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Article

Impact of Cooperative Learning in Developing Students' Cognitive Abilities for Academic Achievement

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Abstract

This study used an Action Research Method to investigate ways to improve the thinking and reasoning skills of grade eight science students in an under-resourced school in Karachi. The students' rote learning patterns were challenged using the schema provided by Blooms' taxonomy of learning domains. A cooperative learning environment was generated with a renewed investment plan, a restructured lesson plan and an intensive workshop with the group leaders. These interventions were done with the help of the preliminary data that was collected through questionnaires. The outcomes of the action research method showed a positive correlation between cooperative learning approach and academic achievement of the students.

Keywords: cooperative learning, cognitive abilities, Bloom's Taxonomy

Introduction

The school, where this study was conducted is located in Shirin Jinnah Colony, Karachi. The school being a government school does not charge any monthly tuition fee. It is an under resourced school that lacks basic physical infrastructure, which includes no running water in the bathrooms and frequent power breakdowns during the day. The desks are also not proper and the overall physical environment is not conducive for teaching and learning. Furthermore, rote learning is also very common amongst these students, as it is encouraged by the government teachers who themselves are not competent in the subject that they are teaching.

After teaching science for eight months to grade seven students, I was disturbed to see the class average being at 45 percent. The bell curve for the marks in the final exam was left skewed, showing that more students had scored below 50 percent. Moreover, there was a big gap between the student who had achieved the highest mark, and the student who had achieved the lowest mark. As a teacher, it was alarming since the exam questions were all based on the content and questions that we had done in class. Furthermore, the group system that I had introduced for the purpose of increasing students' academic performance had really not shown much of an impact on their final exam scores. As a result, I had to revisit and reevaluate the situation.

Literature Review

Cooperative learning promotes learning and fosters respect and friendships among diverse groups of students (Attle & Baker, 2007; Slavin, 2004). In fact, the more diversity in a team, the higher the benefits for each student. Peers learn to depend on each other in a positive way for a variety of learning tasks (Gillies, 2007). In cooperative learning students typically work in teams of four. This way they can break into pairs for some activities, and then get back together in teams very quickly for others (Lai & Wu, 2006). It is important, however, to establish classroom norms and protocols that guide students to contribute, stay on task, help each other, encourage each other, share, solve problems, and also give and accept feedback from peers (Hänze & Berger, 2007; Siegel, 2005).

According to Bond and Castagnera (2006) students' learning is greatly enhanced when a child teaches another child; since social support in class can either be received from peers or from the teacher (Johnson, 1985). However, a cooperative environment is essential for an effective peer support system (Bond & Castagnera, 2006).

In cooperative learning, students work in small groups to help each other learn and understand academic material (Slavin, 2013). Cooperative learning conversely would fail if prerequisite social skills (Slavin, 2008 & 2011) among students were not developed (such as listening, negotiating, problem solving, resolving conflict and encouraging

one another); and at the same time it is important to abandon competition (Zakaria & Iksan, 2007), as there is a difference between making students compete amongst each other and challenging them (Shevin, 1994). If implemented correctly, research has shown that cooperative learning has helped to maximize students' learning, and has also resulted in greater academic achievement than other methods of teaching (Johnson, 1985). Cooperative learning has often been referred to as a means of fostering thinking skills and promoting higher order thinking (Slavin, 2013).

Activities and experiences are important in the academic success of students, but so are standard objectives, assessments, and materials. For standard objectives and assessments, Bloom's taxonomy is quite helpful (Pickard, 2007). The revised taxonomy has been classified into seven hierarchical levels namely remembering, understanding, applying, analyzing, evaluating, and creating. Bloom's taxonomy was revised with the intention of serving to the needs of a larger audience with the emphasis of improving instructional delivery, curriculum planning and assessment.

Methodology

Design

Self-reflective cycles of action research were employed for this research (Koshy, 2013). These cycles included reflecting upon the current practices, coming up with a plan to change a current practice that was not effective in class, implementing the new plan, and then determining the effectiveness of the new actions (Bencze, 2013).

Participants

The participants for the action research were grade eight students. All participants were girls since it is an all-girls' school. The ages of these participants range between 13-16 years. Most of them are Pathan, and students have to wear burqas or chaddars when they are outside the school. They come from low income conservative families.

