Social interactions in a virtual learning environment: a focus on group formation strategies[1]

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Abstract

This article deals with different strategies for group development in a virtual learning environment (VLE). For this purpose, we sought to investigate the organization and social interactions of students, during group dynamics that occurred in a distance education course. The methodology used in the research was qualitative and quantitative, with descriptive approach, classified as a case study. For data collection, we used the VLE ROODA communication tools (Forum, Contacts and Social Map), the environmental sociometry tool (Social Map), as well as participant observation and questionnaires. Thus, we analyzed the application of three group-formation strategies: random, chosen by the teacher and free choice. Interaction data categorization occurred within the virtual learning environment and was accomplished through the group development stages suggested by McClure. This study allowed us to determine that all three strategies are efficient for distance education, as long as the right time in class for the application of the strategy by the teacher is observed. This study aimed to elucidate the importance of using group work in distance education, especially for integrating students and enabling a greater number of social interactions in the virtual environment. Thus, the results confirm that the use of formation strategies can be effective for Distance Education, since the development of collective activities depends on cohesion and the mediation of conflicts between members of the group.

Keywords: Social Interactions; Groups; Virtual Learning Evironment.

[1] The data presented is based on the master dissertation presented in the Graduate Program in Education of the Federal University of Rio Grande do Sul.

1. Introduction

His article aims to analyze group development and their interactions in the distance education environment through the perspective of three different formation strategies in a virtual learning environment (VLE). Group work is relevant, because the exchange between the students allows them to grasp subjects more easily than when other teaching forms are used [1]. According to Morigi [3], the use of technology creates and recreates new ways of interaction, new social habits, identities, as well as turning people more sociable within the virtual environment.

An extension course was carried out to follow the formation and development of the groups. The course was offered at the Faculty of Education of the Federal University of Rio Grande do Sul (UFRGS) in Brazil. The target audience for this cur was composed of academics, professors and professionals from various areas. Thus, we sought to investigate the organization and social interactions of students during the group dynamics in this course. Therefore, three different strategies of group formation were used: random, that uses algorithms to perform the grouping; The choice of the teacher, which leads the teacher to analyze the profile of each student; And free choice, which is characterized by the students' decision. These group formation strategies were chosen after a theoretical analysis of the most recurrent strategies in the literature. For this purpose, we sought to investigate the organization and the social interactions of students, during group dynamics in a distance education course, from the perspective of three different formation strategies: random, which uses algorithms to perform the grouping; teacher's choice, which prompts the teacher to analyze each student's profile; and the free choice, which is characterized by the students' decision.

We observed that the progress and technological development are elements that enhance social interactions. In this perspective, Nunes et al. [4] defends that "in the virtual world, which is also an environment where social relationships occur, the prospect of identity is perceived by stances taken face certain situations".

Therefore, this article's objective was to analyze group development and their interactions, using different formation strategies within a virtual learning environment. To diagnose group development, we employed the stages model suggested by McClure [5], who uses this term to describe the trajectory of the groups using their interactions In order to achieve the purpose of research, we adopted the virtual learning environment (VLE) known as the Learning Cooperative Network (Rede Cooperativa de Aprendizagem - ROODA) as virtual application space. A VLE allows the student to interact with the materials and the actors of the DE (teachers, student-tutors). The VLE ROODA has several communication features, such as: Forum, Contacts, Group Log, Chat, and the Social Map feature, which displays through sociometric charts a mapping of all interactions. To analyze group formation and development, we performed an extension course, applying the three formation strategies. Thus, we were able to classify and check the student development through group dynamics in distance education environments.

To understand the construction of this research, we present, bellow, the concepts of group work in educational activities. Social interactions and group development are highlighted, especially in distance education.

2. Distance education: social interactions and group development

Distance education has shown an evolution, especially since the advent of personal computers and their integrations, leading us to conclude that "classroom education cannot meet the lack of necessary infrastructure, due to the characteristics of students, as well as the conditions of time and space, among other factors" [6].

The path traversed by the DE is being transformed and/or adapting itself to new medias, all the way to our current use of the internet. Guarezi [7] points out that distance education is "an evolutionary process that began with the physical separation of people and reached the communication process, including, in the late twentieth century, information technologies".

Communication can be promoted synchronously, i.e. in real time through web conference, or asynchronous when students, teachers and colleagues can establish dialogues at different times, using forums and message boards. According to Behar [8]: "Synchronous discussions allow students to discourse not only about the proposed subject, but also on other topics, which encourages socialization". Regarding asynchronous discussions, he emphasized that "they can be the best way to support the interactivity of a distance education course, as long as the students take responsibility for actively interacting" [8].

