Creativity Fostering Behavior of Mathematics Teachers through the Implementation of School Based Assessment

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Abstract

The introduction of School Based Assessment (SBA) in Malaysian schools can be seen as providing space for teachers to foster creativity in their classroom. A study was conducted to determine the level of creativity fostering behavior of mathematics teachers involved in the implementation of SBA in the mathematics classroom. Two sets of questionnaire were developed based on the work by Cropley to evaluate the teachers’ self-report and students’ perception of teachers’ behavior respectively. The respondents consist of 246 mathematics teachers and 492 year one secondary school students. The findings gave indication that the teachers showed high level of fostering creativity behavior in the teaching and learning of mathematics. The implication of the study is that the implementation of SBA do provides opportunities for teachers to foster creative behavior in their mathematics classroom.

1. Introduction

Since 1980’s dynamics steps has been taken by the Ministry of Education Malaysia (MOE) in integrating creativity elements in the school curriculum, starting from the now outdated integrated curriculum KBSR and KBSM to the recent standard curriculum KSSR and KSSM. School education in Malaysia has been viewed as teacher-centered and examination oriented (Lim & Hwa 2007; Indramalar & Chapman, 2003). Indeed, the approach labeled as rote learning, rigid and stifles creativity is quite common in Asian schools (Beech, 2002).

The National Education Blueprint 2006-2010 focus on producing confident, creative and well-rounded students and this instigated the introduction of the school based assessment (SBA). Thus, giving more space for teachers to foster creativity and consequently develop students’ competencies in higher order thinking skills (MOE, 2007; 2012; Faizah, 2011). It is of interest that after several years of implementation, are the teachers showing any significant behavior in fostering creativity in mathematics classroom? This study was conducted to seek the answer.

2. School Based Assessment (SBA)

School based assessment refers to assessment of students in a classroom (Evans, 2012) and are also known as “continuous assessment”, “assessment for learning” and “formative assessment” (Rajput et al., 2005; Black et al., 2003). It is considered a holistic assessment that assess the cognitive (intellectual), affective (emotional and spiritual) and psychomotor (physical) aspects. Features include a wide range of assessment tasks and skills, flexibility, and the use of open ended questions (Ahmed and Williams, 1994). Written test carried out within the school such as quizzes, test and examinations are not usually included (Evans, 2012).

As content experts, teachers are responsible to create quality assessments align to the learning outcomes. This provides opportunities for teachers to continuously monitor students and give constructive feedback to improve their learning (Brown, 2001; Shamsiah et al., 2010; AACU, 2011). Indirectly, it helps teachers to develop effective teaching strategies to enhance the learning of students with different abilities (Mansor, 2012).

Grading criteria is set by the Malaysian Examination Board. The Assessment Reference Standards is used as a benchmark for the national education standards. The standard statements (see Table 1) are categories according to bands from Band 1 up to Band 6 (BPK, 2012) which are arranged in a hierarchy with descriptions of the behavioral performance (Lembaga Peperiksaan, 2011).


Table 1: Descriptors of each band

Tools used include problem solving, discussions, project work, scrapbooks, portfolio, investigation, training and testing and may involve informal assessments such classroom observation. Students’ achievements are reported in the form of process, product or the students themselves (Lembaga Peperiksaan, 2011). SBA gives autonomy to teachers in the administration and helps both teachers and students to identify their strengths and weaknesses.

3. Creativity Fostering Behavior (CFB)

Creativity is the ability to think in novel and unusual ways about the solution method to problems (Santrock, 2009). In classroom instruction, Cropley (1992) likens it to divergent thinking and views creativity as the ability to produce original, creative and novel ideas. For Guilford (1967), divergent thinking is considered a characteristic of creativity. The concern is in providing creative practices that stimulate practical intelligence (Sternberg & Wagner, 1989), thinking (Sternberg et al., 1995), and solving problems.

Another challenge faced is in creating an environment that supports students’ motivation and creative behavior. Activities such as, group discussions or working in pairs encourages students to communicate mathematical ideas with their friends and thus promotes cognitive development and organization of minds (Simonton, 1988). In addition, teachers themselves need to be flexible, open towards creative ideas and attitudes and values independence thinking.

4. Purpose of study

The purpose of this study is to identify Malaysian Mathematics teachers level of creativity fostering behavior in SBA implemented mathematics classroom from teachers’ self-report and from students’ perception, and to determine the possibility of a relationship between them.

5. The Method

5.1 The Participants

The participants consist of 246 teachers and 492 students from one state in Malaysia. Their background are summarize in Table 2 and Table 3 below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Background Information</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gender</td>
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<tr>
<td></td>
<td>Male</td>
<td>79</td>
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</tr>
<tr>
<td></td>
<td>Female</td>
<td>167</td>
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<tr>
<td>2</td>
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<tr>
<td></td>
<td>Less than 5 years</td>
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</tr>
<tr>
<td></td>
<td>Between 5 to 10 years</td>
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<td></td>
<td>More than 10 years</td>
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<tr>
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<td>Option</td>
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<td></td>
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<td>Optionist</td>
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</tr>
<tr>
<td></td>
<td>Non-Optionist</td>
<td>39</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Table 2: Teachers Background Information
Of the 246 teachers, 79 were male (32.11%) and 167 were female (67.89%). As for the teaching experience, the numbers of respondents are almost equally distributed between the specified years. Majority of the teachers are bachelor degree holders (81.7%), a few of them with master degree (13%) and none with a Phd. Nearly all of the teachers has mathematics as their main option.

Table 3 below show that out of 492 Form 1 students, 193 were male (39.23%) and 299 were female (60.77 %). Majority of the participants were of Malay ethnic. Half of the students obtained grade A in mathematics in UPSR (Primary School National Examination) and the rest obtained either grades B or C. None of the respondents obtained D or E.

