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ARTICLES

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Cooperative learning and social cohesion: Study in the 4th year classes of tourism degree of Cuba and Mexico

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Abstract: The comprehensive training of future professionals is a fundamental objective of Higher Education. In this sense, cooperative learning, while contributing to learning, also favors the development of social competences that promote the social cohesion of the group or class. The objective of this research is to compare two class groups of Bachelor's degree courses in Tourism from universities in Cuba and Mexico, taking into account the social cohesion achieved from the cooperative learning experience. The Social Network Analysis method is used to obtain those indicators that show the social cohesion achieved by these class groups subject to cooperative learning practices. The results show that the Cuban class group exhibits better results with respect to Mexico. On the other hand, some elements that should continue to be worked on from this experience for the development of social competencies and to achieve greater social cohesion are evidenced.

Keywords: Cooperative learning; social cohesion; analysis of social networks; social competences; higher education; tourism education programs.

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I. Introduction

Cooperative learning bursts internationally as a significant area of research within the social sciences.[1,2] It constitutes a valuable proposal to favor learning in current academic institutions.[3] It is a topic whose timeliness and relevance is revealed by the exponential growth of research related to this field of investigation,[4] in their research show the immense opportunities for future research that can analyze this phenomenon from new perspectives.

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[1] Robert E. Slavin, "Cooperative Learning and Academic Achievement: Why Does Groupwork Work?," *Anales de Psicología* 30 (2014), https://doi.org/10.6018/analesps.30.3.201201.

[2] David. W. Johnson and Roger. T. Johnson, "Cooperative Learning in 21st Century," *Anales de Psicología* 30, no. 3 (2014), https://doi.org/10.6018/analesps.30.3.201241.

[3] Desiderio J. García-Almeida and María T. Cabrera-Nuez, "The influence of knowledge recipients' proactivity on knowledge construction in cooperative learning experiences," *Active Learning in Higher Education* 21 (2018), https://doi.org/10.1177/1469787418754569.

[4] Idevis Lores-Leyva, Félix Díaz-Pompa, and Onaida Calzadilla-González, "Aprendizaje cooperativo: panorama de las investigaciones científicas publicadas en Sciencedirect en el período 1965-2017," *EduSol* 21 (2021), https://edusol.cug.co.cu/index.php/EduSol/article/view/1265/2698.

The progressive increase in the number of works on this subject has led to the existence of numerous definitions of cooperative learning. An analysis of a total of 12 definitions, facilitates the approach on this topic.[5,6,7,8,9,10,11,12,13,14,15,16]

The analysis of the definitions allows assuming cooperative learning as a pedagogical proposal with possibilities of application at any school level, aimed at the integral formation of students, where the teacher, mediator of social interaction and with a didactic enriched by methods, forms of organization and evaluation, promotes learning and socialization through group work, favors responsibility and mutual help among students in the

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[5] David W. Johnson, Roger. T. Johnson, and Karl. A. Smith, "The state of cooperative learning in postsecondary and professional settings," *Educational Psychology Review* 19, no. 1 (2007), https://doi.org/10.1007/s10648-006-9038-8.

[6] Pere Pujolás Maset, "Estrategias metodológicas en la enseñanza universitaria: aprendizaje cooperativo," 2021 (2007), http://www.unex.es/unex/servicios/sofd/archivos/ficheros/formacion/Aprendizaje_Cooperativo.pps.

[7] José M. Serrano and Rosa M. Pons, "Cooperative learning: we can also do it without task structure," *Intercultural Education* 18 (2007), https://doi.org/10.1080/14675980701463562.

[8] Yael Sharan, "Cooperative learning for academic and social gains: Valued pedagogy, problematic practice," *European Journal of Education* 45 (2010), https://doi.org/10.1111/j.1465-3435.2010.01430.x.

[9] Mina Tsay and Miranda Brady, "A case study of cooperative learning and communication pedagogy: Does working in teams make a difference?," *Journal of the Scholarship of Teaching and Learning* 10 (2012), https://scholarworks.iu.edu/journals/index.php/josotl/article/view/1747.

[10] María del Mar García Cabrera, Ignacio González López, and Rosario Mérida Serrano, "Validación del cuestionario de evaluación ACOES. Análisis del trabajo cooperativo en educación superior," *Revista de Investigación Educativa* 30 (2011), https://doi.org/10.6018/rie.30.1.114091.

[11] David W. Johnson, Roger. T. Johnson, and Karl. A. Smith, "Co-operative learning: Improving university instruction by basing practice on validated theory," *Journal on Excellence in College Teaching* 25, no. 3&4 (2014), http://celt.miamioh.edu/ject/fetch.php?id=594.

[12] Robyn M. Gillies, "Developments in Cooperative Learning: Review of Research," *Anales de Psicología* 30 (2014), https://doi.org/10.6018/analesps.30.3.201191.

[13] Slavin, "Cooperative Learning and Academic Achievement: Why Does Groupwork Work?."

[14] José-Manuel Serrano and Rosa-María Pons, "Introduction: Cooperative Learning," *Anales de Psicología* 30 (2014), https://doi.org/10.6018/analesps.30.3.201251.

[15] Van Dat Tran, "The Effects of Cooperative Learning on the Academic Achievement and Knowledge Retention," *International Journal of Higher Education* 3 (2014), https://doi.org/10.5430/ijhe.v3n2p131.

[16] Dwi Sulisworo and Fadiyah Suryani, "The effect of cooperative learning, motivation and information technology literacy to achievement," *International Journal of Learning and Development* 4 (2014), https://doi.org/10.5296/ijld.v4i2.4908.

search for problem solving, completing tasks and achieving objectives in different subjects, contributing to prevent academic and social problems.

Cooperative learning requires cooperative work teams, which must have positive interdependence, individual and team responsibility, stimulating interaction, internal team management, and evaluation and improvement of teamwork.[17,18] The effectiveness of cooperative learning correlates with the social cohesion of the class group. Social cohesion increases academic results, interaction among members, ease of working on different tasks and the development of social competencies, as well as motivation and productivity.[19,20] In contrast, if group management is poor, there may be conflicts, dysfunctional behavior and low performance.[21,22] The role of the teacher is fundamental to improve social cohesion and the success of cooperative learning, but some researchers point out that teachers lack specific training and knowledge in group management.[23,24] Group formation must be careful to ensure interaction among all students and social cohesion. It is essential to investigate the relationships among group members to gain a better understanding of their behavior and improve cooperative learning.[25,26]

[17] García-Almeida and Cabrera-Nuez, "The influence of knowledge recipients' proactivity on knowledge construction in cooperative learning experiences."

[18] José M. Bermejo Díaz et al., "Educación física y universidad: Evaluación de una experiencia docente a través del aprendizaje cooperativo," *Retos* 39 (2021), https://doi.org/10.47197/retos.v0i39.77834.

[19] Lilian Cadoche, "Una propuesta de aprendizaje cooperativo," *Aula Universitaria* (2007), https://doi.org/10.14409/au.v1i9.1039.

[20] Mark J. Van Ryzin, Cary J. Roseth, and Anthony Biglan, "Mediators of Effects of Cooperative Learning on Prosocial Behavior in Middle School," *International Journal of Applied Positive Psychology* 5 (2020), https://doi.org/10.1007/s41042-020-00026-8.