According to Moore and Kearsley [9], the distance education system is composed "by all the component processes that operate when there is distance education and teaching. It includes subsystems sources of knowledge, creation, transmission, interaction, learning and management". Interaction is essential to the collectivity, it occurs through reciprocal actions between individuals that are part of a unit, always focused on certain purposes. Thus, it is evident that "only when individuals produce actions that influence one another, that interaction happens, due to impulses or purposes" [10].

In this context, Gómez [12] explains that teaching and learning strategies are determined as a set of actions for teachers or students, seeking to benefit the development of certain skills. So, we understand that teaching and learning in a virtual learning environment (VLE) are inextricably linked to the construction of knowledge. The issue of identifying interaction within a VLE is important for understanding the possibility of analyzing member group development during interactive dynamics.

In short, it is essential to add as an advantage, the growth and social empowerment that occurs through contributions and collaborations within a VLE. At the following section, we highlight the importance of group dynamics in distance education.

2.1 Group Dynamics In Distance Education

The term "group dynamics" will be used in this article as a synonym for group work, since we understand that both are used for interaction and engaging individuals within a group. The concept of group dynamics is part of the social psychology, considered a science that studies the nature and performance of groups, through interactions and interpersonal relationships among its members [11].

Minicucci [10] points out that group dynamics "emerged as the convergence of certain trends in the social sciences, when they started investing in the study of new technologies for solving social problems [...]" [13]. It focuses on examining the nature (or structure) of small groups, their functioning, as well as their method of development, phenomena and the principles that govern them.

The individual can acquire information by himself or by participating in multiple networks and groups, as long as they share the same interests, ideas, values, have no temporal, institutional or geographic restrictions [14]. For this, the individual need to appropriate the technological resources for collaboration and interaction, along with some practical group dynamics, used in classroom courses. Davis [1] argues that individuals learn to work in groups to solve real problems, gaining experience in collaborative learning. Catapan [13] points out that distance education differs from the traditional mode by the way the pedagogical mediation is established.

There is a substantial difference in how teaching is conducted in the face-to-face method and the distance education. In person, there is the possibility of diagnosing developments, problems and difficulties in real time of events and, then, make immediate adjustments in how the methodology is applied. In the distance education, the creation of methods and tools for these purposes is essential [15]. Similarly, the psychological and emotional issues are naturally identified, while virtually difficult to observe. In this context, another conflicting factor is the process of selecting and grouping individuals, who require an adjustment to the environment to include the establishment of criteria (participants' profile, necessary heterogeneity, etc.), seeking to assist in the formation of the group [16].

Performing group dynamics in distance education courses, is directly influenced by the relevant changes in three main areas of social life: "the scope of production/consumption (economy), the scope of power (political) and the scope of everyday experience (society/culture)" [12]. The author argues that these "confluences of such significant and radical changes, are shaping a new meta-context that modifies institutions, States and the daily life of citizens within an era of globalization and interdependence".

In this scenario, we perceive that individuals are increasingly submerged within an accelerated pace of change and, consequently, are influenced by the communications and information technologies, especially in relation to society and education [6].

Valentini and Soares [16] highlight that educators perform group dynamics without having the knowledge of the variables involved in the formation and development of these groups. The authors also point out that, factors like affinity among students stands out during the formation, even without the participation of all.

The transformations in socialization panoramas are directly affected by changes in relationships, both of power and of the production of individuals, particularly in the current context of digital information [14]. The author further states about the current social scenario that the subjects are confronted with "a climate of insecurity, uncertainty and fear, both as possibilities, aspirations and unforeseen opportunities", very different from those taught by family.

In this scenario, the next section underlies the different strategies and their applications, followed by the explanation regarding group development when faced with different types of formation.

2.2 Group Formation Strategies

Studies focused on group practices in virtual environments, analyze the "complexity of the combining personal skills, existing forms of communication; the importance of interaction; the roles that individuals take within the groups and the types of tasks to be performed" [19]. Therefore, it is within this approach that this article exists, through the observation and monitoring of group development within a virtual

environment.

What affects group dynamics the most, especially in DE, is the teachers' reluctance, especially in defining and pedagogically grounded parameters to form groups [19]. From the subject described by the author, we emphasize that the strategy is used to establish pathways, action plans that must be traversed to reach the end result of a scheduled challenge.

According to Lima and Webber [17], it is important to consider that the Distance Education intensifies the complexity of group formation, since we have a physical separation of the members, diversity in communication, as well as the choice of the best technique and technological apparatus. Usually in group dynamics, we consider only the practice of collaboration, without taking into account the structural features of this collaboration.

This study aimed to analyze the social interactions among group members in different contexts and to collect data regarding group development, using different ways of grouping people. Thus, from a research on the ways of grouping people, it has been identified that there are three recurrent strategies in the scientific litera-ture. The main strategies used were pointed out by Davis [19] and contemplate three possibilities that can be applied in the distance modality. Bellow, we have the group formation strategies, according to Davis [19].

