

Learning about the influence of certain strategies and communication structures in the organizational effectiveness

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Abstract

The purpose of the article is to present the learning about the influence of certain strategies (cooperation or competition) and communication structures (circular or star-shaped) in the organizational effectiveness facing a given task. This article illustrates an active learning methodology that enables the members of an organization, through experimentation and observation, to *design* organizations and *take decisions* regarding the most appropriate communication structures and organizational structures, using the distinctions they can obtain as a result of their own experience.

The methodology was designed for the Organizations Systemic Thinking course of the Industrial Engineering Department of Los Andes University, in which the engineering students learn concepts related to the communication structures and the organizational strategies for organizational effectiveness. Based upon the experience of the aforementioned design, several trial tests have been made with senior students in high school and with engineering teachers of different universities in Europe and Latin America.

Keywords: Star-shaped-communication-structure; circular-communication-structure; cooperative-organizational-strategy; competitive-organizational-strategy; design of a learning process through active experimentation; collaborative learning.

1. INTRODUCTION

The article comprises three parts. In the first part a conceptual analysis of two subjects is presented: 1) the design of cooperation and competition strategies and circular and star-shaped-communication-structures; 2) the choosing of an active learning activity (role playing game), for the appropriation of the organizational concepts. The second part of the article displays the results of the three different cases where these issues have been undertaken. The final part of the article shows the considerations upon the utility of the implemented methodology and its influence in the learning of the concepts and skills associated with communication structures and organizational strategies.

2. THEORETICAL BACKGROUND

Since the objective of the article consists of showing the learning about the influence of specific communication strategies (cooperation or competition) and structures (star-shaped or circular) in the organizational effectiveness facing a given task, it is necessary to define some related concepts.

Organizational strategies: cooperation and competition

'Cooperation' is understood as a social situation in which the individuals of a team have objectives interrelated in the following way: the individuals of the team realize that their objectives can be accomplished if and only if the other members of the team can accomplish their own objectives [1]. In other words, if a member of the team achieves his/her objective, the other members will achieve their respective objectives to a certain degree [2].

'Competition' is understood as a social situation in which the individuals of a team have objectives interrelated in the following way: the individuals of the team realize that their objectives can be accomplished only if the other members of the team fail in the accomplishment of their own objectives [1]. In other words, if a member of the team achieves his/her objective, the other members will be unable to accomplish their respective objectives [2].

According to previous studies on the effects of cooperation and competition in teamwork, the following hypotheses can be posed [1]:

- Cooperative teams will produce more than competitive teams.
- In cooperative teams there is more effort coordination.
- In cooperative teams there is more division of labour (by functions).
- In cooperative teams there is more motivation in the execution of the task.

Communication structures: circle and star

The communication structures inside a work team refer to the ordering number and criteria of the different communication channels between the team members [2]. For our role game, two communication structures will be taken into account as illustrated by figure 1. Each node represents a participant and each line represents the allowed bidirectional communication channel.



FIGURE 1. Communication structures used in the role game.

Previous studies have shown the influence of different communication structures in the organizational effectiveness. Some of the main results are:

- The communication structures determine the emerging leadership, organizational development, team satisfaction and efficiency properties. In general, the centralized (star-shaped) networks increase the emergence of leadership and organizational development in comparison to the decentralized (circular) ones. Nevertheless, the centralized networks disallow the efficient solution of complex problems and reduce the members' satisfaction. These effects are mediated by the independence and saturation of the members: in decentralized networks there is less saturation and more independence [1].
- The task complexity is a critical factor that determines the relative effectiveness of the different communication channels. In simple tasks (symbols, letters, colour and number identification) the star-shaped structure is more efficient, but in complex tasks (mathematical problems, word arrangement, sentence construction, discussion of the problems) the circular structure is the most efficient [3] [2].

Active learning

The role game, which is a part of one of the activities that encourage active learning, is the chosen methodology for the assimilation of the organizational strategy (cooperation and competition) and communication structure (circular and star-shaped) concepts by the students. To support this choice we will explain the concept of active learning and how it relates to the designed role game.

First, for the purpose of this investigation, we use the definition about learning: learning is the process of interiorizing distinctions in our actions. This means that it is possible 'to distinguish', that is, to be able to make distinctions in a particular realm of action, engage these distinctions in a tradition and incorporate them into our experiences [4].