[21] W. Martin Davies, "Groupwork as a form of assessment: Common problems and recommended solutions," *Higher Education* 58 (2009), https://doi.org/10.1007/s10734-009-9216-y.

[22] Margaret Healy, Jhon Doran, and Maeve McCutcheon, "Cooperative learning outcomes from cumulative experiences of group work: differences in student perceptions," *Accounting Education* (2018), https://doi.org/10.1080/09639284.2018.1476893.

[23] David W. Johnson, Roger T. Johnson, and Edythe Johnson Holubec, *Cooperation in the Classroom*, 9th ed. (Edina, MN: Interaction Book Company, 2013).

[24] Nicole Kimmelmann and Johannes Lang, "Vinculación dentro de la formación docente: aprendizaje cooperativo de docentes y estudiantes docentes," *European Journal of Teacher Education* 42 (2018), https://doi.org/10.1080/02619768.2018.1547376.

[25] Tara J. Shawver, "An experimental study of cooperative learning in advanced financial accounting courses," *Accounting Education* 29 (2020), https://doi.org/10.1080/09639284.2020.1736589.

[26] Naureen Durrani and Anjum Halai, "Dynamics of gender justice, conflict and social cohesion: Analysing educational reforms in Pakistan," *International Journal of Educational Development* 61 (2018), https://doi.org/10.1016/j.ijedudev.2017.11.010.

The aspects assessed so far highlight the importance of social cohesion in the success of cooperative learning, the need for an active role of the teacher in the management of groups, the importance of adequate teacher training, and the need for future research on group formation and the management of social cohesion. Research on how to improve cooperative learning and how to get groups to work effectively is essential to ensure academic success and the development of social skills in students.

I.1. Cooperative learning and social cohesion in higher education

From the point of view of Higher Education, teamwork is a fundamental competence for future graduates, since working cooperatively, provides students with the possibility of acquiring basic skills and abilities (effective communication, conflict resolution, adaptation to change, critical analysis, autonomy, sensitivity and empathy towards others, decision making, among others) for their subsequent professional practice.[27,28,29]

From this point of view, a graduate of the Bachelor's Degree in Tourism with competences for group work, is in conditions to face the complexity imposed by the current society and the multiple problems faced in the working world. Thus, the student can intervene in these problems and solve them satisfactorily. The transversality of the tourism sector explains that it is an activity in which coordination and teamwork play a fundamental role. Therefore, it is necessary that from the training process the cooperation of future professionals is promoted. In this sense, there is research that reveals the relevance and the need to include and promote cooperative learning in the teaching-learning process of tourism. Although there is no extensive literature regarding the topic, the findings found reveal the use of different methods and group formation strategies to enhance cooperative work. Wadawi identifies through a qualitative study the benefits of cooperative learning, with his proposal reveals that academic results are superior,[30] Jamaludin and

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[27] Irina S. Castillo Reche and Belén Suárez Lantarón, "Una experiencia inclusiva de aprendizaje cooperativo: fomentando habilidades para el empleo en la universidad," *Siglo Cero Revista Española Sobre Discapacidad Intelectual* 51 (2020), https://doi.org/10.14201/scero20205125572.

[28] García Cabrera, González López, and Mérida Serrano, "Validación del cuestionario de evaluación ACOES. Análisis del trabajo cooperativo en educación superior."

[29] Abdelaziz M. Hussien, "The Impact of Combining Communicative Traits of Writing with Cooperative Learning on Trainee Teachers' Pedagogical Knowledge and Attitudes," *International Journal of Instruction* 13 (2020), https://doi.org/10.29333/iji.2020.13152a.

[30] Joe Kibuye Wadawi, "An assessment of cooperative learning effectiveness in tourism and hospitality teaching – a case study of selected student groups at Strathmore University in Kenya," *ECOFORUM* 2 (2013), http://hdl.handle.net/11071/5489.

Stapah evaluates the attitudes of students in the Geography of Tourism course after a cooperative learning situation, students show a positive attitude towards group work by feeling less pressure and achieving greater interaction of all its members to solve tasks.[31] Sarıoğlan and Cevizkaya based on the results of their research, state that learners achieve more positive interdependence if they manage to create different working groups and during the different sections they keep changing their members, so that more interaction is achieved among all members of the class group.[32]

The results presented so far highlight the importance of cooperative learning and social cohesion, and how the latter is addressed in the different studies, which reveal the positive influence on learning outcomes, motivation, sense of group work and helping. However, it is considered necessary to further deepen studies in this field of research, as one of the most distinctive features of previous research is that social cohesion is a complex and difficult concept to measure. Researchers often use self-report measures, which may not capture the full range of behaviors and attitudes that contribute to social cohesion. Many studies of social cohesion in cooperative learning are conducted with homogeneous groups of students, which may limit the generalizability of their findings to more diverse student populations. Potential for bias, given that researchers may have biases that influence their interpretations of social cohesion data, such as a preference for cooperative learning or a belief that social cohesion is always positive.

The lack of longitudinal studies is another limitation since most studies on social cohesion in cooperative learning are cross-sectional, meaning that they only measure social cohesion at a single point in time. Longitudinal studies would provide a better understanding of how social cohesion changes over time and how it affects student outcomes. However, throughout their careers, students experience different experiences in their formative process and under different cooperative learning situations, which, in turn, has an impact on the subjects' perception of the importance of group work.

The limited generalizability of studies on social cohesion in cooperative learning is another limitation, considering that many of these studies are conducted in specific contexts, such as specific courses or institutions, which

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[31] Mazlina Jamaludin and Mazura Stapah, "The cooperative learning approach in Tourism Geography" (paper presented at the e-Proceeding of the 3rd Global Summit on Education GSE, Meliá Hotel Kuala Lumpur, Malaysia, 2014).

[32] Mehmet Sarıoğlan and Gülhan Cevizkaya, "Applicability of cooperative learning model in gastronomy education," *Journal of Tourism Theory and Research* 1 (2015), https://doi.org/10.24288/jttr.202824.

may limit their generalizability to other contexts. Finally, there is also limited attention to contextual factors studies often focus on individual factors, such as student characteristics and behaviors, and may not fully take into account contextual factors that can influence social cohesion, such as institutional policies and classroom dynamics.

Based on the limitations found, the need to examine how cooperative learning has impacted the students of the Bachelor's Degree in Tourism who during their entire academic program (four years) were in group learning situations is revealed, by analyzing the degree of integration and union among the members of an organization or social group from a structural point of view, that is, from the bonds and integration achieved in class groups working in a cooperative learning situation.

I.2. *The educational context of research*

In recent years, there has been growing interest in the use of cooperative learning in higher education, especially in the field of tourism studies. The use of cooperative learning in tourism courses has the potential to improve students' understanding of complex concepts and topics, as well as develop their critical thinking and problem-solving skills. However, the effectiveness of this approach may depend on a number of factors, such as the cultural context in which it is applied.

In this study, we intend to investigate the use of cooperative learning in tourism courses in Cuba and Mexico. Both countries have similar tourism industries and face similar challenges, such as the need to balance economic development with environmental sustainability. However, they also have different cultural contexts and educational systems that may influence the implementation and outcomes of cooperative learning.