•Random – is defined by an algorithm, automatically. Thus, it is considered the most democratic of strategies;

•Free – it is the most liberal, since it allows for the stu-dent to choose, with whom he or she wants to work. Thus, there is a risk of segregation, though it may also be motivating;

•Teacher – it is the most controlling, since the educa-tor analyzes the student's choice and sets up groups that are most balanced and just; however, there is the risk of demotivation.

Still according to Davis [19], the number of members may influence the time it takes to achieve the tasks. The author claims that to form groups of four or five mem-bers is ideal. However, the less time there is, available to perform the tasks, the smaller the group should be.

For all members to be involved in group works, it is important for members to have affinity of ideas, as well as similar values and understandings about the subject they have been given. Thus, we stresses the need to un-derstand how strategies influence group development

2.3 Classification Of Group Development

This article had as a basis the stage model suggested by McClure [5] to identify the structural development of groups. The author proposes a model with seven stages, which are: pre-formation, unity, disunity, conflict-confrontation, disharmony, harmony and execution. This author points out that there is a decline towards the conflict-confrontation stage, which is the bottom apex, following a constant rise towards execution (see Figure 1).

Figure 1. Arc of a group's stages in social. Source: Autor et al (2018). Adapted from McClure (2005, p.80).

The model is represented by a symmetrical arch, where each stage on one side is the exact opposite of the next on the other side. What the members dispose at each stage during the descent, shown on the left side (from the Pre-formation to the Conflict-Confrontation), they win back in the corresponding stage during the ascent (right side). According to McClure, the movement of the stages displayed in the arc shows in the descent a random oscillation, while the ascent, individuals have voluntary control of their movement [5].

Progress through the stages is uneven, with advances and setbacks, but the overall movement of the group is progressive. The transitions between the phases occur by discontinuous leaps and nonlinear and unorganized transformations. Each stage in the arch is a higher level of organization. Success in each stage is necessary for the group to reach its full potential.

Regarding McClure's [5] arc, he also adds that at each stage is a movement of spiral forces. These forces arise from the need of satisfying the interests of individual members of a group. The author shows these needs juxtaposing them against the global forces that are represented by: safety, association, dependence, independence, privacy and risk-taking. Thus, in the stages of development, each of the group's tasks can be seen as a satisfying the central issue.

This work used group development analysis, from the social networks point of view, through sociometric charts that are provided by the Social Map, within the virtual learning environment ROODA. This is a feature that aims to portray, through charts, the diagnosis of the subjects' social interactions in the courses and disciplines that use this VLE. Currently, this tool is in the testing and validation phase, thus available only for the teacher to use. In this perspective, we can identify connections, influences and existing priorities within a group. The feature is in the testing phase, and we expect that it will be available to the academic community at the end of 2016.

Given these assumptions, the next section has the methodology and the research steps performed in this study.

3. Research Methodology

O meet the proposed objective in this research, we developed a qualitative and quantitative research, with a descriptive approach, a case study. The subjects were students, teachers and professionals from various fields, who participated in a Management extension course.

The methodology was divided into three steps:

• STEP 1 - Theoretical Study - a survey of theoretical concepts and constructs were initially developed, allowing the related topics to be understood and known in depth.

• STEP 2 - Pilot Project This stage began with the participant observation of the researcher in an undergraduate course at a University in Brazil. The students (total of eight) were undergraduate courses from the University. The data were collected in the Forum and Social Map of VLE ROODA. In VLE ROODA, the students' social interactions were also observed. The data made it possible to identify some difficulties encountered by the participants in relation to the group formation and, thus, to observe which strategies of group formation the teacher used during the discipline. These data enabled the mapping and improvement of group formation strategies. The pilot project provided an analysis of group formation, with the application of the three suggested strategies: 1) free choice; 2) random; 3) choice by the teacher. The pilot study provided some information regarding strategies that were very important to consolidate the research trajectory. The relevance of this investigation occurred from the difficulty of students to organize and interact collaboratively for the good of the work group;

• STEP 3 - Extension Course - The course provided an extensive range of important data to support this research. The functionalities of the VLE ROODA used were: Classes, Contacts, Forum, Chat, Webfolio, InterROODA, Logbook, A2 and Social Map. For each strategy of group formation used, a specific forum was set up social panels between the participants. For the evaluation of the course, the social interaction between the students in the VLE ROODA functionalities and the application of a final questionnaire, with open and closed questions, was considered. The data collected allowed an analysis of each strategy of group formation delineated in step 2.

For data collection, we used different techniques to gather information and register the elements. The instruments used in this research were: the ROODA functionalities (Group Forum, Forum, Contacts, Chat, Group Log, Group Diary, InterRooda and Social Map); Questionnaires (at the beginning and end of the course) and participant observations of the researcher.

