

La eficiencia del aprendizaje cooperativo en la enseñanza de la química en el nivel medio superior

The efficiency of cooperative learning in teaching chemistry at the high school level

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Resumen

La presente investigación compara el método de aprendizaje cooperativo con el método de enseñanza tradicional en el rendimiento académico y los efectos de ambos en estudiantes de primer semestre de bachillerato en la materia de Química I. La muestra estuvo conformada por 40 estudiantes distribuidos en dos grupos. El diseño utilizado fue de tipo cuasi-experimental con grupo experimental y grupo control. En el grupo experimental se aplicaron tres estrategias cooperativas, mientras que el grupo control fue trabajado con el método de enseñanza tradicional. Se administró a dos grupos un test de conocimientos de la primera unidad para determinar la equivalencia entre ellos y se tomaron en cuenta como instrumentos de evaluación los tres parciales realizados durante el semestre. Los datos fueron analizados estadísticamente con el programa SPSS versión 20. El resultado fue un incremento significativo en el rendimiento escolar del grupo experimental.

Palabras clave: aprendizaje cooperativo/rendimiento, académico/enseñanza, tradicional/estrategias.

Abstract

The present study compares the effect of the cooperative learning method and traditional teaching method in the academic performance of freshmen in high school chemistry matter I. The sample consisted of 40 students divided into two groups. The design was quasi-experimental with experimental group and control group. In the experimental group three cooperatives strategies were applied, while the control group was working with the traditional teaching method. The design was quasi-experimental with experimental group and control group. In the experimental group three cooperatives strategies were used, while the control group worked with the traditional teaching method. They were granted a test of knowledge of the first unit to determine the equivalence of the groups and were considered as instruments the three partial evaluations performed during the semester. Data were statistically analyzed with the program SPSS version 20. As a result there was a significant development increase in the experimental group.

Keywords: cooperative learning / achievement / traditional teaching/strategies.

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Introduction

Reprobation is a growing problem in educational institutions of different levels. This problem is magnified especially in the area of materials sciences, such as Mathematics, Physics and Chemistry (Galagovsky, 2005). The disapproval shown by a rating, according to Carrasco, Lopez Velasquez and Avila (2011), the difficulty of students to acquire knowledge, skills and attitudes taught in school (Ponce, 2004).

One of the areas where high school students show more apathy is Chemistry (Rodriguez, 2013), considered a difficult subject because of the complexity of the concepts and almost no activities that promote student learning, generating rejection (Valero and Mayora, 2009).

Chemistry is a complicated science as the learner should be able to relate the phenomena observed with a microscopic world of indivisible particles called atoms that can not see; also you must learn symbols needed for representation (Nakamatsu, 2012). Also, the contents of the subject generally are isolated and out of context of everyday life and therefore alien to the interests of students (Caamaño, 2006).

In this teaching method that usually they give teachers, supported mainly in oral presentations to passive students who only take notes (Pozo & Gómez, 2006) adds. This method of teaching, according to Ponce (2004), increases the low academic achievement, as it encourages memorization and no participation of students in their learning process.

In the College of Bachelors No. 26 (COBAES 26) of Sinaloa, the percentage of failure in the field of Chemistry I was high, according to data from 2009-2012, making clear the need to implement new teaching strategies in students achieve better learning.

From the above it was conducted educational research where the method was implemented cooperative learning as a teaching strategy in order to determine their effect on the academic performance of students.

Cooperative learning

Cooperative learning is a teaching method that is to organize the classroom in small groups of 2-5 members. The groups are heterogeneous, both sexes and different educational levels, where students work together to solve academic tasks (Mir et al., 1998). This kind of teaching promotes interaction among members, who have a common goal, which is to learn themselves the material given by the teacher and ensure that all members of his team also do the (Pujolàs, 2004).

To generate cooperative learning certain basic elements must exist, Johnson, Johnson and Hobulec (1999) note the following:

- Positive interdependence: the interdependence that should exist among members of a group. Students should understand that the efforts of each team member are indispensable and reach the goal only if they help each other.
- Individual and group responsibility: the team must fulfill the responsibility of achieving the proposed target class and each complete part of the work that was assigned member.

- stimulating interaction face to face: students help their peers to develop positively, motivate, encourage and help to foster learning by sharing ideas, materials and strategies.
- interpersonal and technical team: the team must learn to create a climate of trust and manage conflict presented to them.
- Group evaluation: the team analyze and evaluate the efforts made to achieve a goal. Based on their evidence, they act to improve procedures that are taking place.

That way, students communicate within the group and relate to each other, promoting their intellectual and social development. These interactions allow them to comment, exchange ideas, establish rules and regulations and develop higher mental functions. Once agreed the information, the subject assimilates generating greater knowledge (Calero, 2009).

In addition, studies show that this method has a positive effect on school performance and socio-emotional relationships of students (Barriga and Hernández, 2010); for example, promotes the mental health of students, improve their self-esteem, social integration and their level of reasoning (Johnson, Johnson and Hobulec, 1999); It improves their creativity, develop values and promotes the integral progress of all students, even those with difficulty in acquiring knowledge (Pujolàs, 2008), among many other benefits.