The model of Higher Education in Cuba is characterized by being free and universally accessible, aimed primarily at training professionals in strategic sectors for the country's development. It emphasizes the relationship between cooperative work and professional training. It is based on promoting a collaborative work environment between students and teachers, with the aim of fostering values such as solidarity, responsibility and social commitment. In addition, teamwork is considered an effective tool to improve learning and develop social and leadership skills in students. Therefore, it is used in the main pillars of the integral formation of students (training, research and university extension), from the realization of projects in the classroom to participation in community activities. In the Cuban Higher Education model, cooperative work is considered a key element for

the formation of professionals committed to society and capable of working as a team to achieve common objectives.[33]

In Mexico, the Higher Education model is aimed at training highly qualified professionals, where theory and practice are combined. However, there are challenges in terms of equity in access to higher education and improving the quality of teaching. This model also recognizes the importance of teamwork in the development of social and professional skills. In this sense, collaboration between students and professors is encouraged to improve the quality of teaching and learning through team projects and participation in activities that allow students to develop their ability to work in teams and solve problems collaboratively. Similarly, the active participation of students in university life is promoted, including participation in student organizations and community projects. As in the Cuban model, teamwork in higher education in Mexico is considered a fundamental element for the formation of trained professionals committed to society.[34]

Through a comparative analysis of student experiences and outcomes in cooperative learning groups, the present research aims to identify similarities and differences between the two contexts and to provide insights into the potential benefits and challenges of this approach in tourism education. In doing so, we hope to contribute to the growing body of literature on cooperative learning in higher education and to inform future pedagogical practices in the field of tourism studies.

I.3. Social network analysis

The analysis of social networks (hereinafter referred to as SNA) has become an essential tool for the study of social cohesion and the learning process in educational settings. Social network analysis allows us to examine the connections and relationships between individuals, groups, and communities, and to identify patterns of interaction and communication that contribute to the development of social cohesion. In the context of cooperative learning, social network analysis can provide valuable insights into the dynamics of collaboration and communication among students, as well as the formation of social ties and the emergence of shared norms and values. By mapping and analyzing the social networks that emerge in the classroom,

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[33] Ministerio de Educación Superior, *Modelo Educativo Cubano* (La Habana: Ministerio de Educación Superior, 2018). http://www.mes.edu.cu/.

[34] Secretaría de Educación Pública, *Educación Superior en México* (Secretaría de Educación Pública, 2020). https://www.sep.gob.mx/.

researchers can gain a deeper understanding of the factors that promote or inhibit social cohesion and the development of effective learning communities.

The SNA focuses its attention on the links between actors or nodes; from identifying and interpreting the patterns derived from the relationships established between them. SNA facilitates the description of the social structure in terms of a network and the analysis of the relationships formed between each of the actors from the position they occupy within the structure. The SNA is based on the conception that a social network constitutes a finite set of actors in which one or more types of relationships are established and that their links are based on the relational information shared among the actors. As a result of these interpersonal links, behaviors, attitudes, information, goods or merchandise are transmitted through all the actors in the network.[35]

Some of the indicators traditionally used in the SNA are:

Density: is considered as a measure of cohesion among network actors.[36] Density, basically, is a measure of the number of existing links in the network, presented as a proportion of the number of possible links.

Centralization: for the study of complete networks within the SNA, an indicator that measures the difference between the levels of actor centrality and provides an idea that dominant nodes exist is the level of network centralization. Since centralization measures the degree to which an actor is dominant in the network, different measures of centralization can be obtained based on the three indicators of node centrality;[37] however, for the purposes of this paper emphasis will be placed only on network centralization based on degree centrality.

Nodal degree: takes into account the direct ties of an actor (or node), it refers to the number of nodes to which a node is directly connected. Nodal degree or rank analysis indicates the most connected node in a group. Rank can also be interpreted as the degree of opportunity to influence or be influenced by others in the network.[38]

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[35] Norman Aguilar-Gallegos et al., "Análisis de redes sociales para catalizar la innovación agrícola: de los vínculos directos a la integración y radialidad," *Estudios Gerenciales* 32 (2016), https://doi.org/10.1016/j.estger.2016.06.006.

[36] Stephen Borgatti, Martin Everett, and Jeffrey Johnson, *Analyzing social networks* (London: SAGE Publications Limited, 2013).

[37] Linton C. Freeman, Stephen Borgatti, and Douglas White, "Centrality in valued graphs: A measure of betweenness based on network flow," *Social Networks* 13 (1991), https://doi.org/10.1016/0378-8733(91)90017-n.

[38] Alejandro Velázquez-Álvarez and Norman Aguilar-Gallegos, *Manual introductorio al análisis de redes sociales. Ejemplos prácticos con UCINET 6.85 y NETDRAW 1.48. Medidas de centralidad* (Toluca: Universidad Autónoma del Estado de México, 2005).

Centrality degree: is the number of actors to which an actor is directly linked. Centrality degree is divided into input degree and output degree. This indicator shows which students have the most relationships and are therefore the most influential within the group.

Degree of intermediation (betewenss): indicates the number of times an actor appears on the shortest (or geodesic) leg and links two others. That is, it shows when a subject mediates between two other subjects who do not know each other and belong to the same group, which can be called a "bridging actor". One reason to consider the importance of an actor lies in its intermediation, this focuses on the control of communication, and explains the possibilities that a subject has to intermediate communications between pairs of subjects (actors). That is, it demonstrates when a student is an intermediary among two other persons within the group who do not know each other (what is called "bridge person").[39]

Betweenness centrality: is the ability of the subject to occupy an intermediate position in the informal communications among the totality of the subjects. the subjects with a higher degree of intermediation are creditors of a great leadership, being able to control the informal communication flows, assuming that each node transfers following the shortest paths.[40]

Networks within networks (groups and subgroups or cliques): Also known as communities, it is a characteristic that can be observed at a glance is that through this it is possible to identify groups or sub-networks. This is nothing more than a set of nodes or actors that have all the possible links between them. The actors that make up a clique must be more than two; usually cliques of three or more members are used. A group of nodes that have all possible links between them is called "maximum complete subgraph".[41]

Consequently, and taking into account the need to analyze social cohesion from the point of view of the links established between the different actors in a network, the analysis of this structural component is much better dealt with using SNA techniques. The analysis of this structural component is much better dealt with using SNA techniques. The use of SNA not only aims to study the relationships that arise from the implementation of

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[39] Aguilar-Gallegos et al., "Análisis de redes sociales para catalizar la innovación agrícola: de los vínculos directos a la integración y radialidad."

[40] Antonieta Kuz, Mariana Falco, and Roxana Giandini, "Social Network Analysis: a Practical Case Study," *Computación y Sistemas* 20 (2016), https://doi.org/10.13053/cys-20-1-2321.

[41] Van Ryzin, Roseth, and Biglan, "Mediators of Effects of Cooperative Learning on Prosocial Behavior in Middle School."

cooperative learning, but also to identify the aspects that retard the social cohesion of the class groups under study. In this way, it is possible to advance in the understanding of "micro" (students) and "meso" (class group) social phenomena; that is, those phenomena that derive from social actors in which individual interactions, institutions and empirically observable social structures are simultaneously present.

