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Cooperative Learning Method and Its Influence on Learning Factors

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To evaluate the implementation of the cooperative methodology in the learning factors of the "Structures I" course in the Architecture program at the Technical University of Loja (UTPL), a statistical analysis was conducted using data obtained from a survey technique. The results show a strong preference among students for the implementation of the cooperative methodology. It is essential to introduce cooperative learning as a tool in higher education, as innovation in teaching practices will lead to a change in teaching concepts.

Keywords: learning factors, cooperative learning methodology

Introduction

Cooperative learning, as defined by the Laboratory of Educational Innovation (n.d.), is an organized system of interaction that leads to teaching where students work together to achieve a favorable environment through both social and individual learning. In this context, its application in the classroom would help improve student performance, leading to significant improvements in grades, mental health, productivity, and fostering critical thinking and reasoning. The roles of both student and teacher are intertwined, requiring active participation from both, as mentioned by D. Johnson & R. Johnson (1999). In cooperative learning, the teacher must know the basic elements that will enable students to work cooperatively, for example, designing class programs that allow for clear tasks that can be solved through group work, knowing that the efforts of each group member benefit not only themselves but all members, achieving the ultimate goal of promoting the cooperative model. In this context, teaching and learning in virtual times have not surpassed academic results in presence. Therefore, it is proposed to evaluate the result of applying the cooperative model in the face-to-face period April-August 2022 to the students of Structures I, analyzing the acceptance of the cooperative methodology and the average grades through inferential statistics. The question arises: Does the cooperative method in the transition period from virtuality to face-to-face help improve results in academic factors? The cooperative model for teaching and learning as a social scheme to teach and learn increases the results of academic factors.

Materials and Methods

Sample

For this purpose, a total sample of 103 students was considered, corresponding to the A and B sections of the Estructuras I course in the Architecture program at the Universidad Técnica Particular de Loja (UTPL).

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Data Collection Instrument

For this phase, the survey technique was used, which allowed for the collection of data regarding the students' perception of the methodology applied by the teacher.

Learning Factors

During the academic cycle, the cooperative method was included in the course work plan for both class sections. The data on learning factors were obtained from the different evaluation activities established by the teacher and, according to the regulations set out in the Academic Regime Regulation, issued by the Higher Education Council, learning activities at UTPL are managed considering the following components:

Learning in contact with the teacher: corresponds to those learning activities aimed at the development of scientific, technical, professional, and humanistic knowledge, which will be developed with the direct intervention of the teacher.

Autonomous learning: activities planned in the corresponding planning guided by the teacher, for the student to develop autonomously and independently, thereby enhancing their capacities related to the achievement of competencies and defined learning outcomes.

Practical-experimental learning: oriented towards the practical application of theoretical, methodological, and technical-instrumental knowledge in academic activities that contribute to the student's application of their knowledge in solving real problems.

Data Analysis

The information obtained was entered and organized in a data matrix for quantitative analysis in the SPSS statistical program. Analyses of data normality and variable correlation were performed. The data were organized into one scalar quantitative variable: the bimonthly average obtained from the three learning factors, and one nominal qualitative variable: agreement or disagreement with the methodology employed by the teacher. This latter variable allowed for the establishment of two sample groups, from which the non-parametric Mann-Whitney U statistic was applied to answer the following research question: Is there a difference in learning between students who accept or reject the methodology applied by the teacher? For this, the following hypotheses were established:

H0: Learning is the same among students who accept or reject the applied methodology.

H1: Learning is different among students who accept or reject the applied methodology.

Results and Discusion

Sampling Distribution

As the sample size is n = 103, the Kolmogorov-Smirnov hypothesis test was used to determine the sample distribution. Table 1 shows the results of the normality test with a value of $p = 0.000$, this means, the sample is free distribution.