Measures

The measure that was used in this research was the ability of the student to answer questions pertaining to level one and level two thinking skills on Bloom's taxonomy during the independent practice and summative test. The questions for level one of Bloom's taxonomy aimed at assessing whether students remembered a concept or not? The cues used to devise these questions were 'what', 'list', and 'name'; whereas, the objective of questions pertaining to level two was to assess whether the students had understood the concept. The cues used for devising these questions were 'explain', 'classify', 'differentiate' and 'give examples'.

Procedure

As part of the first step of the self-reflective cycle I tried to assess my current teaching practices by doing a situational analysis. This helped me to identify the areas that I wanted to explore during my literature review. In the literature, the terms cooperative learning and Bloom's taxonomy were explored in more depth. Once this was done, I made an intervention plan to meet my objective. The research objective was to make my students capable of answering questions pertaining to level one (remembering) and level two (understanding) on Bloom's taxonomy with the help of a cooperative learning environment. I wanted to determine the effectiveness of my intervention plan by looking at the improvement in the summative test scores of the students. My situational analysis was based on two investigation tools which were the following:

1. Questionnaire
2. Reflective journal

Questionnaire

The questionnaire was administered on 46 students who had been promoted from grade seven to grade eight. The questionnaire had nine questions. The first question required them to rank the subjects that they were studying in order of their preference. Looking at the frequencies for this question, English was given the highest preference, which was followed by math and science.

Table 1. Frequency table of students' subject preferences

Rank	1	2	3	4	5	6	7	
Math	9	16	11	3	4	1	2	46
Urdu	2	9	4	18	10	2	1	46
Islamiyat	0	2	2	7	10	17	8	46
Social Studies	1	4	2	7	14	17	1	46
English	24	12	6	3	1	0	0	46
Science	12	5	19	7	2	1	0	46
Sindhi	0	0	0	1	2	9	34	46

In the second question, students had to rate their likeness for science on a five point Likert scale (five being the highest score and one being the lowest score). The questionnaire results showed that 86 per cent of the students liked science subject. In the third question, 73 per cent of the students felt that they understood the content that was taught during the science class. In the remaining six questions of the questionnaire students had to give a score on a five point Likert Scale to the following factors:

1. Clarity of lesson objectives;
2. Effectiveness of group work;
3. Getting individual attention from the teacher;
4. Getting help from the group leader;
5. Usefulness of books;
6. Getting help from home.

It can be concluded that students were not 'getting help from home'. This was followed by not 'getting help from the group leader'. Students however, given the highest score to 'getting individual attention from the teacher' which was followed by 'effectiveness of group work'.

Table 2. Total scores given by students for questions four to nine

Questions	Total score (230)
The teacher tells the objectives of the lesson.	195
Group work is effective.	210
Teacher gives me individual attention.	216
Group leaders explain when I don't understand.	193
Books are effective in understanding a concept.	203
At home I get help when I don't understand a concept.	172

Findings of the reflective journal

I maintained a reflective journal and kept recording my field experiences in it. The reflective journal helped me to assess my practices of cooperative learning. I implemented a group system in the class with the class strength of 47 students. The whole class was divided into groups of four. The groups had been formed such that every group had a strong student, one or two weak students, and one or two average students. The stronger student was made the group leader. According to the findings from the journal, this group system was not helping the weaker students especially during the guided practice of my lesson. During the guided practice of the lesson plan, I made students work with their respective groups. I gave every group a problem sheet that had questions and they had to solve it as a group. The problem that arose from this practice was that I could not assess whether the weak students had tried solving the problem or not.

In structuring of the group system the pitfalls that I had identified through my reflective journal were three. First, I did not mention to my class as to why I was making them work as a group and what I expected of the groups. Secondly, my group leaders were not instructed about what they were supposed to do, especially with members who were not listening.

Leaders had not been coached or trained for the responsibility that they had been assigned for. Thirdly, I was focusing more on achieving academic objectives than developing their social skills, which are crucial for academic achievement. Lack of planning and implementation were the reasons for not fully benefiting from the group system.