The objective of this study is to compare the social cohesion of 4th year class groups of the Bachelor's Degree in Tourism of the University of Holguín, Cuba and the Meritorious Autonomous University of Puebla (Atlixco Campus), Mexico in terms of social cohesion derived from cooperative learning. To achieve this objective, we will use social network analysis to analyze the relationships and interactions among the students in each group. By examining the network structure, we can obtain information about the levels of social cohesion within each group and compare them to identify any differences or similarities between the two countries. Therefore, social network analysis serves as a tool to facilitate the comparison of groups and the identification of factors that contribute to their levels of social cohesion in cooperative learning.

II. Methodology

The SNA is a methodological tool that allows understanding the social structure and dynamics, based on a set of social relationships, thus, from the use of this methodology we intend to dimension the social reality of two groups of Bachelor's Degree in Tourism classes subject to cooperative learning. According to Marsden (1990), the main objective of the study of the links between actors or nodes is to detect and interpret patterns derived from the relationships established between them.[42] In other words, the SNA seeks to describe a social structure in terms of a network and to interpret the existing relationships among the actors, taking into account their position within that structure.

SNA facilitates the evaluation and incorporation of strategies that contribute to favor cooperative learning and social cohesion of class groups, since it offers a broad perspective of the social relationships established in society.

In response to the general objective of the research, the following specific objectives are determined:

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[42] Peter V. Marsden, "Network Data and Measurement," *Annual Review of Sociology* 16 (1990), https://doi.org/10.1146/annurev.so.16.080190.002251.

- Determine the criteria for analyzing the social cohesion of the groups under study.
- To analyze the relationship between positive interdependence and interaction in the groups under study.
- To determine the elements that affect positive interdependence and interaction in the groups.
- To compare the results obtained from the selected indicators.

II.1. *Origin and data collection*

The population of the research is determined by 53 students who make up the class of the last year of the Bachelor's degree in Tourism of Cuba and Mexico. In order to analyze the pattern of interactions and their relationship with positive interdependence, a convenience sample has been selected where all the students of both class groups are chosen. The selection of this type of sample responds to the need to structure the network of each class group from the relationships between each one of the undergraduate students who reach the conclusion of their four-year degree program in Bachelor's Degree in Tourism and to determine the finite set of the network. For their selection it was necessary to verify that during the four years they lived cooperative learning experiences and were in different group activities among which were, case studies, course work, research projects, among others, many of these evaluated, others not evaluated for which workshops were developed with professors and students. Given the longitudinal perspective of the research study, the specific nature of each group work activity is not reported here.

An online survey was used to collect information, which included four sections (introduction, sociodemographic data, evaluation of the impact of cooperative learning on social cohesion and the section dedicated to the generation of names). The reliability and validity analysis was calculated using SPSS.26 software, obtaining a Cronbach's Alpha coefficient of 0.968 and a KMO measure of 0.901, which indicates that these validity criteria guarantee the reliability and validity of the survey results and allow an adequate interpretation of the findings. Subsequently, the students answered an online questionnaire applied with the aim of deepening cooperative learning in these class groups. From this questionnaire data were extracted, in this case, attributes (age, gender), aspects affecting cooperative learning and relational data.

The aforementioned sources of information and knowledge were coded and recorded in a database to construct a mode-one network, in which each

node can be related to any other node in the network,[43] and for the analysis of the elements that affect the social cohesion of these groups subject to cooperative learning a mode-two network is constructed.

Different types of software were used for data analysis, depending on the stage. First, NetDraw v. 2,139 was used to visualize the network.[44] At a second stage, Ucinet v6 was used to obtain the first and second order indicators.[45]

To prepare the graphs and show the results, and in order to maintain the anonymity of the sample, each student was assigned a code composed of three letters for the location in each network structure analyzed.

Ethical approval: for the present study, the researchers carefully considered ethical aspects when designing their study. The selected Class groups meet the inclusion criteria, such as being part of the final year class group of the Bachelor of Tourism degree, having received cooperative learning influences throughout their studies, and being enrolled in a public school. In addition, it ensures that the sample size is sufficient to obtain meaningful results. Participants' rights are guaranteed based on informed consent before collecting personal and sensitive data, and they are informed that they can withdraw from the study at any time. To protect the privacy of participants, a label is given to each participant in order to anonymize the data and avoid sharing personal or identifiable information by third parties. It was also presented and approved by the Scientific Advisory Board of the Faculty of Economic Sciences of the University of Holguín and the University of Puebla.

III. Results

III.1. Respondents' profile

The Cuban group consisted of 24 students, 8 of them male (33.3%) and 16 female (66.7%), with an average age (22.2 years). The Mexican group consisted of 29 students, 6 of them male (20.7%) and 23 female (79.3%), with an average age (23.1 years).

A first approach to the networks of the University of Holguín and Meritorious Autonomous University of Puebla (Atlixco Campus) class

[43] Robert A. Hanneman, *Introducción a los métodos del análisis de redes sociales* (California: Universidad de California Riverside, 2000).

[44] Stephen Borgatti, *Netdraw Network Visualization* (Harvard, MA: Analytic Technologies, 2002).

[45] Borgatti, Everett, and Johnson, *Analyzing social networks*.

groups is provided by two measures that inform about the network globally, the density and centralization of the network. Next, the analysis of these indicators is carried out to later focus the analysis and comparison of the indicators at the node level.

III.2. *Density*

Density analysis provides information about the number of existing relationships with respect to the possible ones, therefore, it is considered as a measure of cohesion among the actors in the network. According to De Nooy, Mrvar and Batagelj, if density means cohesion in a network, then then there is a directly proportional relationship between density and cohesion and, therefore, the greater the number of links between the actors forming the network.[46] For the cases under investigation, there would be a positive relationship of social cohesion, mutual aid and positive interdependence in the class groups, because the higher the density, the greater it tends to be.

The density of relationships recorded in each of the class groups reveals significant differences. The Holguin class group shows a network with a high density (24.28%) with respect to the Puebla class group (7.15%) (See Table 1) if it is taken into account that the limits of the Holguin and Puebla student network are 24 and 29 actors respectively, therefore, the possibility that the actors know and interact with each other is greater. Furthermore, in all cases these are incomplete networks; in the Holguín class group there is one disconnected actor and in the Puebla group there is a subgroup with five actors.

With respect to gender and its influence on network density, note (Figure 1) that in both networks the male gender (represented by the blue colored nodes) are the most distant in the network. There is a coincidence with the results obtained by Healy, Doran and McCutcheon and Durrani and Halai[47,48] and are contrary to the studies of Martin and Good who reports that the female sex reported lower levels of cohesion than males.[49] One element that

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[46] Wouter De Nooy, Andrej Mrvar, and Vladimir Batagelj, *Exploratory Social Network Analysis with Pajek* (Cambridge, UK: Cambridge University Press, 2005).

[47] Healy, Doran, and McCutcheon, "Cooperative learning outcomes from cumulative experiences of group work: differences in student perceptions."

[48] Durrani and Halai, "Dynamics of gender justice, conflict and social cohesion: Analysing educational reforms in Pakistan."