The question is how to fulfill this learning process? The learning can be seen as the process in which the knowledge is created, through the experience transformation. This is possible with thoughtful observation, abstract conceptualization and active experimentation. Therefore, the students can learn in a more effective way the posed concepts by the means of experience [5].

In addition, it is important to recognize that learning is a socially constructed process [6]. That is to say, in order for the students to learn, the dimension of social interactions, which generate the necessary bases for the natural incorporation of distinctions into their actions, must be taken into account.

Furthermore, in order for the learning process to make sense, the transactions between the individual and his environment must be taken into account. These transactions involve the manner in which the individual relates to the 'real world' and how these personal experiences feed back from this relation [5].

Another factor to take into account in active learning is the motivational dimension, achieved with the development of a personal sensitivity for the learning incentives [7]. These incentives may be provided by the sociocultural context in which the student is immersed.

Finally, for the beginning of a learning process, there must exist a breakthrough statement (observation and evaluation of the lack of knowledge of something) [4], a test or comparison of the previous experience with a new one [5] or the formulation of a series of meaningful questions about a phenomenon [8].

The active learning is action oriented; in it the person who is learning is involved with his/her senses and is inside of the process, not only as an observer. It focuses in developing high level thinking skills: analyse, synthesize, evaluate. It challenges the participants to think, talk, listen, read, write and reflect upon the content of the course through activities such as problem-solving exercises, simulations, case studies, role games, activities in which the participants are required to apply what they are learning, to learn doing [9].

To sum up, we propose a model that takes into account the previously posed conditions in an active learning process. This model is thoroughly explained in the following section (see figure 2).

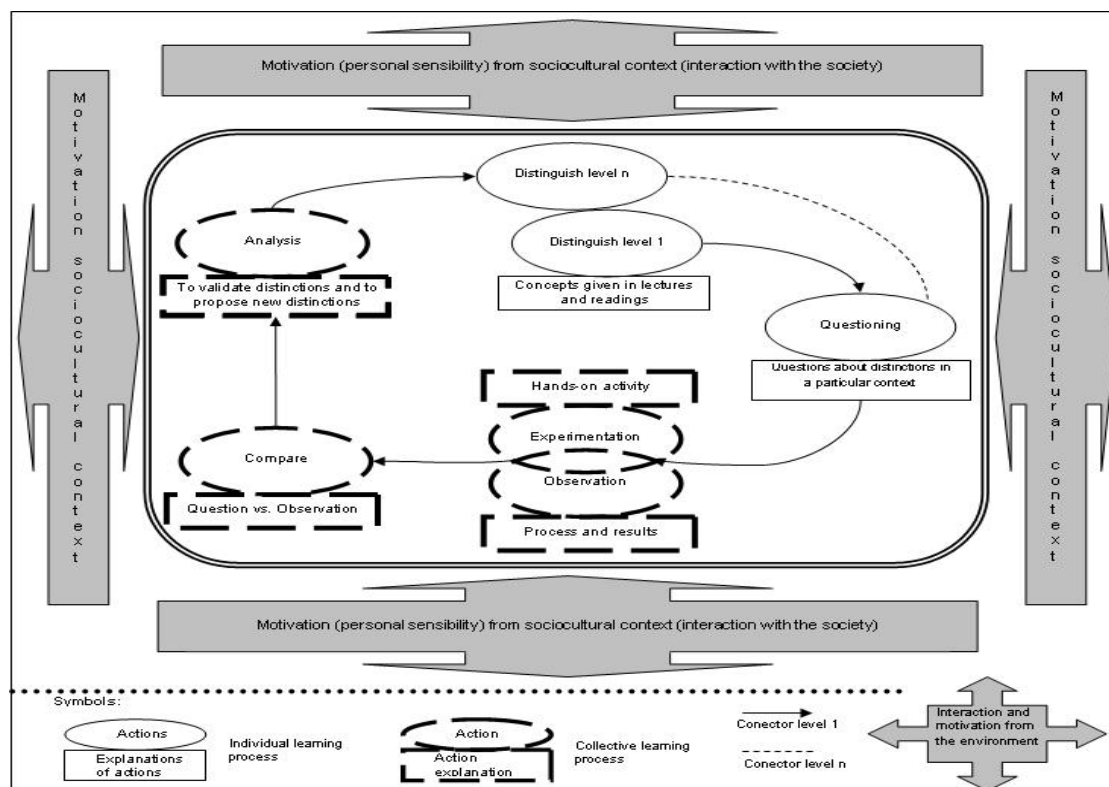


FIGURE 2. Proposed model for the active learning process.