For the purpose of a quantitative research, data collected were organized in spreadsheets, tables and charts submitted to exploratory analysis of the questionnaires. For the qualitative diagnosis, we used the stages described by Moraes [20]: preparation, unitarization, categorization, description and interpretation. The analysis of group development used the seven stages of structural development proposed by McClure[5], previously described: pre-formation, unity, disunity, conflict-confrontation, disharmony, harmony and execution.

Having the necessary information, out next step was to organize and analyzed the data

4. Data discussion and analysis

He course held in step 3, entitled "The Art of Managing: application in everyday life", allowed data collection about the formation strategies and group development. We chose analysis activities and solutions to challenges presentation. The pedagogical proposal consisted, therefore, of group dynamics with the same level of difficulty and likeness for each group formation strategy used.

The subjects that participated in the research were students, teachers and professionals from different areas. In all, 40 people participated in the study, of which 27 were female (67%) and 13 were male (33%). The age range varied from 17 to 50 years, with 37% between 17-26 years, 45% between 27-36 years and 18% between 37-50 years. The profile of the participants pointed out that the students that accept to study in the distance modality are adapting to new realities of the society, especially linked to the digital technologies. Thus, it is important to constantly analyze the interactions within virtual learning environments to apply strategies that can facilitate the formation of groups in distance education.

Participants also pointed out that there are some aspects that can help in the development of the group in distance education: communication, exchange of ideas and experiences (34%); Collaboration, participation, dedication and commitment (23%); Division of labor (23%). These data corroborate authors such as Behar[8], Davis [1] [19] who stress the importance of group dynamics for educational practices.

The subjects who participated in the survey were students, teachers and professionals from various fields, with 27 female participants (67%) and 13 male (33%). Age ranged from 17 to 50 years of age, with 37% between 17-26 years, 45% between 27-36 years and 18% between 37-50 years. Through the participants' profile, we observed that students who accept studying in distance education have been adapting to new realities of society, especially linked to digital technologies. Thus, it is important to constantly analyze the interactions within the virtual learning environments, to apply dynamics that facilitate group formation in distance education.

Besides a profile survey, students understand the aspects that facilitate group work, since they highlighted as relevant and pertinent points in the context of interaction: communication, exchange of ideas and experiences (34%); collaboration, participation, dedication and commitment (23%); division of labor (23%). Data regarding distance education experiences corroborate other items collected on the subject analysis profile and demonstrate the importance of group dynamics in educational practices.

Seeking to systematically present the trajectory of group development, we designed tables to summarize and expose this construction. Groups were analyzed separately, following what occurred in the extension course.

The first strategy adopted was the random, enabling participants to have a first contact, since not everyone knew each other. The second was the teacher's choice, to group students with the same interests. The third strategy was the free choice, giving the students more responsibilities within the groups. Thus, after the first week, which was reserved to get to know the VLE ROODA and the presentations of the members in the forum, we began implementing the group formation strategies.

4.1 Group Formation Strategies: Interaction Analysis

This section presents the results observed through group analysis, using the three strategies applied in the

extension course.

4.1.1 Random strategy

In the overall analysis of the random strategy for creating groups, we observed that some of the factors that caused difficulties were that the students did not know each other, did not master the VLE ROODA platform and most had never participle in distance education courses before. Thus, we realized that working in groups during this strategy was a challenge. Participants who exceeded the insecurity barrier created by these factors accomplished excellence in their works. We found that, of the ten groups formed, only one obeyed the seven stages suggested by McClure [5] in an orderly and linear fashion (Group A), the other nine groups walked through the stages in a disorderly manner. We would like to highlight that, since there were many groups, we chose Group A (table1) to represent this strategy in the detailed analysis of the development phase, since it was the most complete.

GROUP A		
McClure STAGES	**Extracts from the Group's Forum**	**Analysis**
Pre-formation	"Good night, everyone! I want to check with you how we're going to organize ourselves to do the tasks. We could each post our visions about the cases and continue interacting through the forum. I propose that on 05/31 we could schedule a time to chat and discuss the best solution for the cases and and formalize the finishing of the weeks activities. Regarding putting the material together, I offer myself to do it. What do you think?" (Student 46).	At this stage, the leader (Student 46), organized the group, determined the structure, and found an appropriate environment.
Unity	"Hiiii, guys... Could we divide the work into parts.. And I agree with Student 46 of scheduling a time for us to talk... If anyone wants to share their numbers, it also helps..." (Student 28)	The members worry about the survival of the group, producing dependence regarding the leader.
Disunity	"I think that diving the work would end up leaving us with a limited view on each case" (Student 46).	At this stage, we have the first conflict and the suggestion of ways to go.
Conflict-confrontation	"But we could created several scenarios to line up the group work and then each posts their idea and then we interact. And, anyway, we have three cases and 4 group members. I finished reading the material today and I intend to start the activities tomorrow. What do you think?" (Student 46) "I think it is a good idea for each one to post their idea" (Student 24)	We verified a search for balance.
Disharmony	"You are right, Student 46, of each one sharing their ideas. My answers to the questions are similar to those of student 24. I have a doubt regarding the	Here we have an agreement despite differences and diversities between