[49] Eleanor Martin and Judith Good, "Strategy, team cohesion and team member satisfaction: The effects of gender and group composition," *Computers in Human Behavior* 53 (2015), https://doi.org/10.1016/j.chb.2014.06.013.

is striking is the structure of the Cuban class group, although a distancing of the male gender is appreciated there are greater links between both sexes. According to Bosselut, Castro, Chevalier, and Fouquereau these results may be due to the total workload of the course or academic curriculum, which includes cooperative work among its requirements, since it favors social interaction and the positive interdependence of students.[50] Although Durrani, and Halai offer another perspective related to the conception of a gender transformative curriculum, taking into account that these can be transformed into places to promote gender-equitable attitudes and behaviors, for the achievement of this end it requires deep commitment from teachers and principals to policy makers at the state and national level.[51]

In the cases analyzed, the Holguin class group (see Figure 1 left) shows a more solid basis for the existence of greater social cohesion, in this sense, the speed of information dissemination between nodes will be faster than in the Puebla class group, which, due to the elongated shape of the network (see Figure 1 right), points to great inequalities in access to information and knowledge within the network, The elongated shape of the network (see Figure 1 right) points to great inequalities in the access to information and knowledge within the network, on the other hand, in the latter, the degree of access of each actor in this network can be a limiting factor for the achievement of greater positive interdependence.

From this perspective, we agree with the studies of Guillies who refer that more cohesive groups are more willing to share ideas and information among themselves and are more motivated to achieve the group's objectives.[52] From the point of view of Paredes León and Ramos Serpa the best cooperative learning experiences are those that depend on the level of social cohesion achieved by the class group and depend fundamentally on components such as: social skills, positive interdependence, social interaction, and group processing;[53] which are essential aspects to achieve significant team learning, empathy and good relations among members, efficient results and great help and collaboration among members.

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[50] Grégoire Bosselut et al., "Does Perceived Cohesion Mediate the Student Personality–Engagement Relationship in the University Setting," *Journal of Educational Psychology* 112 (2020), https://doi.org/10.1037/edu0000442.

[51] Durrani and Halai, "Dynamics of gender justice, conflict and social cohesion: Analysing educational reforms in Pakistan."

[52] Gillies, "Developments in Cooperative Learning: Review of Research."

[53] Wilmer R. Paredes León and Gerardo Ramos Serpa, "El aprendizaje cooperativo, educación desde la participación social en estudiantes de bachillerato," *Revista Científica Uisrael* 7 (2020), https://doi.org/10.35290/rcui.v7n2.2020.300.
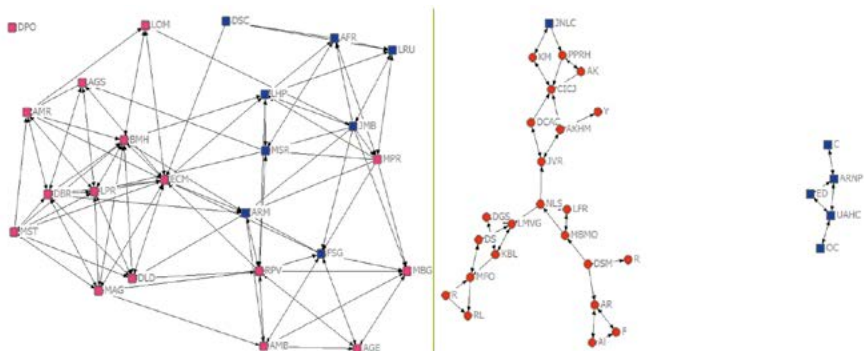
Figure 1

Structure of the Network class group University of Holguín (left)
and Meritorious Autonomous University of Puebla (right). Each node
is the position that each student occupies in the network and is identified
by a label. The red color is for female students and the blue color
is for male students

III.3. Centralization

In this research, when working with an asymmetric matrix, two types of data are obtained: on the one hand, the relations that an actor claims to have with the rest (degree of exit) and, on the other hand, the number of times that this actor is mentioned by all the others (degree of entry). Viewed globally, the degree of output refers to the flow of information (access and diffusion) within the network and the degree of input to the prestige or recognition of the actors within the network.

Regarding the degree of exit, it is evidenced that the Holguin class group has 24.6% higher than 3.7% of the Puebla class group (See table 1), these values indicate that in the Holguin students' network there is access and dissemination of more information, positive experiences are sought in cooperative work than in the Puebla students' network. Similarly, it occurs with the degree of entry, where a greater number of actors in the Holguín student network 33.6%, have greater prestige or constitute important nodes for the achievement of social cohesion within it, than the Puebla student network 11.1%.

These elements reveal that the Puebla network is classified as a star-type network where few nodes achieve greater centrality (see figure 1 right); the opposite occurs with the Holguín network, which shows a more connected

network (see figure 1 left) with a greater link between its actors. An important element to take into account is that in both networks the input degree is higher than the output degree (a result that rarely occurs, usually the output degree is higher than the input degree), which implies that the network is based, fundamentally, on the prestige and importance of its actors rather than on the flow of information through the network.[54]

Table 1

Descriptive statistics of the SNA (density and centralization)
of the Holguin and Puebla class groups network

	Groups of Bachelor's Degree in Tourism	
	Holguín	Puebla
Network density	0.2428	0.0715
Network centralization (output grade)	24.575%	3.699%
Network centralization (input level)	33.648%	11.097%

After a first approach to the global analysis of the networks of the Holguin and Puebla class groups, the following is an analysis of the networks based on a series of indicators that allow us to know the characteristics of each of the actors.

III.4. Degree centrality

The analysis of the nodal rank or degree indicates that the most connected person in the Holguin class group (see Figure 2 left), the one with the highest degree of output, is ECM with 11 ties, followed by RPV and BMH with ten ties each, there are also 11 nodes between nine and five ties each, and there is one DPO node with no degree of output. In this case, there are three nodes that reach more than 40% of normalized output degree, so it is assumed that these nodes, including ECM, which is the person with the highest percentage, have a high degree of influence on the rest of the actors in the network.

From another point of view, when we analyze the degree of entry, it can be seen that ECM has the highest degree of entry with 13 relationships,

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[54] Aguilar-Gallegos et al., "Análisis de redes sociales para catalizar la innovación agrícola: de los vínculos directos a la integración y radialidad."

dominating 56.6% of the relationships with normalized degree and marks a notable difference with the rest of the nodes, followed by LPR with nine ties and BMH, DBR and LHP with eight ties each, in this case it is evident that these nodes are important in the network, due to the prestige or recognition of the rest of the actors.

In the case of the network of the Puebla class group (see Figure 2 right), in terms of the degree of output, the existence of nodes with few ties can be seen, seven actors (DSM, KBL, NLS, LMVG, ARNP, UAHC and AKMH) share three degree of output, each one reaching 10% of normalized degree of output. Although these nodes are the ones with the highest output degree within the network, due to the number of ties or relationships they have, it is evident that they do not have a high degree of influence over the rest of the actors in the network. From another perspective, it is evident that the degree of input is also low, although with a notable difference between each of its nodes, in this case CICJ has the highest degree with five ties followed by LMVG with four and ARNP, UAHC, MFO, AR and JVR with three ties each, these nodes are the most important within the network to contribute to the cohesion of the group.