3. HANDS-ON LABORATORY DESIGN: A ROLE GAME

The proposed activity consists of a role game, in which the participants represent a particular situation, acting according to predefined action rules [8]. A key point in the design of the activity is that the participants assimilate in an insightful way, both the *organizational strategy* and *communicational structure* concepts.

The participants face four central processes (see figure 2): 1) To Distinguish: The distinctions made by the students on some organizational concepts, seen in different contexts, are established. 2) To Question: On the basis of these distinctions, questions about their behavior in the activity's context are formulated. 3) To Experiment and Observe: is the implementation of a dynamic that enables them to work in teams and carry out the analysis, and 4) To Compare and Consider: the subsequent reflection of the individuals based on the process and results of his/her team, as well as those of the other teams. The four processes are explained below:

1-Step. To Distinguish:

The distinctions are made to function for two groups of organizational concepts:

- The distinctions made by the participants before the activity: Leadership, Motivation, Incentives, Communication-Skills, Bureaucracy, Power-Relations, Self-regulation, Teamwork, Division of Labour and Trust. The distinctions made in this stage of the process are known as 'Distinctions – Level 1'. These distinctions are made based on classes and texts.
- The new distinctions made by the participants through experimenting and observing during the activity. Among these are: conflicts inside and among the groups, intrinsic and extrinsic motivation, shared responsibility and information flow. These types of distinctions, which emerge after the implementation of the activity, are termed 'Distinctions – Level n'.

In this step of the process the students perform individually the following activities:

- They read articles (recommended by the teachers) related to the strategy and structure subjects.
- They take a lecture related to strategy and structure subjects.

2-Step. To Question:

The question process consists of the generation of hypotheses, questions, predictions and explanations of the participants, regarding the distinction behaviours learned previously in a particular context. To achieve this purpose they are required, previously to the activity, to consider which distinctions, and how, influence the organizational performance. The thoughtful reflection requires the inquiry into concepts seen both inside and outside of the class. Then, they are informed that they must solve a group challenge using different *communication structures* and *organizational strategies*.

In this step of the process the students perform individually the following activities:

- They write a technical report based on the lectures and readings, in which they propose a hypothesis regarding the existing relation between the associated distinctions and communication structures and organizational strategies.
- The students receive feedback from this report by the teachers' team. The evaluation criteria are: 1) that it responds to the research query; 2) that the references analyzed are pertinent; 3) that the document is written coherently.
- The above is exemplified in Table 1.

Case
 You are part of an organization that's interested in presenting a bid proposal to undertake a public work. You make several of your work groups compete among themselves, in order to choose the best proposal. Each group can only communicate with you and you are the only one who can communicate with every group.

What organizational distinctions do you think have an influence in solving effectively the assigned task in the case? Rate the relevance of those distinctions accordingly:

0 = Doesn't influence
 1 = Low Influence
 2 = Medium Influence
 3 = High Influence

Aspects (Distinctions)	0	1	2	3
Leadership				
Motivation				
Incentives				
Communication Skills				
Power Relations				
Self-regulation				
Bureaucracy				
Teamwork				
Labour Division				
Trust				

TABLE 1. Homework in the step "To Question".

3-Step. To Experiment and Observe:

Once the preliminary steps are concluded, the students face the challenge of "living" directly an organizational situation, in which they will experiment situations they have only studied up until then. Hence, they face an activity experimentation and observation through a particular challenge.

The purpose of the activity consists of making, in the least amount of time possible, as many tangram figures as possible (see figure 3), taking into account a sequence of pre-established figures using different *organizational strategies* and *communication structures*. The purpose behind of this activity is that the participants identify the distinctions that have the most influence on the organizational performance, depending on the communication structure and the organizational strategy they are analysing. Table 2 presents the explanation of the activity.

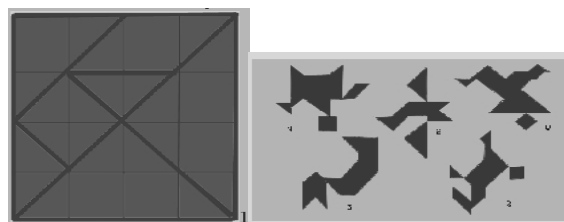


FIGURE 3. Tangram.

