Aceh” further widen the implementation of IRME to all primary schools so that Mathematics teaching and learning can be more effective and meaningful. This, indirectly, will increase the Mathematics performance of Aceh students to a higher level on par with the Indonesia’s National Achievement.

References