The analysis of this indicator shows in terms of the degree of exit, how the Holguin student network has a higher percentage, although ECM is the student with the greatest influence on the network, there is a group that reaches a high degree of exit, therefore, there is a greater degree of influence on the rest of the students in the network, while the Puebla student network shows a low percentage of degree of exit and it is difficult to determine important nodes within this network. Regarding the degree of entry, similar results are shown, in the Holguin student network ECM continues to be the student with more recognition and importance by the rest of the students for the achievement of social cohesion of the class group, however, there are other students with possibilities of achieving recognition and importance within the network. In the case of the Puebla network, CICJ is the student who enjoys the greatest prestige and makes a difference with the rest of the students in the group; however, since she has a low entry grade, there are no students who have the recognition of the rest of the students in the class group. Therefore, this result can be taken into account as a measure that can be linked to the index of accessibility that a subject has to the rest of the subjects.[55,56]

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[55] Velázquez-Álvarez and Aguilar-Gallegos, *Manual introductorio al análisis de redes sociales. Ejemplos prácticos con UCINET 6.85 y NETDRAW 1.48. Medidas de centralidad*.

[56] Kuz, Falco, and Giandini, "Social Network Analysis: a Practical Case Study."
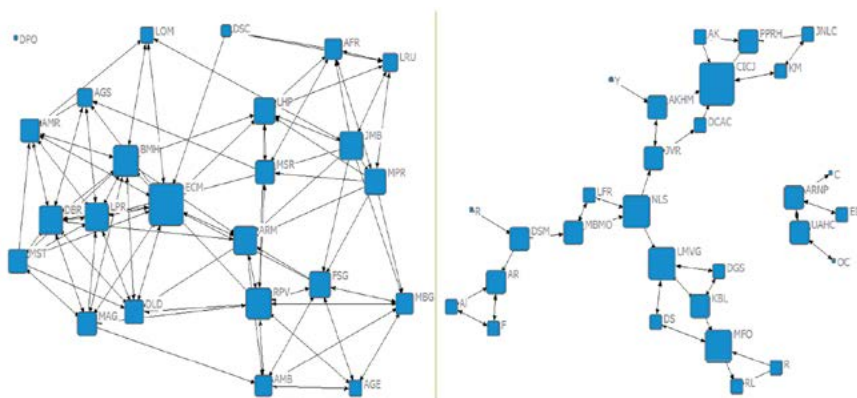
Figure 2

Network based on degree of centrality. Network class group University of Holguin (left) and Meritorious Autonomous University of Puebla (right). Node size indicates the degree to which students are connected to the network in each class group

III.5. *Intermediation*

This indicator identifies the capacity of an actor to become an intermediary in the relationships between all the others. Therefore, actors with a high intermediation capacity (bridging actors) tend to occupy positions of power to the extent that they control information and communication flows.[57] As a result, they can withhold, disrupt, or distort the operation of the same,[58] but they can also accelerate the dissemination of information or other "resource" of interest to network actors.

As can be seen (Figure 3 left), in the network of the Holguin class group, among the nodes that manage to position themselves among the most central ones in terms of intermediation is ECM intermediating 115 geodetic paths, which represents 22.8%, followed by RPV with 16.5% and LHP with 11.6%, it can also be seen that there are only two nodes with zero level of intermediation, so they cannot be considered to intermediate the flow of connections.

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[57] Ramasuri Narayanam and Yadati Narahari, "Topologies of strategically formed social networks based on a generic value function—Allocation rule model," *Social Networks* 33 (2011), https://doi.org/10.1016/j.socnet.2010.10.004.

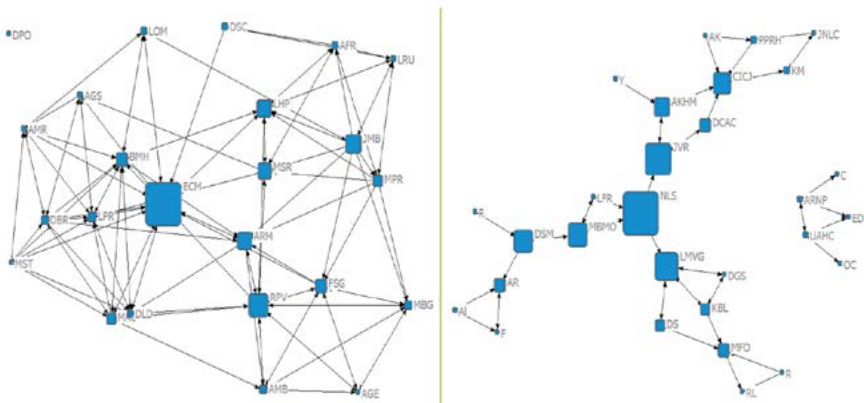[58] Borgatti, Everett, and Johnson, *Analyzing social networks*.

Figure 3

Network formed from the degree of intermediation. Network class group University of Holguin (left) and Meritorious Autonomous University of Puebla (right). The size of the node shows the capacity of each student to become an intermediary in the relationships between all the others

When observing (Figure 3 right) the Puebla class group, NLS intermediates 60 geodesic paths, a fundamental element in this network, is that if the operation of the node (student) NLS is interrupted, the Puebla student network fragments into four subgroups, on the other hand, a significant number of students (11) with zero intermediation level is appreciated, which means that they cannot be considered to intermediate the flow of connections.

Although in the networks of the class groups of Holguín and Puebla there are students with a high degree of intermediation, it is possible to distinguish between these networks, that in the Holguín network, 91% of the students serve as bridges between other students (only two have zero level of intermediation), however, in the network of students of Puebla 62% of students have the possibility of being bridges, in this network 11 students cannot be considered to intermediate the flow of connections between students. A particular element in this network is that when the NLS student is affected, this flow of connections and the social cohesion of the class group would be lost, as four isolated subgroups would be formed.

The results obtained from this perspective surpass those of Cadoche who obtained in his study that in 50% of the groups created for the cooperative

learning experience, students stood out for the possibility of integrating and mediating among their peers.[59]

Another essential component of cooperative learning is to achieve social cohesion of class groups with the objective of involving each student to be responsible for his or her own success, but at the same time for the results of the group Johnson and Johnson and Gillies.[60,61] In such a sense, the organization of the teaching-learning process should give the opportunity to generate links between the different students in the class group.[62] In this case, intermediation constitutes a powerful tool for the pursuit of positive interdependence.

III.6. Eigenvector

The results obtained (Figure 4 left) for the Holguin class group network show that ECM has the largest eigenvector 0.375 (53% normalized eigenvector) followed by BMH (0.301) and DBR (0.283). Thus, these are the best connected students with students who in turn are also well connected with other students. It can be seen that only one student DPO has zero eigenvector being an isolated node in the network. Regarding the network of the Puebla class group (Figure 4 right) it can be considered that CICJ has the highest eigenvector 0.348 (49.1% normalized eigenvector) followed by LMVG (0.342) and NLS (0.341), these are the best connected students within the network to other students who are also well connected, on the other hand, five students have zero eigenvector.

The analysis of this indicator in the networks of the Holguin and Puebla class groups shows that 95.8% of the students of the Holguin class group are connected to other students who are well connected within the network, only one has zero eigenvector, on the other hand, the Puebla class group reaches 82.7% of the students are connected to other students who are well connected, five of them have zero eigenvector.

The eigenvector can be interpreted as a measure of the popularity of an actor in the sense that a node with a high value of the indicator is connected to nodes that are themselves well connected.[63] This indicator, by taking into

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[59] Cadoche, "Una propuesta de aprendizaje cooperativo."