Table 1

Kolmogorov-Smirnov Normality Matrix

		Average	Compliance with the methodology
N		103	103
Normal parameters	Mean	6.9676	1.06
	Standard deviation	1.27119	0.235

Table 1 to be continued

	Absolute	0.125	0.539
Maximum external differences	Positive	0.064	0.539
	Negative	-0.125	-0.402
Test statistic		0.125	0.539
Asymptotic significance (two-tailed)		0.000	0.000

Correlation Analysis

Given that the data do not meet the assumptions of normality, Spearman's Correlation analysis was applied. Table 2 shows the correlations between both variables. The obtained value of the correlation coefficient rS = −0.378 indicates that there is a medium correlation between the average obtained and the methodology applied by the teacher. In turn, the *p*-value of significance is less than the critical value for Spearman's ρS at a significance level α = 0.05. Therefore, it is concluded that the two variables are significantly correlated.

Table 2

Spearman's Correlation Matrix

			Average	Compliance with the methodology
Spearman's Rho correlation	Average	Correlation Coefficient	1.000	-0.378**
		Sig. (two-tailed)	.	0.000
		N	103	103
	Compliance with the Methodology	Correlation Coefficient	-0.378**	1,000
		Sig. (two-tailed)	0.000	.
		N	103	103

Note. ** Correlation is significant at the 0.01 level (two-tailed).

Mann-Whitney U Test

The rank analysis presented in Table 3 shows that there is a difference in learning between the two groups. Those students who agree with the methodology employed by the teacher show the highest average rank (54.79), and in turn, reach higher positions in the quantitative variable as seen in Figure 1, in contrast to the second group comprised of students who disagree with the methodology used by the teacher. While there is evidence of dissatisfaction among six students with the implementation of the cooperative methodology, it is not the majority as it represents only 5.8%. In contrast, 94% express agreement with the cooperative methodology.

Table 3

Rank Matrix

	Conformity with the methodology	N	Average range	Sum of ranks
Average	Yes	97	54.79	5315.00
	No	6	6.83	41.00
	Total	103		

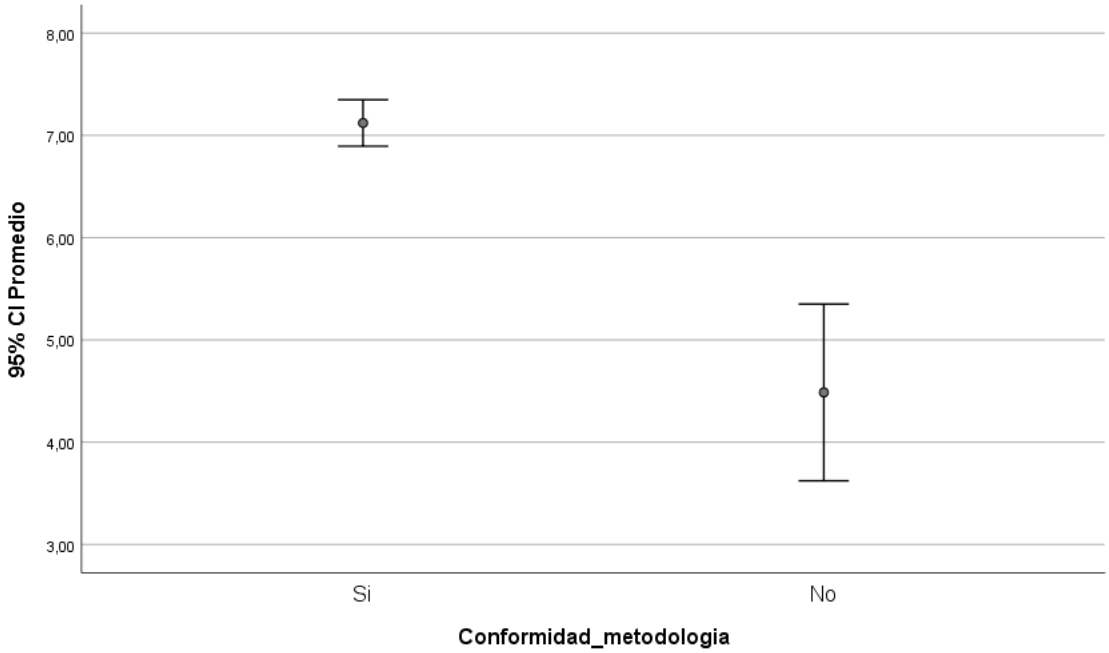

Figure 1. Bar chart showing the behavior of variables between groups.

On the other hand, the level of significance obtained $p = 0.000$ as shown in Table 4 leads to the rejection of the null hypothesis, therefore, a statistically significant difference in learning between both groups of students is evidenced.