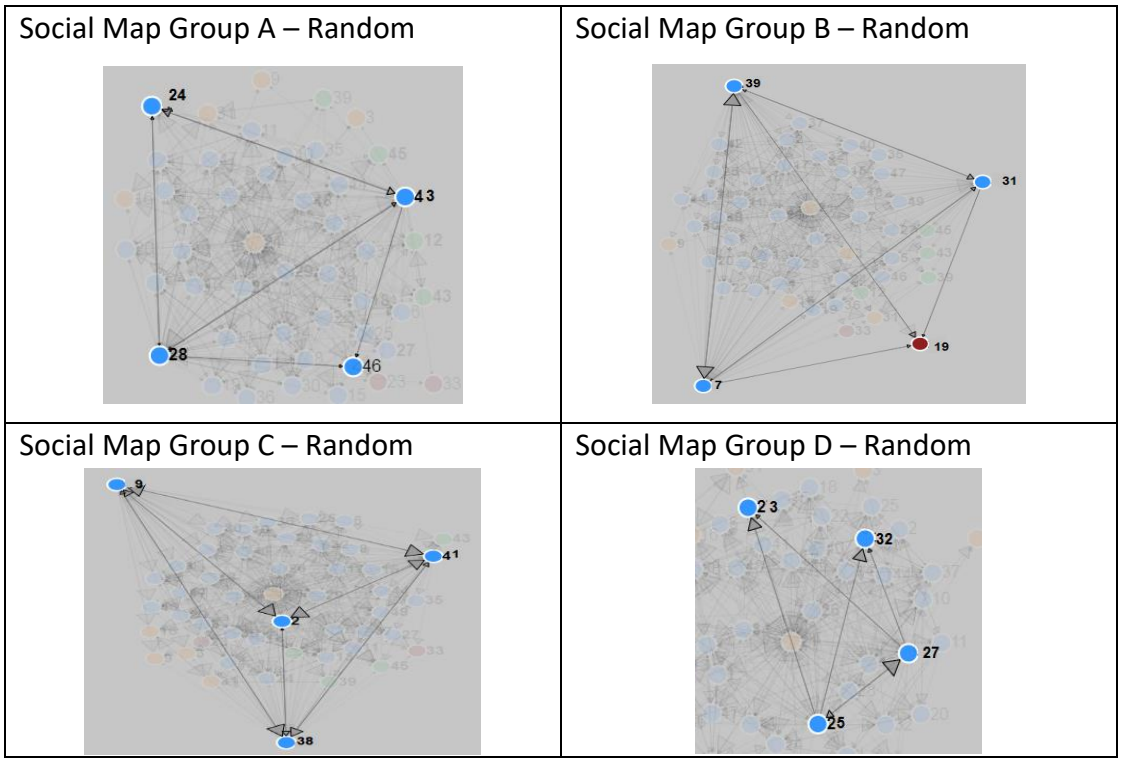
	presentation? Do we have to create a background scene? I didn't really understand it..." (Student 28).	members.
Harmony	"hiii guys I caught the idea of our colleague regarding the first case. what do you think? I accept suggestions... I tried to create a scenario..." (Student 28) "hiii Student 46, I think it looks good..." (Student 25).	We see that differences were overcome and social norms were established.
7.Execution	"Colleagues, according to what we talked about, I posted the final work presentation at the Webfolio" (Student 46).	At this final stage of the arc, which is characterizes by productivity, we have the posting of the final work.

Table 1. Analysis of Group A of the Random Strategy.

According to Palloff and Pratt[15], with the understanding of group dynamics, educators have more opportunities to organize their classes.

To have an overview of the interactions in the random strategy, we analyzed the interaction maps of the groups (see Figure. 2).

Considering the interaction of a person or a group, exemplified by their connections, we have the strong and weak ties within a group context. According to Recuero [21], the "[...] transformations, in a social network, are largely influenced by the interactions".