Strategy	Objective	Number of students	Communication Structure
Competitive	The aim of the competing teams is to make, in the least amount of time possible, the highest number of figures of the sequence.	Teams of 5 students.	Half of the teams use a star-shaped communication structure and other half a circular one.
Cooperative	The purpose is to make, in the least amount of time possible, the highest number of figures of the sequence, cooperating between teams.	Two groups of 25 students each one. Each group form teams of 5 students.	One of the groups uses a circular communication structure and the other group a star-shaped one.

TABLE 2: Explanation of the activity.

The interaction rules are shown in the table 3.

Strategy	Interaction rules
Competitive	<ul style="list-style-type: none"> ▪ Each participant individually builds the proposed figure (is forbidden to watch how other team members build their own figure). ▪ Each participant communicates with the other team members via written messages, so that every member of the team assembles the figure successfully (is forbidden to draw the figure). ▪ When all the team members consider that the figure is properly assembled, an external agent validates the result. If all of the members have assembled the figure correctly, they move on to the next figure.
Cooperative	<ul style="list-style-type: none"> ▪ Each team assembles the proposed figure (is forbidden to watch how other teams assemble their own figure). ▪ Each team communicates with the other teams via written messages, so that every team assembles the figure successfully (is forbidden to draw the figure). ▪ When all the teams consider that the figure is properly assembled, an external agent validates the result. If all the teams have assembled the figure correctly, they move on to the next figure.

TABLE 3. Interaction rules for each organizational strategy.

4-Step. To Compare and Consider:

Considering the results obtained from the activity, the participants reflect upon basis of the comparison between the initial hypotheses (questions) and the experience lived in the activity. As an input for this reflection, the participants have information on the results obtained in every possible scenario. There are two organizational effectiveness indexes to be appraised: index 1 is defined as the number of figures assembled properly per minute; index 2 is defined as the number of figures assembled properly per minute per person.

4. CASE STUDIES

Table 4 shows the participants' profile and results (in terms of effectiveness) of the three case studies.

Case Studies	Participants' Profile	Results related to the considerations on organizational effectiveness
Case 1: Engineering Students	Approximately 320 students of the Systemic Thought on Organizations course, of the Industrial Engineering Department of Los Andes University, participated. Their age range is between 20 and 25 years.	The results of the activity show that, according to the number of figures assembled per minute, the most effective organizational strategy was the cooperative, with a circular communication structure. Taking into account the number of people (number of figures per minute per person), the competitive strategy was better, regardless of the communication structure.
Case 2: High School Students	The participants were 60 high school seniors with an age range between 15 and 17 years, from six educational institutions in Bogotá linked to an investigation project on mathematics learning virtual networks. The project is led by an investigation group from the Industrial Engineering Department of Los Andes University.	The results of the activity provide the evidence that, according to the number of figures made per minute, the most effective organizational strategy was the cooperative one, with a star-shaped communication structure. Taking into account the number of people (number of figures per minute per person), the competitive strategy was better when the participants had a star-shaped communication structure.
Case 3: Engineering Teachers	Twenty-five teachers from engineering schools in Chile, Colombia, France, the Netherlands, Denmark and Spain participated, in the context of the seventh Active Learning Engineering workshop that took place in Toulouse, France. The age range of the participants was between 30 and 50 years.	The activity showed that the circular communication structure was more effective in relation to the two proposed indexes (number of figures per minute and number of figures per minute per person), regardless of the chosen organizational strategy.

TABLE 4. Participants' profiles and results of the cases studies.

Results Case 1: Engineering Students

Validated Distinctions – Organizational Strategies (figure 4)

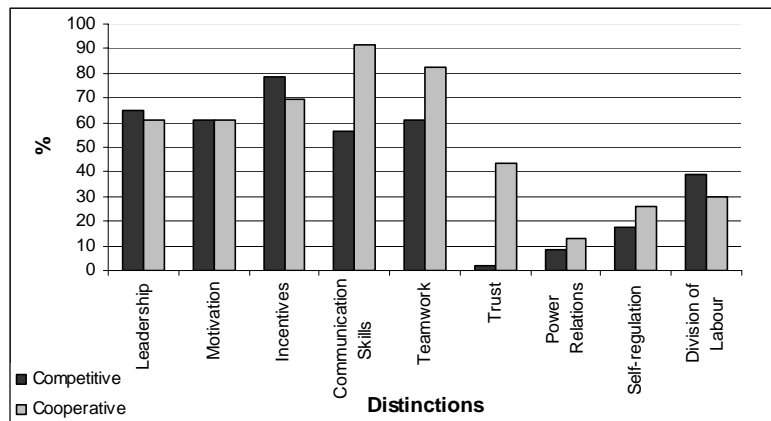


FIGURE 4. Rating of influences on the organizational strategy.