<table>
<thead>
<tr>
<th>Item</th>
<th>Background Information</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gender</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
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<td>2</td>
<td>Race</td>
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<tr>
<td></td>
<td></td>
<td>Chinese</td>
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<tr>
<td></td>
<td></td>
<td>Indian</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>UPSR Mathematics Result</td>
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<td>262</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>176</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>54</td>
</tr>
<tr>
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<td>D</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3: Students Background Information

5.2 Instrumentation

Data were collected using two sets of questionnaire, one is for teachers who will self-report and another one is for students who will evaluate the teachers’ behaviors. The teachers’ creativity fostering behaviors are measured using Soh’s (2000), Creativity Fostering Teacher Index (CFT). Both the questionnaire consists of 45 items constructed based on the nine creativity fostering behavior (CFB) identified by Cropley (1997) as below:

i. Independence : Encouraging students to learn independently.
ii. Integration : Having a cooperative, socially integrative style of teaching.
iii. Motivation : Motivating students to master factual knowledge to have a solid base for divergent thinking.
iv. Judgment : Delaying judging students’ ideas until they have been thoroughly worked out and clearly formulated.
v. Flexibility : Encouraging flexible thinking.
vii. Question : Taking students' suggestion and question seriously.
viii. Opportunities : Giving students opportunities to work with a wide variety of materials under different conditions.
viii. Frustration : Helping students to learn to cope with frustration, failure and disappointment so that they can have the courage to try the new and unusual.

Each CFB contains five items and the items are measured using a six point Likert Scale. The Cronbach-alpha value for statistical reasoning test was 0.96. According to Fisher (2007), the item reliability, that is 0.99, was excellent based on the rating scale instrument quality criteria and thus verifies the instrument construct validity.

6. Findings and Discussion

Figure 1 below showed the mean score on teachers’ self report. The highest mean score obtained was in judgment (4.80) followed by independence (4.68), opportunities (4.47), evaluation (4.46), flexibility (4.43), motivation (4.41), questions (4.36), integration (4.33) and
lastly frustration (4.30). Seven of the nine CFB showed high level of teachers’ creativity fostering behavior. As a whole, the average mean is 4.47 and this gives an indication that the mathematics teachers have a high fostering creativity behavior in SBA system.

Figure 1: Mean Score for Each CFB based on Teachers’ Self Report

The two CFB seen to be frequently fostered most by the teachers were judgment and independence and of the two, judgment is the highest. Several teachers lowly reported fostering integration, questions and frustration. Although the number of teachers involved in the study is small, but the matter is of concerned.

In general, 138 (56.10%) teachers claim having a high level of fostering creativity behavior in their mathematics classroom (see Figure 2). Whilst, 107 teachers considered themselves moderate (43.50%) and only 1 (0.41%) teacher reported poor fostering behavior.

Figure 2: Level of Creativity Fostering Behavior in SBA based on Teachers’ Self Report

Although we can see that the teachers had a high CFB but there are many teachers too in the moderate level. Possible reason for the teachers’ level of CFB may be due to the transition period, moving from moderate to high level, as SBA is still newly implemented and teachers are still in the midst of getting themselves adapted to the system. Thus, the environment has a direct influence over the creative behavior of people (see Rhodes, 1961; Amabile et al. 1996). A nurturing environment will not only benefit learners, but also teachers in their attempt to foster the creative potential of their students.

Figure 3 below showed the results of students’ perception on their mathematics teachers’ CFB in the classroom through SBA. From students’ perspectives, the CFB fostered most by the teachers are judgment and opportunities with the mean score of 4.78 and 4.65 respectively. This is followed by evaluation (4.58), independence (4.56), motivation and flexibility (4.43), questions (4.38) and lastly frustration (4.35). Like the teachers, students too were still adapting to SBA. They felt relieved and less pressured but the downside is, any assessment given by teachers was not taken seriously.
Overall, the teachers’ CFB from students’ perspectives are shown in Figure 4. 55.28% of students felt that their teachers’ fostering creativity behavior in the SBA implemented mathematics classroom is high. Whilst, 43.50% considered their teachers’ fostering behavior is moderate. Only 1.22% of the students think that their teachers have poor fostering creativity behavior. In short, majority of the students felt that their teachers showed a highly fostering creativity behavior in the mathematics classroom.

<table>
<thead>
<tr>
<th>Creativity Fostering Behavior Teacher-Student</th>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>t</th>
<th>Significant (2-Tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>246</td>
<td>4.47</td>
<td></td>
<td>-1.48</td>
<td>0.141</td>
</tr>
<tr>
<td>Student</td>
<td>246</td>
<td>4.51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Teachers’ Self Report verses Students’ Perception on Teachers’ CFB

Based on the paired t-test result in Table 4, a significant value of 0.141 with significant level 0.05 is obtained. This indicates no significant difference between the teachers’ self-report and students’ perception about teachers’ CFB through SBA in mathematics classroom. Thus, we can say that the information gathered from both groups is reliable, where a positive correlation and a strong relationship are obtained between the responses from teachers and students.

7. Conclusion
The implementation of SBA can be seen as promoting a positive impact on teaching and learning where students are involved in meaningful learning. However, the results also showed that almost half of the teachers reported having moderate CFB in their mathematics classroom.
It is likely that the teachers were not well prepared or equipped with the required knowledge or skills. This matter is of concerned and efforts should be made to ensure teachers have a better understanding of what creativity is, its implication in education and how it can be better integrated in the implementation of SBA in mathematics classroom.

Acknowledgment
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References
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