[60] David W. Johnson and Roger T. Johnson, "Learning together and alone: Overview and meta-analysis," *Asia Pacific Journal of Education* 22, no. 1 (2002), https://doi.org/10.1080/0218879020220110.

[61] Gillies, "Developments in Cooperative Learning: Review of Research."

[62] Deniz Gökçe Erbil, "A Review of Flipped Classroom and Cooperative Learning Method Within the Context of Vygotsky Theory," *Frontiers in Psychology* 11 (2020), https://doi.org/10.3389/fpsyg.2020.01157.

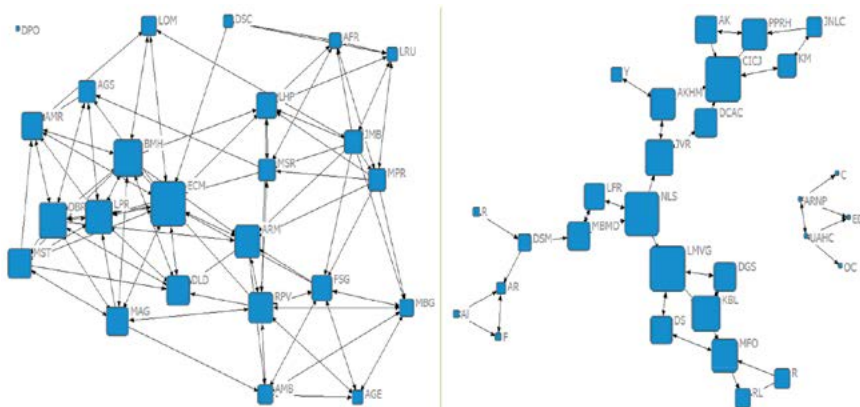[63] Borgatti, Everett, and Johnson, *Analyzing social networks*.

Figure 4

Network formed from the eigenvector degree. Network class group University of Holguin (left) and Meritorious Autonomous University of Puebla (right). The size of the nodes represents the best connected students within the network to other students who are also well connected

account indirect relationships, also provides more information regarding the links of the nodes, because it may be that there are nodes with low degree centrality, but they are connected to nodes with high degrees and, therefore, their eigenvector will be high; on the contrary, it may be that there are highly connected actors (high degrees) but that these are not connected to anyone, therefore, their eigenvector will be low.

From this point of view, the sums of positive nominations received by each group member is a measure of group acceptance and constitutes a measure of rejection when negative nominations are higher.[64]

From the point of view of social cohesion or social interdependence theory, the impact that can be achieved with cooperative learning is closely related to the degree of cohesion that the group can achieve.[65,66] In this sense, they take as a basis the postulates of Vygotsky, mainly the usefulness of working and

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[64] Esther Ruiz Palomo et al., "Validación de un instrumento que estima la incidencia del aprendizaje cooperativo en el estatus sociométrico de los alumnos," *Contextos Educativos. Revista de Educación* (2020), https://doi.org/10.18172/con.3937.

[65] M. P. Li and Bick Har Lam, Cooperative Learning. A class. The Active classroom, (Hong Kong 2013).

[66] Erbil, "A Review of Flipped Classroom and Cooperative Learning Method Within the Context of Vygotsky Theory."

collaborating with a more competent partner. From this perspective, the group is more cohesive when collaboration is achieved with students with a high degree of popularity, seen as the possibility that this student is connected to more expert students or with greater cohesion within the group.

III.7. Networks within networks (cliques)

Since a clique is nothing more than a set of nodes or actors that have all the possible links between them. In this research, the analysis of groups and subgroups was carried out based on the integration of at least three students, a reference offered by research on cooperative learning for group work to exist.

In this case, it can be seen in Table 2, that in the Holguin class group 10 cliques are formed, of these, three subgroups with five students, four with four and three subgroups with three students. It can also be said that this network is made up of substructures with a high degree of overlapping (ECM and BMH, for example, appear in half of the cliques). Most of the actors only belong to one subgroup, while we have four isolated actors, who do not belong to any clique.

In the case of the Puebla class group, there are three subgroups formed by three members each, in this case the actors belong to only one group, more than 50% of the students are considered to be classified as isolated actors. In general, the Holguín class group shows a more robust "group" relationship with stronger ties than the Puebla group.

This indicator addresses the idea of Lewin, who concluded that the analysis of groups and subgroups constitutes a formidable instrument for the subjects to know themselves, to know others, to know the specific group of which they are part and which lives in a given context, and the rest of the groups that are in their environment and go through similar processes.[67]

In this sense, groups are key indicators, as they constitute the most cohesive structures, where identification and solidarity spaces are established among each of the subjects that make up the group.[68] In terms of the present research, this analysis allows identifying groups formed by students with high cohesion, with a greater sense of commitment in group work for the pursuit of group goals and success.

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[67] Kurt Lewin, "Frontiers in group dynamics," *Human Relations* 1 (1947), https://doi.org/10.1177/001872674700100201.

[68] José Manuel Gaete Fiscella and Jorge Ignacio Vásquez, "Conocimiento y estructura en la investigación académica: una aproximación desde el análisis de redes sociales," *Redes. Revista Hispana Para El Análisis de Redes Sociales* 14 (2008), https://doi.org/10.5565/rev/redes.121.

Table 2

Number of groups and subgroups that are formed from the network
of each class group. Each subgroup is made up of a set of nodes (students)
that are identified by the labels

	Groups of Bachelor's Degree in Tourism	
	Holguín	Puebla
Cliques	1: DBR ECM BMH AMR LPR 2: DBR ECM DLD BMH LPR 3: MAG DBR ECM BMH 4: ECM BMH AMR LOM 5: MAG ECM BMH MST 6: DBR ECM AGS LPR 7: MBG AGE AMB RPV FSG 8: AFR LHP LRU 9: AFR LHP MSR 10: AFR MPR LRU	1: UAHC ARNP ED 2: AI AR F 3: DGS KBL LMVG

III.8. *Elements that hinder social cohesion in the Holguín and Puebla class groups*

In the analysis of the elements that constitute elements that hinder the social cohesion of the group, a mode two network was constructed from the criteria of the students of the class group, where the students of each class group are related to the elements that hinder social cohesion, to this network is made the analysis of centrality, results that are shown below.

In the Holguin class group, in the opinion of these students, there are 10 aspects that can affect the social cohesion of the class group (see Table 3). However, through the network graph based on the degree of centrality, there are six elements that exceed the average degree of centrality (responsibility, studious, intelligence, companionship, friendship and organized).

Table 3

Descriptive statistics based on the analysis of centrality
of the factors affecting social cohesion of the class group in Holguin, Cuba

	Factors	Degree
1	responsibility	0.708
2	studious	0.500
3	intelligence	0.375

	Factors	Degree
4	companionship	0.375
5	friendship	0.333
6	organized	0.333
7	empathetic	0.292
8	communication	0.208
9	help	0.167
10	understanding	0.083

In the case of the Puebla class group, 12 elements that hinder the positive interdependence of the group are related (see Table 4). Through the graph of the network based on the degree of centrality six elements that exceed the average degree of centrality these are (responsibility, companionship, participation, intelligence, friendship and organized)

Table 4

Descriptive statistics from the analysis of centrality of the factors affecting social cohesion of the class group in Puebla, Mexico

	Factors	Degree
1	responsibility	0.483
2	companionship	0.310
3	participation	0.241
4	intelligence	0.241
5	friendship	0.241
6	organized	0.207
7	studious	0.172
8	communication	0.138
9	empathy	0.138
10	show interest	0.103
11	honesty	0.103
12	creativity	0.103

The analysis shows that the Puebla class group lists a greater number of factors that hinder social cohesion than the Holguín class group. The fact that the Mexico class group has a greater number of factors means that it is more difficult to achieve the formation of positive relationships and trust between individuals, which is key to the success of cooperative learning and the achievement of social cohesion.