Validated Distinctions – Communication Structures (figure 5)

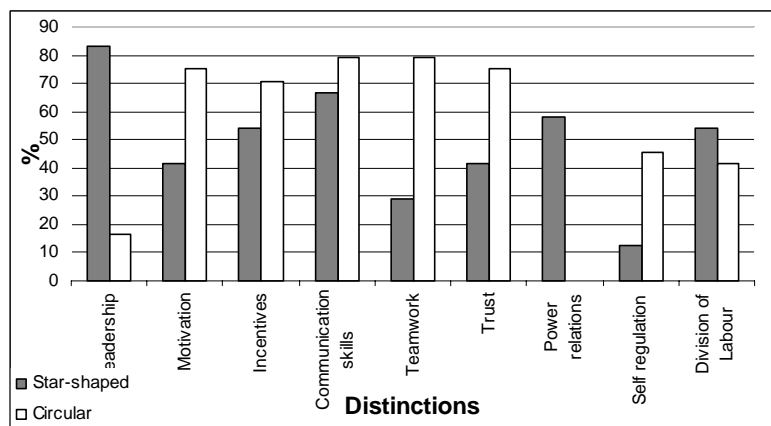


FIGURE 5. Rating of influences on the communication structure.

Results Case 2: High School Students

Validated Distinctions – Organizational Strategies (figure 6)

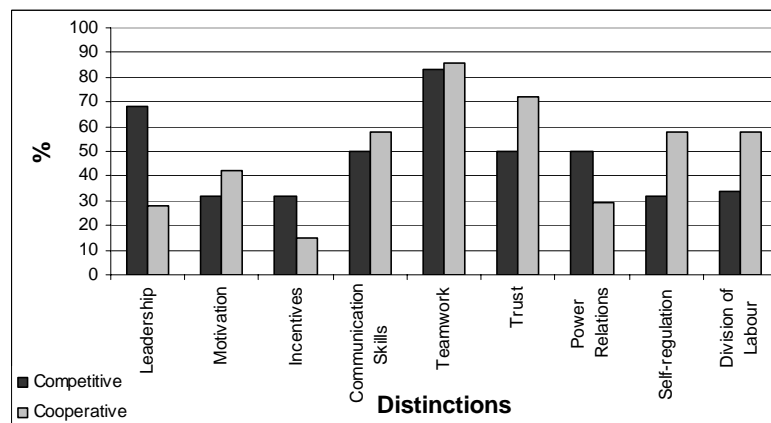


FIGURE 6. Rating of influences on the organizational strategy.

Validated Distinctions – Communication Structures (figure 7)

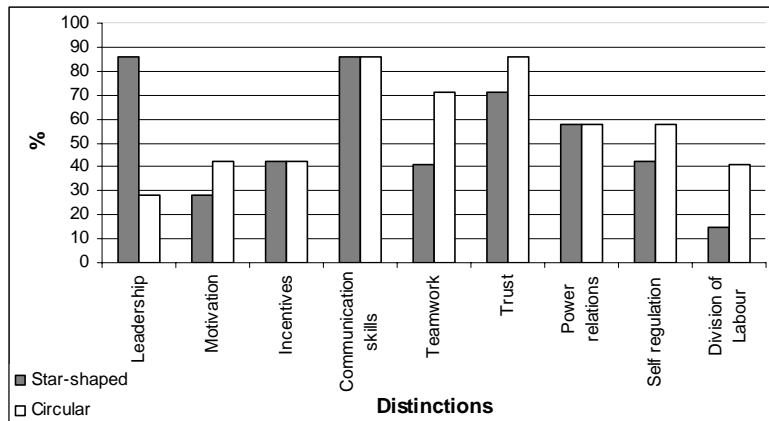


FIGURE 7. Rating of influences on the communication structure.