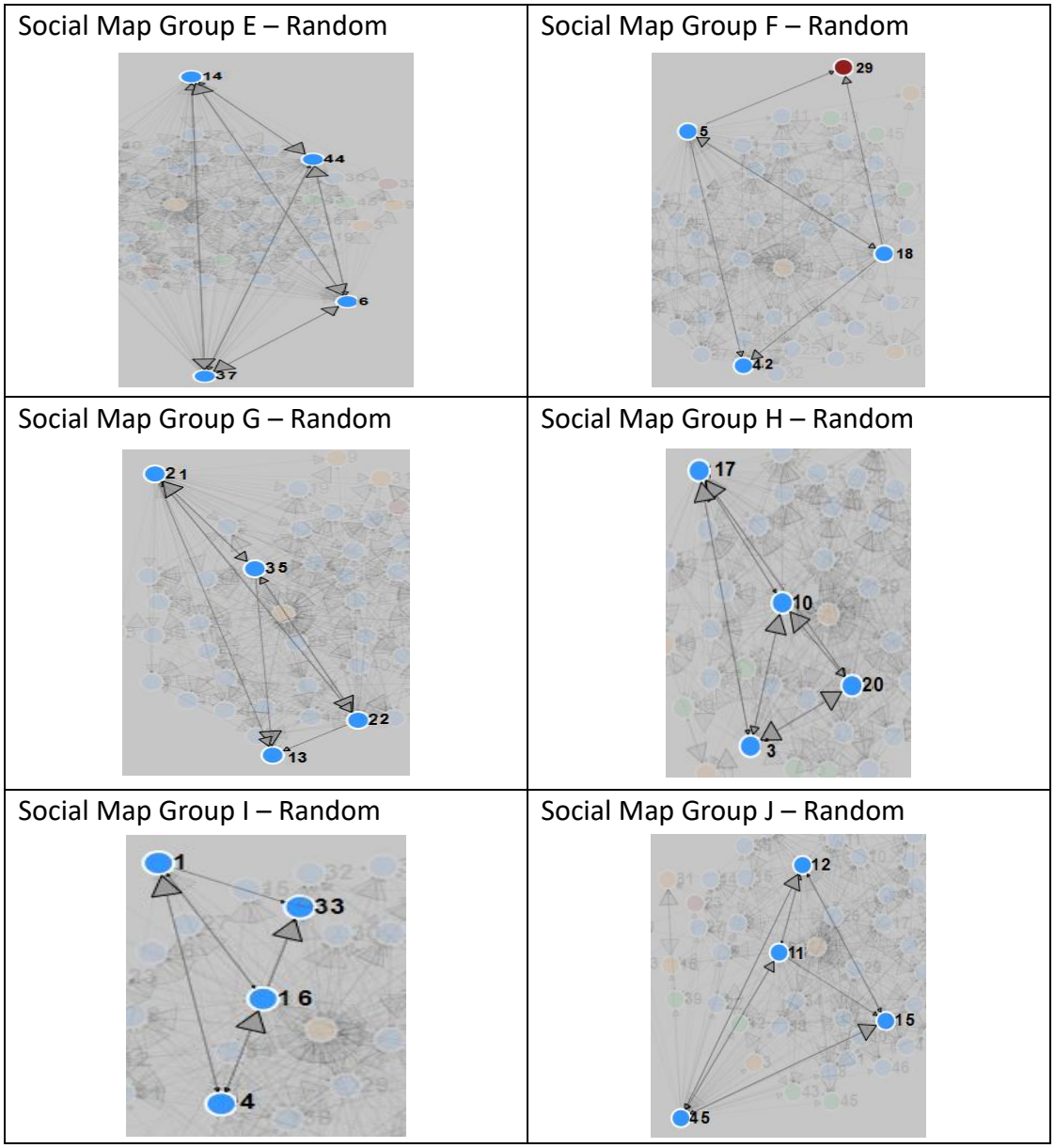


Figure. 2. Group maps of the random strategy.

Several authors, such as Barabási [22] and Recuero[21], recognize the importance of social relationships and student interactions for a good performance in the activities developed in the educational context. Similarly, Moreno [23] and McClure [4] point out the importance of socialization for a group to have good coexistence. In accordance with these authors, it is believed that the understanding of interpersonal relationships, as well as its structure and the position that individuals occupy within it, help educators in their teaching activities.

In this perspective, we see that the random strategy created groups that successfully performed the requested task, even when faced with some difficulties

4.1.2 Teacher's choice strategy

The second strategy was the teacher's choice, where the teacher used the presentation and also an analysis of each student from the previous activity to create groups. In the end, we had 9 groups. Below, we have a

summary of Group G (table 2), displaying the influence of the context and the participation of students in performing each tasks.

