

Cooperative Learning and Performance in Biology of Non-Science Major Students

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Abstract

This study tried to show the positive effect of cooperative learning on the performance in Biology of the eighty education students over the eight weeks of instruction at Capiz State University, Main Campus. A pre-test-post-test control group design was used with the intact groups of two sections who are Filipino major. Forty students in each section served as the subjects of the study. One section was exposed to the teaching of Biology integrating learning together strategy while the other section was not exposed to such strategy instead of lecture-based teaching was employed. Data were gathered through the use of a validated 50-item performance test. In the pre-test, both the experimental and the control groups had “satisfactory” performance in biology. In the post-test both the experimental and the control groups had “very satisfactory” performance, with the experimental one getting a higher mean score as compared to the control group. For the test of difference in the pre-test performance of both groups, there was a significant difference in favour of the control group and for the post-test performance, a significant difference was found out in favour of the experimental group, hence, cooperative learning had contributed much to the improved performance of the experimental group.

Keywords: cooperative learning, lecture-discussion, biology performance, learning together

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INTRODUCTION

Good education is the foundation of a strongly developed country. This statement explains that the task of a teacher is complex and multifarious. It is common knowledge of how the teacher assumes a very important role in ensuring that the right values attitudes and knowledge are imparted to the student.

Most students in introductory science courses find the subject boring, difficult and generally unnecessary for non-science-oriented careers. According to Zoller (2000), some researchers found out this type of difficulty arises from the passive role the students play in a traditional class in their lives. Even students headed for non-science-oriented careers need to have an understanding and appreciation of the role science plays in their lives. After all, how many people think about the importance of the sun and photosynthesis as they eat their lunch? How many artists consider the light-reflective properties that produce the colors they use to create masterpieces?

Before, biology is taught in a traditional teacher-centered style. The traditional classroom can sometimes resemble a one-person show with a captive but largely uninvolved audience. Classes are usually dominated by lecture or direct instruction. The idea is that there is a fixed body of knowledge that the student must come to know. Most often, they encounter situations in their classroom environment that make them confused about what should be their particular response to meet a variety of stimuli exposed to them. They are expected to blindly accept the information they are given without questioning the instructor. This type assumes that all students have the same level of background knowledge in the subject matter and are able to absorb the material at the same pace.

In the real classroom, students population varied based on their social background, academic achievement, and personality. The question is how to deliver the lesson effectively to every student in the classroom and motivate them to work cooperatively on class activities.

A review of literature suggested that the success of cooperative learning in other fields such as Engineering, Mathematics, Psychology education and Languages (Bolukbas, Kesking & Polat, 2011) enhanced their students' academic achievement, improve self-esteem, communication skills and develop intrinsic motivation. Cooperative learning generates opportunities for students to communicate and learn from each other. This view was supported by Mizano (2011), cooperative learning would provide the opportunities for students to interact explain and describe steps used in understanding the main concept of the course as compared to traditional learning method. Besides academic achievement, social implication and benefits potentially improved

their communication and interpersonal skills.

The expression “cooperative in education” may appear to be a twentieth-century development. There were also systematic and widely international researches being done that lead to the development of the key concept and methods related to cooperation in education.

According to William (2005), the methods applied in the classroom were typically known as cooperative learning. In cooperative learning, the teacher plays a significant role to incorporate elements of cooperative learning and ensure that the students know how to work cooperatively in a cooperative learning situation. The elements of cooperative learning may differ from one approach to another. Kagan (1997) approach laid four basic elements of cooperative learning which need to be incorporated in learning namely: positive interdependence which occurs when gain of individual and team positively correlate; individual accountability which requires all students to be actively involved and responsible for their own learning; equal participation which means that working as a team and all students are encouraged inequality of participation among students; and simultaneous interaction where there is equality of active engagement and where discussion and activities take place all at once. A study conducted by the Office of Institutional Research of the California State University in Sacramento (2011) found that active leadership in the class had a lasting impact and was a positive contributing factor in relation to student academic performance, especially with regard to facilitating graduation.

Furthermore, cooperative learning makes each student a stronger individual by doing work cooperatively. It places responsibility for action and progress on each of the members of the group somewhat equally. Positive role and goal interdependence help students become more autonomous and self-controlled and less dependent upon outside authority, and over time, they will gradually move from interdependence to independence (Kagan, 1997).

In biology class, it has been the observation of the researcher that students seem to avoid and escape work. Self-activity and group work does not come up to expectation. It is in this aspect, that the researcher wanted to verify the effect and contribution of a teaching strategy through cooperative learning to higher performance in biology for science major students.

MATERIALS AND METHODS

Research Design

The pre-test-post-test control group design was used in the study which contains two groups. Purposive sampling was used in determining the

subjects of the study. However, in assigning which group is assigned as experimental and control, the lottery was done. In this study, the experimental group was taught using cooperative learning while the control group was taught using the lecture-discussion method. Furthermore, in this design, both the experimental and the control groups were given a pre-test before the experiment, started. Immediately after the experiment both groups were given a post-test. The post-test mean scores of the experimental group were compared with the mean scores of the control group to determine if there is a statistical difference between them. Both groups were observed at two points in time, before and after an intervention.