Results Case 3: Engineering Teachers

Validated Distinctions – Organizational Strategies (figure 8)

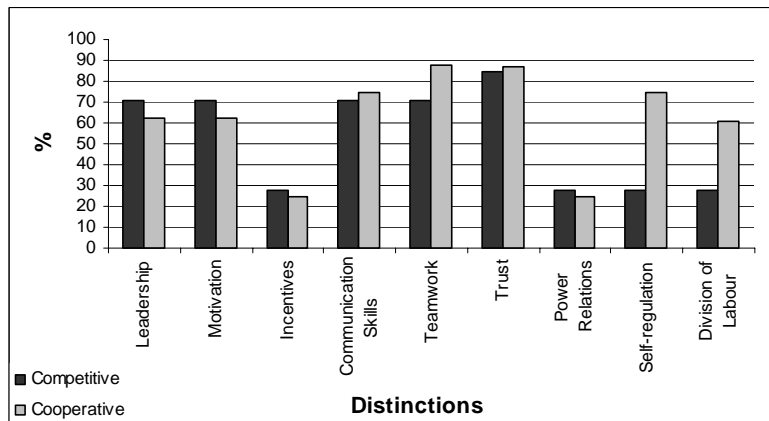


FIGURE 8. Rating of influences on the organizational strategy.

Validated Distinctions – Communication structures (figure 9)

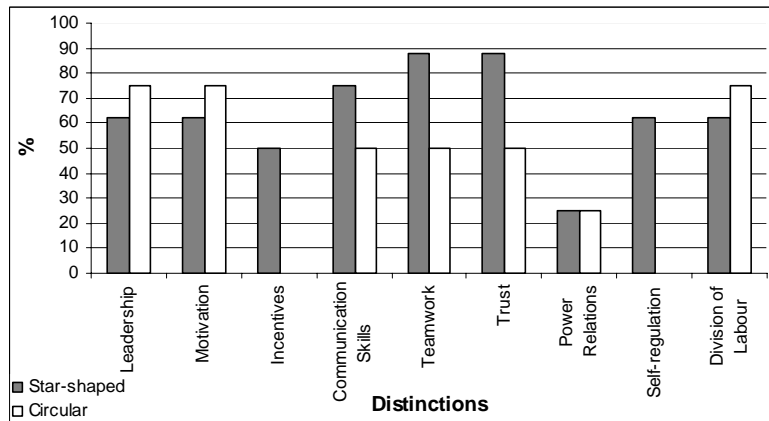


FIGURE 9. Rating of influences on the communication structure.

5. RESULTS DISCUSSION

For the purpose of this study it is convenient to show the reader how the participants made the distinctions regarding the influence that they have on the chosen organizational strategy and communication structure. The following are the qualitative analyses obtained from the consideration of the participants and validated with the data and registers gathered during the experimentation period.

5.1 Meaning of the distinctions on the organizational performance for each case

Table 5 shows the results of the distinctions that proved to be statistically meaningful for each case and for strategy/structure (proportion differences).

For case 1, organizational distinctions such as Communication-Skills, Teamwork and Trust have a higher influence on the cooperative strategy. In the competitive strategy there is no especially meaningful distinction. In terms of communication structure, Trust and Teamwork, along with Motivation and Self-Regulation, have more relevance in the circular communication structure. In the star-shaped communication structure, the most meaningful distinctions were Leadership and Power-Relations.

For case 2 the following organizational distinctions have shown complete relevance in cooperative strategies with star-shaped communication structures: Self-Regulation, Division of Labour, Communication-Skills, Teamwork and Trust.

Finally, case 3 displays a higher influence of distinctions such as Leadership and Power-Relations in the competitive strategy; and of Self-Regulation, Trust and Division of Labour in the cooperative strategy. On the other hand, in the communication structures, Teamwork and Division of Labour affect more the effectiveness of the circular communication structure; and Leadership influences the effectiveness of the star-shaped-communication structure.

		Case 1	Case 2	Case 3
Organizational strategy	Leadership			○
	Motivation			
	Incentives			
	Communication-Skills	✓		
	Power-Relations			○
	Self-Regulation		✓	✓
	Teamwork	✓		
	Division of Labour		✓	✓
	Trust	✓		✓
Communication structure	Leadership	✓		✓
	Motivation	○		
	Incentives			
	Communication-Skills		✓	
	Power-Relations	✓		
	Self-Regulation	○	✓	
	Teamwork	○	✓	○
	Division of Labour			○
	Trust	○	✓	
○	Meaningful difference in competitive strategy or circular structure.			
✓	Meaningful difference in cooperative strategy or star-shaped structure.			