GROUP G		
McClure STAGES	**Extracts of the Group's Forum**	**Analysis**
Unity	"Good morning for everyone on the group, we have to schedule a day to discuss the work, who has the time can post their ideas. Hugs." (Student 22) ... Hello, guys, this is the week's activity, I hope we can talk on the weekend to discuss out trip. Hug." (Student 22)	Demonstrated the participant's anxiety regarding the activity's execution.
6. Harmony	"After the initial definitions we established, I'll be available to share the first few slides of our presentation, if you agree, in PPT." (Student 6) ... "Perfect, Student 6, I'll be waiting to add straight to the slides." (Student 22)	We observed the group overcoming their differences and established social norms and the feeling of belonging.
1.Preformation	"Hello Student 22, good night. On the previous post, you suggested the Caribbean as a destination and I agree with this option, but we still need Student 45's opinion to move forward with the work. I suggest dividing the tasks to makes things quicker. I can save a ppt file and each one of us can add some content. Student 22, could you research the places and put together travel itinerary for a 15 day trip?" Hugs." (Student 6)	The leader (Student 6), determined the tasks and structured the work.
6. Harmony	"I don't know if you guys imagined it like I did, but if you agree with it, we could add Tuesday the content's checklist to slide 3 and the description of the itinerary to slide 4." (Student 6) ... "Yes, this information is important and I intended to include them on the Checklist slide. And I also think that in a more direct way, with the data and information highlighted somehow to be conferred/checked by the family members whenever necessary. Agreed?" (Student 6)	Indicated a feeling of mutual respect in the group.
5. Disharmony	"Hello colleagues, Yesterday I post some things at the forum, saved another file on the Webfolio and sent some messages through "Contacts" letting you know all this, however, I received no answer regarding our work. Please, let me know if you will be participating of this	Demonstrated a conflict caused by the yearning for equal effort from all members in favor of the group.

	work's completion. Hugs." (Student 6) ... "I'm sorry, yesterday I couldn't view anything. What exactly is missing? Regarding the summary of subjects, only viable if we remove the explanation of the places." (Student 22) "Student 22, I tried to get in touch with you tonight using the A2 but unfortunately I couldn't view you. I'm sorry, but considering the late hour, I won't remain ROODA anymore for today. [...] so, this i show it's going down, I'll draw up 03 slides with possible hotel in Aruba, to make the research more appealing, since we won't be able to decide today anyway which hotel we'll use, we waited too long for the decision of our third colleague, and it seems she hasn't had a lot of time for this task.."(Student 6)	
6. Harmony	"... Since I had to add to this task, I apologize for some misunderstanding or lack of participation, and thank you for your understanding. A big hug and good luck with the other assignments" (Student 22).	They recaptured the feeling of mutual respect.
7. Execution	"Yes, I think the work turned out good. Though we had different views regarding content and form of presentation (texts, data and others), I believe the result is satisfactory" (Student 6).	The posting of the final work as requested was considered the execution.

Table 2. Group G Analysis of the Choice Strategy by the Teacher

Due to evasions, Group G was left with only three members. It achieved all seven stages, but in a totally disorganized way, starting with the unit that is the stage of anxiety and then returning to the harmony stage three times before execution. Despite the divergences between students 6 and 22, and the withdrawal of student 46, the group delivered the requested activity on time.

According to McClure[5], through group works, members tend to change, evolve and mature due to the interactions they had between them. Analyzing the teacher's choice strategy, we identified through the final questionnaire that most students liked the groups created, since members with common interests were brought together. Also, with it being a strategy that provided productive work, we demonstrated the importance of analyzing each student's characteristics before grouping them.

To supplement the data on the teacher's choice strategy, we present below an overview of the groups (see Figure 3).

Social Map Group A – The Teacher's Choice	Social Map Group B – The Teacher's Choice	Social Map Group C – The Teacher's Choice