Table 4

Mann-Whitney U Test Statistics

	Average
U the Mann-Whitney	20.000
W the Wilcoxon	41.000
Z	-3.816
Sig. (two-tailed)	0.000

These differences in learning, evidenced in the bimonthly averages obtained by the students, can be attributed to the benefits of the cooperative learning method. Thus, students who agree with the implementation of the cooperative methodology have grades higher than 7, unlike those who disagree, which constitutes one of the achievements of cooperative learning (Oberto, 2014). This is corroborated by other studies that have recorded improvements in academic development when applying the cooperative learning method in different areas of higher education such as technical education (Maldonado Perez & Sánchez, 2012), basic education (Carrión Candel, 2019; Espinoza Freire et al., 2020; García-Ruiz & González Fernández, 2013), among others.

It has been determined that a proper study methodology implemented by the teacher is a key factor for efficient learning in students (Catota Caiza et al., 2020). However, traditional learning systems with an individualistic approach are still predominant, which, although they hinder the development of students' abilities (Catota Caiza et al., 2020), have become habitual among students and are often resistances that teachers face when wanting to introduce cooperative methodology in their teaching (Abellán, 2018).

That is why, with the implementation of the cooperative method, the aim is to achieve team learning, and it is here where learning factors play an important role. In this context, one of the activities was the execution of a project, which was presented to the university community. A true organization and responsible interaction of each of the group members was evidenced, which ultimately translated into student satisfaction. These results contribute to the personal formation of the students through the acquisition of social interaction skills.

Finally, the results obtained allow us to reflect on the evolution of pedagogical methodologies. Therefore, with the previous experiences obtained in this and other studies, the induction of cooperative learning as a tool in higher education is essential, as the innovation of teaching practices will produce a change in the conceptions of teaching.

References

Abellán, C. M. A. (2018). El método de aprendizaje cooperativo y su aplicación en las aulas. *Perfiles Educativos*, *40*(161), 181-194. https://doi.org/10.22201/iisue.24486167e.2018.161.58622

Carrión Candel, E. (2019). El uso del juego y la metodología cooperativa en la Educación Superior: una alternativa para la enseñanza creativa. *Artseduca*, *23*, 71-97. https://doi.org/10.6035/Artseduca.2019.23.4

Catota Caiza, L. A., Chavarrea Meléndez, C. V., & Espinel Armas, E. E. (2020). Estudio de los factores que influyen en estudiantes con tercera matrícula en los períodos académicos septiembre 2017 -marzo 2018 y abril 2018- agosto 2018 en la Facultad de Ciencias Químicas de la Universidad Central del Ecuador. *Revista Educación*, *44*, 160-185. https://doi.org/10.15517/revedu.v44i2.39068

Espinoza Freire, E. E., Samaniego Ocampo, R. de L., Guamán Gómez, V. J., & Vélez Torres, E. O. (2020). La metodología cooperativa para el aprendizaje. Universidad Técnica de Machala. *Publicaciones de La Facultad de Educacion y Humanidades Del Campus de Melilla*, *50*(2), 41-58. https://doi.org/10.30827/publicaciones.v50i2.13942

García-Ruiz, M. R., & González Fernández, N. (2013). El aprendizaje cooperativo en la universidad. valoración de los estudiantes respecto a su potencialidad para desarrollar competencias. *RIDE Revista Iberoamericana Para La Investigación y El Desarrollo Educativo*, *4*(7), 106-128. https://doi.org/10.23913/ride.v4i7.89

Johnson, D., & Johnson, R. (1999). El aprendizaje cooperativo en el aula. *The Social Studies*, *80*(3). https://doi.org/10.1080/00377996.1989.9957455

Maldonado Perez, M., & Sánchez, T. (2012). Trabajo colaborrativo en el aula: Experiencias desde la formación docente. *Revisata Educare*, *16*(2), 93-118.

Oberto M., T. M. (2014). El aprendizaje cooperativo como herramienta para la educación universitaria. *Revista Educacion En Valores*, *1*(21), 58-69. http://servicio.bc.uc.edu.ve/multidisciplinarias/educacion-en-valores/v1n21/art09.pdf