TABLE 5. Meaning test of the distinctions for each case

5.2 Meaning of the distinctions on the organizational performance among cases

Figure 10 shows that the participants recognize, in the realm of organizational strategy (cooperative–competitive), a greater impact of Teamwork, Self-Regulation and Trust in the cooperative strategy; and of Leadership and Incentives in the competitive strategy. Therefore, there is a clear coincidence with the

experiments carried out by [2] and [1], in which there is a major coordination of efforts (Teamwork) in cooperative groups.

Regarding communication structures (circular, star-shaped), the participants perceived a higher impact of Self-Regulation and Motivation in the circular structure. In the star-shaped structure, the highest impact distinction was Leadership. These results concur with those revealed by [3] and [2], about the influence of the communication structure in Leadership and Motivation.

Furthermore, in figure 10 it is evident that in all three cases the participants tend to associate a higher number of distinctions as highly influential on the organizational performance when the strategy is cooperative and the structure is circular.

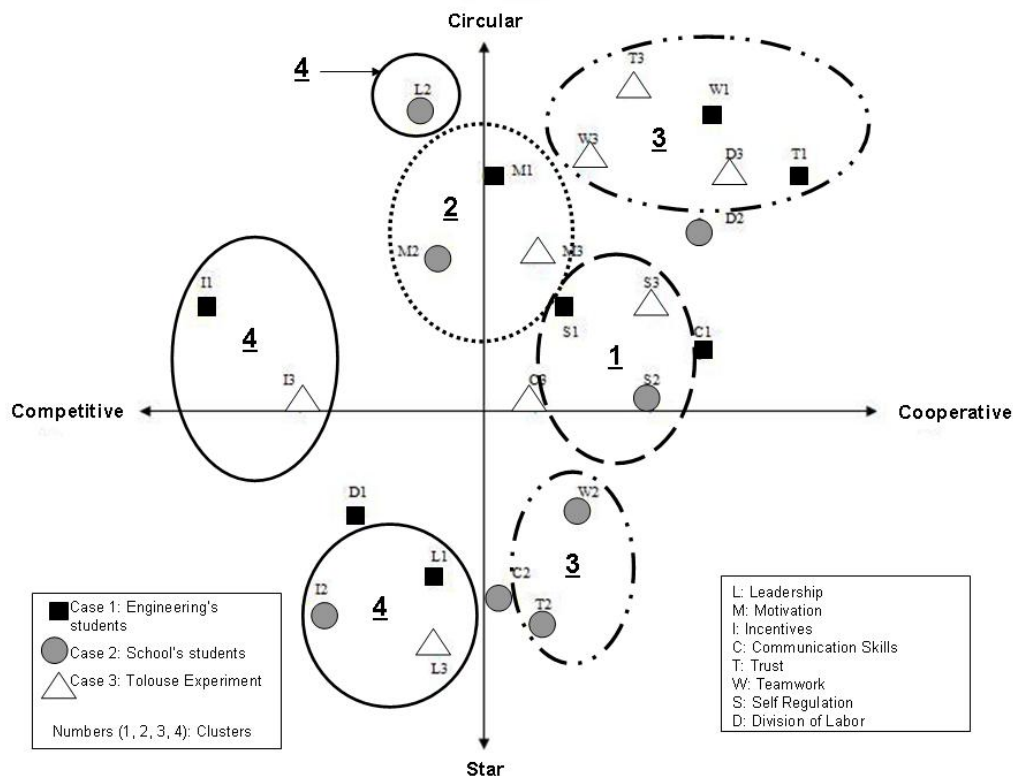


FIGURE 10. Qualitative analysis of the organizational strategy against the communication structure.

5.3 Distinctions analysis

Taking into account figure 10, the analysis of the influence of the distinctions on organizational performance on the basis of a determined organizational strategy and communication structure is shown next. The observations are made according to the similarities and the differences among cases. The following are the most relevant *clusters* (each *cluster* is identified in the text and in the graphic with a number).

- Cluster-1: The participants – in the three analysed cases – recognize that the organizational performance for the cooperative strategy and the circular structure is heavily influenced by Self-Regulation.
- Cluster-2: The participants also evaluated Motivation as highly relevant in the performance of a circular structure, regardless of the organizational strategy.
- Cluster-3: Another interesting result is the similar conception of Teamwork and Trust shared by the engineering students and teachers. As a matter of fact, in these two cases there is a realization that these distinctions influence the organizational performance when there is a cooperative strategy and a circular structure. Conversely, the high school students consider that Trust and Teamwork have a higher impact on the organizational performance when the strategy is cooperative, but the communication structure is star-shaped. This difference in the impact of the communication structure on the organizational performance could mean that the individuals with greater observation and organizational analysis

experience have identified that an equal delegation of responsibilities can be more effective. That is to say, that each individual has enough autonomy to carry out part of the group's task without the necessity of the presence of a person who centralizes the teamwork results.