The analysis of each of these factors for each class group yields a certain similarity when listing each of these groups (six elements with a higher degree of centrality). There is consensus among both class groups that responsibility is the fundamental element that affects the social cohesion of the group, in a way that coincides with the studies of Arana Ercilla, Acosta Arévalo, Ibarra Argoty and Huérfano Caicedo and Paredes León and Ramos Serpa.[69,70] It also coincides with the work of Sharan, who states that effective communication is fundamental for social cohesion, since it facilitates individuals to communicate and listen to others.[71] On the other hand, Elliot and Dweck state that cultural, ethnic and personality diversity in a group can be a challenge for social cohesion, but it can also enrich cooperative learning.[72]

However, in the present research, factors such as being studious, intelligent, companionship, friendship and being organized come to light. Being studious and intelligent are factors that can significantly influence the social cohesion of a class group in the context of cooperative learning. First, students who are dedicated to study and strive for good academic results are often perceived as leaders or referents within the group, which can generate a higher degree of cohesion among members. In addition, these students tend to be more committed to learning and to teamwork, which translates into a higher degree of cooperation and coordination in the group. In terms of intelligence, students who show more advanced cognitive skills and superior analytical and synthesis skills may be seen as valuable resources for the group, which may increase social cohesion. On the other hand, it is also possible that these factors may generate tensions and conflicts within the

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[69] Martha Hortensia Arana Ercilla et al., "La formación de valores de responsabilidad y trabajo cooperativo en equipo, en el proceso de investigación para el trabajo de grado," *Revista Científica General José María Córdova* 11 (2013), https://doi.org/10.21830/19006586.190.

[70] Paredes León and Ramos Serpa, "El aprendizaje cooperativo, educación desde la participación social en estudiantes de bachillerato."

[71] Sharan, "Cooperative learning for academic and social gains: Valued pedagogy, problematic practice."

[72] A. J. Elliot and C. S. Dweck, *Handbook of competence and motivation* (Guilford Press, 2005).

group, especially if some members feel inferior or excluded because of their academic performance.

In any case, it is important to bear in mind that social cohesion in cooperative learning does not depend exclusively on individual factors, but is influenced by multiple social and contextual variables.

IV. Conclusions

The theoretical elements addressed allow us to appreciate the importance of cooperative learning, as corroborated by the growth of research on this topic. The conceptualization of cooperative learning is characterized by the diversity of criteria; different authors contribute to its enrichment from research results that contribute new elements to it. It is evident that research in the context of Higher Education, at the international level, is below the rest of the teaching levels, which does not take into account the potential of this proposal for the preparation of future professionals through the development of social skills, facilitating group work and autonomous and cooperative learning in the academic field, where one learns to learn, that is to say, teaching how to learn and how to continue learning throughout life. Essential aspects in the integral formation of the future professional.

In this sense, studies show that cooperative learning constitutes a valuable proposal for the achievement of social cohesion in class groups, based on the development of social skills in students, who, through group work, are more motivated and committed to individual goals and those of the group in general. However, it is necessary to study it from other perspectives that, in the end, contribute to the design of strategies that help achieve greater social cohesion in the class groups where this proposal is put into practice.

On the other hand, the use of the SNA in the present study allowed, through the selected indicators, the analysis of social cohesion of the class groups in Holguín, Cuba and Puebla, Mexico, to analyze the results individually and arrive at comparisons, as well as to identify the elements that constitute barriers to the achievement of greater positive interdependence in these groups.

In this research it was found in the individual analysis of each class group network that there are students with outstanding reticular characteristics, which also has important implications, because through the "key students" a greater number of students could be reached, since they are well integrated in the network. Acting on these actors would allow that when new tasks for cooperative work are set, they are quickly disseminated to a network, in addition to updating it and facilitating cohesive and articulated work.

On the other hand, from a global perspective, the class groups subject to cooperative learning practices show different networks of relationships. The comparison of the networks of the class groups of Holguín, Cuba and Puebla, Mexico shows that the Holguín student network achieves greater cohesion, by forming a denser network, with a greater flow of information among the students of the network, as well as, with the identification of a greater number of students who enjoy recognition and importance within the network. The 91% of the students of the Holguin class group have the possibility of mediating in the relationship between other students which facilitates the flow of connections, in this sense, the Puebla class group reaches 62% with the condition that if a student is affected, the network is fragmented in four subgroups. On the other hand, it is significant that, in both networks, the male students are the ones who remain more distant in the network.

The analysis of the groups shows that the Holguín students have more strongly cohesive structures where the commitment to the results of cooperative work is evident, with a high sense of solidarity, as evidenced by the formation of 10 subgroups, more than the three in the group of students from Puebla.

Finally, there is agreement that the element that most affects cooperative work is responsibility; however, there is evidence of the existence of other socio-psychological factors that have a negative influence on the achievement of social cohesion in the class group. It should be noted that the Mexican class group takes into account a greater number of factors than the Cuban class group, an aspect that is reflected in the social cohesion of this group. However, the research on this point has a limitation because it is necessary to analyze longitudinally (over time) these changes dynamized through the actors mentioned. It should also be considered to analyze other attributes possessed by the students, such as: gender, age, race, academic results, social status, conflict resolution in the group, leadership, commitment, responsibility, among others that may be influencing the articulation of the network.

The findings of this research allow us to recommend that the implementation of cooperative learning should take into account the contributions of SNA, where students who are actors with the possibility of transmitting help, as well as those who enjoy the recognition of the rest of the students in the group, are considered in the search for the social cohesion of the class group, Another fundamental element is to consider the students who mediate the relationship between other students, so that, through the design of cooperative learning strategies, the teacher contributes to the formation of groups, in this sense, students who are more peripheral can be included in the group.

From this perspective, it is about connecting the most isolated students to students who are better connected with other students, so that, through their help, better academic results are achieved and contribute to the prevention of problems that come to light in the school group. In addition, knowledge of potential subgroups allows for the creation of more cohesive groups with a greater chance of success.

Finally, inquiring about the barriers that affect cooperative work provides the possibility for teachers to design strategies to minimize the impact and achieve greater social cohesion among students. The present study highlights empirical evidence related to indicators such as centrality, intermediation, eigenvector and cliques that may be valuable for the identification of actors that contribute catalyze the social cohesion of the group and enrich the cooperative learning proposal with the search for new strategies.

Integrating this SNA approach to the context of higher education is a means that allows the professor to detect and diagnose the transformations in the class groups subject to cooperative learning with emphasis on the social cohesion of the group, as well as to determine the retarding elements and intervene according to the results obtained, ultimately, to design strategies that contribute to favor the practice of cooperative learning and to strengthen the social cohesion of the class groups with the objective of integrally training future professionals in the tourism industry.

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