After situational analysis, I made an action plan that I implemented in my class. My action plan had two phases. As part of the first phase of my action plan, grade eight was divided into two sections so as to reduce class strength. Section A had 26 students, whereas section B had 21 students. This was followed by a renewed investment plan, through which the class was introduced to new rules and consequences, along with a new quantitative and qualitative goal which revolved on developing a cooperative learning environment. Furthermore, during the first phase the group leaders were made to go through an intensive workshop that tried to inculcate skills that would foster a cooperative learning environment within the class. The second phase focused on changing my instructional delivery by using Bloom's taxonomy within a cooperative learning environment.

Renewed investment plan. Students were introduced to new qualitative class goals. The qualitative goals of my class were team work, discipline, determination and hard work. These goals were discussed with the students and new but simple rules and consequences were also introduced in the class. If any student broke any rule, they had to face a consequence so as to discourage the behavior. The severity of the action was determined by how many rules were broken, and with that also determined the severity of the consequence.

Group leader workshop. The workshop was five days long. The purpose of the workshop was to make group leaders understand their role and responsibility. The workshop aimed at making the group leaders understand who is a leader, and tried to nurture the soft skills of listening, negotiating, problem solving, resolving conflict and encouraging one another.

Changing the structure of the lesson. The old lesson plan had a learning objective. The plan was divided into three parts: introduction to (a) new material, (b) guided practice, and (c) independent practice. In guided practice, I only gave them group work. In the new lesson plan there were social objectives along with the learning objectives. Learning objectives unlike in the old lesson plan format were based on Bloom's taxonomy level one and level two. The introduction to new materials was limited to seven minutes like in the old lesson plan format. Guided practice was divided into two stages. Each stage of the guided practice ensured that students master level one and level two thinking skills of Bloom's taxonomy. Stage one of the guided practice had pair work in which the pairs had to decide who would be the writer and who would be the speaker. Once they had decided, the speaker had to answer level one question of Bloom's taxonomy by dictating it to the writer who had to just write the answers. This role had to be then reversed, and students had to adhere strictly to their respective self -assigned roles. Once done, and if they had more time they could discuss the answers amongst each other. This was then followed by the second stage of the guided practice where students had to answer questions pertaining to level one and level two on Bloom's taxonomy individually. In both phases they were permitted to ask for my help if they needed it and then these questions were discussed in class. In the independent practice, students had to answer questions pertaining to level one and level two on Bloom's taxonomy, on their own. Students' work was tracked and any student who failed to attempt even one question during the independent practice had to stay back for remediation after school.

Results

During my action research, I used the new lesson plan format for the topics: temperature, matter, states of matter, melting, boiling, and freezing within a cooperative learning environment. A summative test was given to students once all of the above topics had been taught in class. The summative test had questions pertaining to level one and level two on Bloom's Taxonomy. The class average for the summative test of grade 8A was 80.10 per cent and the standard deviation of the scores was 3.7 per

cent; whereas for grade 8B the class average was 89 per cent and the standard deviation of the scores was 2.9 per cent.

Outcomes and Discussion

In my action research I learnt that learning objectives need to be specific. Once my objectives were tailored to level one and level two on the Bloom's taxonomy I was able to plan a more structured lesson. Questions during the guided practice and independent practice were driven by the learning objectives which made assessment genuine. It also ensured that remedial was not just for below average students but were for any student who failed to answer any of the independent practice questions.

The investment plan had qualitative goals along with the rules and consequences, and the workshop helped in creating a cooperative learning environment within the class. This environment helped in maximizing students' learning. Pair work was also a good activity as it helped students to not only remember the concepts, but to listen to the lecture carefully during the class.

Students, however, did struggle in remembering the content after the lesson was delivered. Once this was noticed I gave them a post lesson worksheet. This worksheet summarized the key points of my lesson followed by questions pertaining to level one and level two on Bloom's taxonomy. Students had to copy the content of the worksheet in their copies and then had to answer the questions of the worksheet on their own. The name of this post lesson worksheet was *Dorbeen1*.

Conclusion

Cooperative Learning Method and clear objectives helped me to bridge the gap between the weaker and the stronger students. Cooperative learning method provided me the ultimate foundation for the smooth execution of the lesson plan during the class; whereas, clear objectives helped me in structuring an effective lesson that maximized students' learning. Bloom's Taxonomy was a useful framework that helped me in establishing clear and precise objectives for my lessons. It also allowed me to devise questions that made the assessment of students authentic.

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