- Cluster-4: The influence conferred on the distinctions of Leadership and Incentives by the engineering students and teachers are similar, but completely opposite to the perception that the high school students have of these same distinctions. As in the above case, this difference could imply that the perception of the mentioned distinctions varies with observation and organizational analysis experience. The participants in cases 1 and 3 consider that when the communication structure is star-shaped, Leadership has a high impact on organizational performance, whereas for participants in case 2 (high school students) there is a greater influence in a circular structure. This could explain why high school students prefer not to have a leader to carry out the assigned task and where everyone has a similar function weight. For cases 1 and 3 the influence of Incentives on the organizational performance was perceived with great impact in the competitive strategy using a circular structure. With this same strategy, the participants in case 2 perceived that incentives have a high impact when the communicational structure is star-shaped. This could be explained by the fact that when individuals do not have a great deal of observational and organizational analysis experience they need incentives in order to accept someone's leadership.

5.4 New distinctions' analysis

As well as assimilating the already mentioned distinctions, the participants generated new distinctions that they proposed as influential for the organizational development with certain kinds of structures and strategies (see table 6).

	Organizational strategy		Communication structure	
	Cooperative	Competitive	Circular	Star-shaped
Internal-conflict		X		
External-conflict	X			
Shared responsibility	X		X	
Information flow	X		X	
Emotional intelligence		X		
Culture				X

TABLE 6. New distinctions

6. CONCLUSIONS

The article proposes the design of an organizational activity so that decision makers and problem solvers have the possibility of knowing in which conditions certain organizational strategies and communication structures influence the organizational performance. This proposal seeks to generate questioning, experimentation, observation and reflection processes. Three different samples of individuals connected with the engineering field were faced with these processes, in order to assimilate and generate new distinctions that would allow them to develop a greater appropriation of organizational concepts. Throughout this investigation we have reflected on four interesting aspects:

First, even though the results regarding the distinctions made by the participants are not always the same in the three case studies, individual distinction and questioning processes were evident, as well as collective experimentation–observation, comparison and analysis that allowed the organizational performance issue to be approached, not only from a traditional learning stance but also taking into account the social construction of learning, in which people actively participate (see figure 2).

Second, by experimentation–observation, comparison and analysis, the participants achieved the realization that there is no unique choice of organizational strategy and communication structure capable of solving several organizational situations. Nevertheless, the participants realized that, under different structures and strategies, they must be aware of different organizational distinctions if their objective is to improve the organizational performance. From that order of ideas, the participants recognized some necessary distinctions that influence the organizational performance, under a particular structure and strategy.

Third, it could be seen that the sociocultural context (the interaction with society) may have an impact on the active learning process. Clear evidence of this is the fact that the individuals who had more experience in observation and organizational analysis (engineering students and teachers) made different analysis and distinction processes to those made by the high school students.

The fourth, and final aspect, is that the new relevant distinctions generated by the participants allow the design of effective organizational spaces to become a process recurrent in time. Based on the new distinctions the participants can restart questioning, experimentation and analysis processes that lead them to advances in decision making and organizational problem solving.

In this way we hope to have contributed to the design of reflection spaces, in which engineers make decisions on organizational performance related to organizational strategies and communication structures, regardless of the context in which they work. A next step consists of facing two new challenges: first, to introduce this process of reflection–action in other scenarios, especially in organizations with different strategy types and communication structures; second, to analyse the effectiveness of the proposed active learning model when the organizations or their members do not share a physical space and rely mainly on virtual communication.

Finally, is important to highlight that this methodology is evidently reinforces not only the individual study, but also the group dynamics. The fact that the students have to “live” in group certain situation makes them reflect on how they should make their individual and collective decisions. Furthermore, the students reflect on how these decisions they are taking affect the individual and group performances of an organization.

As a result of the conclusions and considerations already mentioned, a profound exploration into the associated investigation path is proposed through this question: how does active learning help individuals to make distinctions, question them, compare them with an experience and analyse them with the purpose of contributing to organizational performance?

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