Sample

The subjects of the study were eighty-first-year secondary education students who are Filipino major. Forty students came from section A and were made up of 6 males and 34 females, and the other forty came from section B which was made up of 5 males and 35 females. Section B was the experimental one as it was their section that picked up cooperative learning through lottery and section A was assigned the control group.

Instrument

A performance test included 50 items focused on the students' knowledge in Biology. The test covered topics intended for eight weeks session. All questions were presented in a multiple-choice format. Each item had four alternative choices for the correct answer. It was used to assess the students' knowledge in biology before and after the treatment. This researcher-made test was adapted from the previous study of the researcher. Both the experimental and the control group were taught the same subject until the end of the study and were exposed to a similar classroom environment.

Procedure

In the control group, the lecturer instructed students to learn biology for eight (8) weeks. A pre-test in biology was administered to both groups before the treatment. The same lecturer taught both groups. In the treatment group, the lecturer guided students to learn biology using the learning together technique. In this group the lecturer applied the following nine steps (1) the lecturer organized the learning materials and identified the objectives of the subject matter,, (2) the lecturer introduced the structure

of the lesson raised the outcomes expected, (3) the lecturer formed groups, (4) the lecturer moved students to groups assigned, and (5) the lecturer delivered the learning materials to students, (6) students studied their learning materials, (7) students helped each other to learn their learning materials and (8) students presented their understanding of the entire unit and (9) the lecturer assessed students' understanding through their presentation in front of the whole class. This whole process was repeated 8 times, once for each unit of work. After the treatment, both groups took a post-test measuring students' performance.

Data analysis

Mean and the standard deviation were used to describe the performance in the biology of non-science major students in both the experimental and the control groups.

Mann-Whitney U for non-parametric test was used and set at 0.05 alpha level. This test was used to determine the difference in the pre-test and post-test performance of the experimental and the control groups.

Results and Findings

Pre-test Performance in Biology of The Non-Science Major Students in the Experimental and the Control Groups

Table 1 shows the pre-test mean scores of the performance in the biology of science major in both the experimental and the control groups. The data show that the mean scores ranged from 22.48 in favour of the control group and 20.28 for the experimental group, and both scores had a verbal interpretation of "satisfactory". The result implies that students in both groups had a similar learning experience in biology before the intervention. The result confirms the result done to psychology students by Tran (2014).

Groupings Interpretation	Mean Score	Verbal
Experimental Group	20.28	Satisfactory
Control Group	22.48	Satisfactory

Scale of means

41-50 Outstanding

31-40 Very Satisfactory

21-30 Satisfactory

11-20 Fair

0- 10 Poor

Table 1. Pre-test performance in biology of the non-science major students in the experimental and the control groups

Post-test Performance in Biology of the Non-Science Major Students in the Experimental and the Control Groups

Table 2 shows the post-test mean scores of the performance in biology of the non-science major students in both the experimental and the control groups. The data show that the mean scores ranged from 37.98 in favour of the experimental group with verbal interpretation of “very satisfactory” and 33.40 for the control group had a verbal interpretation of “very satisfactory”. The result implies that the experimental group performed better as shown by their mean score compared to the mean score of the control group. The result affirms the result of (Bolukbas, Kesking&Polat, 2011) indicating that the use of cooperative learning enhanced students’ academic achievement.

Groupings Interpretation	Mean Score	Verbal
Experimental	37.98	Very Satisfactory
Control Group	33.40	Very Satisfactory

Scale of means
 41-50 Outstanding
 31-40 Very Satisfactory
 21-30 Satisfactory
 11-20 Fair
 0- 10 Poor

Table 2. Post-test performance in biology of science major students in the experimental and the control groups

Differences in the Pre-test Performance in Biology of Non-Science Major Students in the Experimental and the Control Groups

Table 3 shows the test of difference in the pre-test performance in biology in the experimental and the control groups. Results show a z- value of -2.296 and a p-value of .022 which implies not to accept the hypothesis. The result concludes that there is a significant difference in the pre-test performance in biology of non science major students in favor of the control group who performed better than the experimental group based on the mean score.

Group	Mean	Mean Difference	z-value	p-value	Remarks
Experimental	20.28				
		2.28	-2.296	.022	Sig
Control	22.48				

Table 3. Differences in the Pre-test performance in biology of science major students in the experimental and the control groups

Differences in the Post-test Performance in Biology of Non-Science Major Students in the Experimental and the Control Groups

Table 4 shows the test of difference in the post-test performance in Biology in the experimental and the control groups. Results show a z-value of -2.042 and a p-value of .041 which implies not to accept the hypothesis. The result concludes that there is a significant difference in the post-test performance in biology of non-science major students in favour of the experimental group who performed better than the control group based on the mean score. Cooperative learning has contributed to their improved performance.

Group	Mean	Mean Difference	z-value	p-value	Remarks
Experimental	37.98				
		4.58	- 2.042	.041	Sig
Control	33.40				

Conclusion

The presented study concludes that there is a significant positive effect on the performance in Biology of the experimental group following their participation in cooperative learning as compared to the control group. However, learning takes place also for the control group as shown by their increased mean scores. Cooperative learning enabled the students to learn positive interdependence, individual accountability, participated equally within the class and interacted with other students in order to learn from each other.

Although the findings support the effectiveness of cooperative learning for students' achievement, the sample of this study is restricted to only 80 participants. Therefore, future studies should apply cooperative learning with more participants to generate more evidence on its effectiveness.

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