There are different cooperative strategies that can be used during the implementation of cooperative learning method. However, for purposes of this procedure they were used only three of them, which are:

- Learning together: method is to form groups of 4-5 members. The teacher introduces the topic to the class and allows time for the team work. The aim is that all members of the group understands the subject and help your partner to learn. They all work together and deliver a single job. The material consists of various exercises of the lesson, which help students to practice, to help each other, to assess themselves and their peers (Goikoetxea and Pascual, 2002).
- Puzzle I: method is to form heterogeneous teams of up to 6 members, who work on a given by Professor material. The teacher teaches not, however, is responsible for dividing the subject. Students should learn the fraction of material that touched them (puzzle piece), take notes and reflect on the content. Then all parties get

together and socialize the information so that everyone learns the contents of all (Goikoetxea and Pascual, 2002).

- Guided or structured cooperation O'Donnel and Dansereau: method used especially in procedures of academic texts. The work is done in pairs with similar levels of performance. Students adopt roles and reminds the listener. The text is divided into fragments, read the topic and assigned participation by letters: A and B. A student must remember and explain the student reading B without seeing the lesson, the student later to explain the student B A reading . They are exchanged roles to finish reading (Slavin, 1999; Barriga y Hernández, 2010).

Matherial and Method

The research design according to the proposed objectives was quasi-experimental. The sample consisted of 40 students of the subject of Chemistry I, with an age range of 14-17 years. We worked with two intact groups, taking an experimental group and a control group (Hernández, Fernández and Baptista, 1998). The experimental group consisted of 19 students (47.5%) and the control group by 21 students (52.5%). test (diagnostic examination of the first unit) was administered to determine the equivalence between the groups. Subsequently, the cooperative learning method was applied to one group, while the other was worked with the traditional method. To measure the effect of treatment (cooperative strategies) three exams applied to both groups during the semester, which were provided by the campus were compared. Data were analyzed using SPSS version 20.

Results

The first step was to determine whether the groups were equivalent, that was obtained by a diagnostic test of the first unit, where no significant differences between the groups. Then applied the three exams during the semester of each of the groups were compared, which were analyzed with SPSS version 20. From the first quarter average better grades were observed in the experimental group than in the control; It is noteworthy that only net partial qualifications were taken. Thus, in the first quarter the group worked with cooperative strategies earned an average 1.2 points higher than the other group with a significant difference $p = 0.001$; in the second quarter it increased 1.3 points difference with $p = 0.024$ in favor of the experimental group; finally, in the fourth quarter increased difference

between groups with a value of 2.5 points and a significant difference $p = 0.000$ was reached. The averages are observed in Table 1.

	Calificaciones					
	Grupo					
	Experimental		Control		Diferencia	Sig.
Media	Desv. típ.	Media	Desv. típ.			
Test	5.3	2.5	5.1	1.7	.1	.860
1 PARCIAL	5.6	.9	4.4	1.1	1.2	.001
2 PARCIAL	5.3	1.7	4.1	1.6	1.3	.024
3 PARCIAL	6.2	1.2	3.7	1.8	2.5	.000

Tabla 1. Promedios de calificación entre grupos de estudio en las evaluaciones

It is seen in Figure 1 that the groups start at the same point (diagnostic examination of the first block). However, the average experimental group increases unlike control group whose average tapering to achieve in the final set a value of only 3.7. You can see that the overall average of the group who worked with cooperative strategies always remained above the group that worked with the traditional method, even in the small setback he suffered in the second quarter.

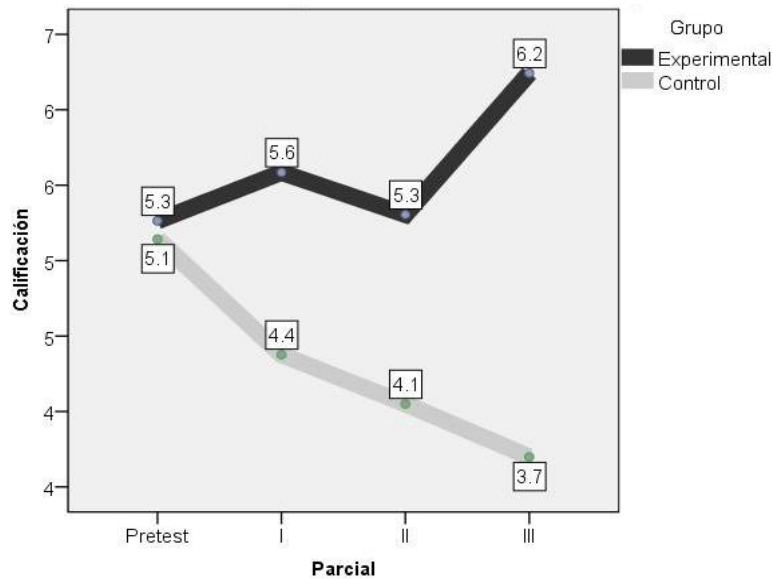


Figure 1. Average evaluation between groups.

Coinclusiones

This work was done with the purpose of the students of the subject of Chemistry I the first half of high school to improve their school performance. We worked with two groups, and only one cooperative learning method was implemented. After comparing the results in each part it was observed that the experimental group had better overall than the control in each of the partial group. This is consistent with studies by various authors as Brandy (2013), Reguera (2010), Salazar and Song (2002), Ruiz (2012), Gavilan and Alario (2012), Whicker Bull and Nunnery (2001), Alanis (2012), Chumba (2009), among others, who point out that this method has a positive influence on student learning. It should be noted that this methodology is based on the constructivist paradigm, where the student participates actively constructing their own knowledge. In this way, students are able to interact among themselves, reflect on the issues, express their ideas and interact with each other, generating knowledge. This coincides with that described by Calero (2009), who notes that it is this direct interaction with the object of study and the socio-cultural environment which helps to improve student learning. Therefore, this method can help reduce failure rates recorded in the field of Chemistry I.

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