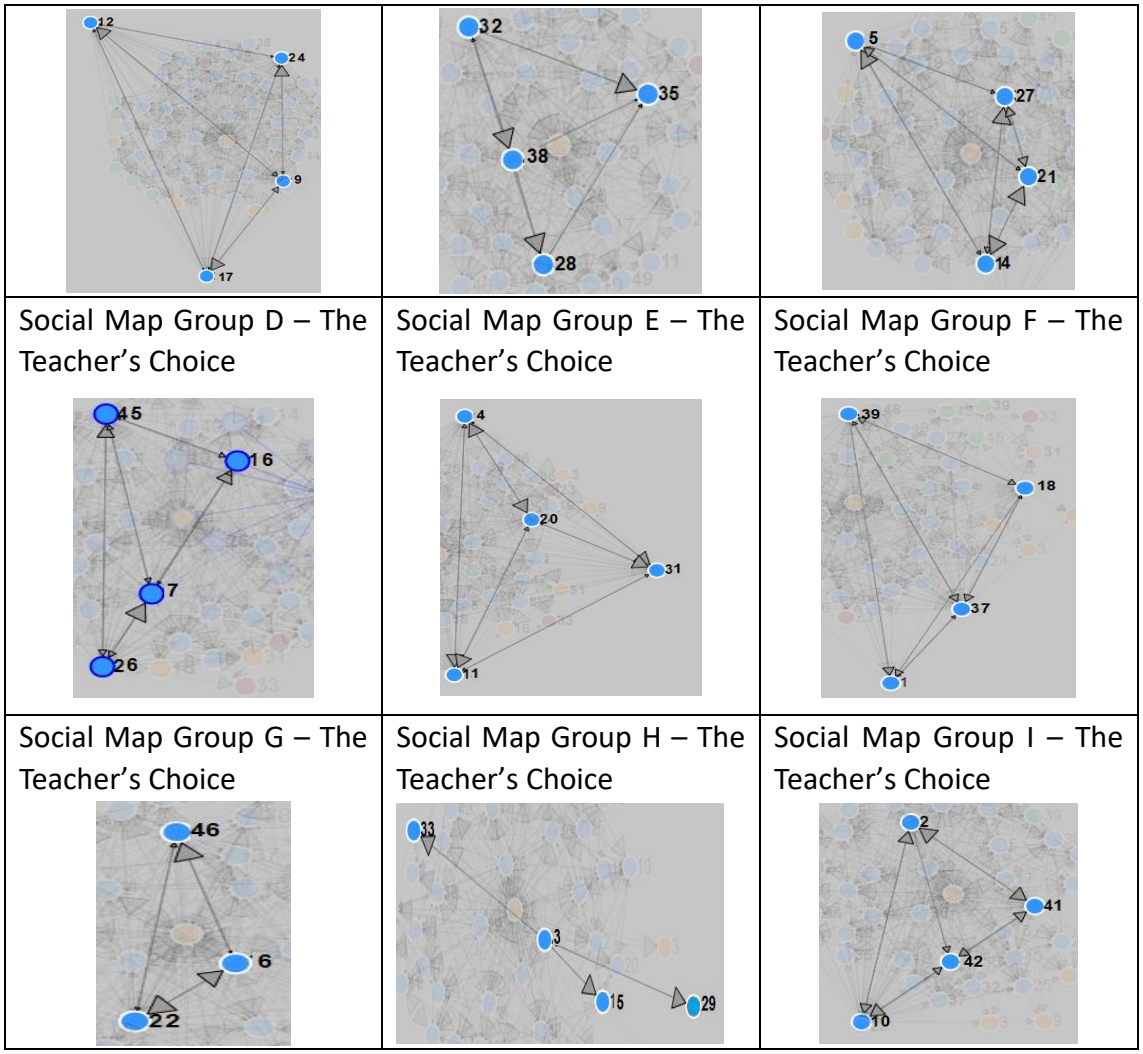


Figure. 3. Group maps of the teacher's choice strategy.

Analyzing the maps with the first strategy, we see a substantial increase in the interactions of this second activity. Connections are more intense and ties are stronger. Through this perspective, Recuero [21] points out that "a social network requires the actors, who are part of this network, to engage in a process of cooperation. Without cooperation, there is no group".

Thus, we can understand group movement along all stages. In this context, McClure[5] emphasizes the importance of divergence for group development and explains that progressive growth in these collective activities, cannot be viewed as linear or one-dimensional. Each stage has its peculiarities and, therefore, all stages must be performed in an orderly fashion, seeking to demonstrate a linear evolution of the group. In the next section, we have the description of the free choice strategy.

4.1.3 Free choice strategy

The free choice strategy created 9 groups, with one group not interacting at all within the forum, but posting the final work. The other 8 groups interacted more effectively in this strategy and – like the previous one –, there was no group that failed to complete all seven stages. There were some disagreements, but without arguments. To better grasp this, we have some extracts of the Group A (table 3) bellow. This group was selected as an example for analysis, because they had a better evolution than the rest.

GROUP A		
McClure STAGES	**Extracts from the Group Forum**	**Analysis**
Pre-formation	"Hi guys. How are your schedules for this week?" (Student 20) ... "Hello Student 20, I usually log in to ROODA at noon and at night" (Student 6) ... "could we settle then at night. Like during the day is complicated for me. I saw that we have to plan an event!" (Student 3)	They started by finding an appropriated environment to ensure interaction between members.
Unity	"Colleagues, I agree that at night we could settle the first interactions regarding our work, division of labor, etc. for next monday. What do you think?" (Student 6) ... "ok, tomorrow at what time? 20,21h? xx. I'll try to read all the material before and write down some ideas." (Student 3)	Demonstrated concern with the progress of the activities.
6. Harmony	"I really liked Student 3's idea, totally what I was thinking" (Student 6)	We verified the feeling of belonging to the group, for having ideas in common.
5. Conflict-confrontation	Hi girls, I agree with the summary of what you said and congratulations for the impulse! ... I already copied the summary posted and I suggest we divide the topics into four, each one develops it and then we share. Regarding our next meeting, I'm available. How and when is best for you guys? Who knows, at the chatroom like Student 3 did yesterday! (Student 6)	We identified the leader's capacity (Student 6) of propelling the group forward.
6. Harmony	"I copied bellow again the script for you guys to review, now with some extras that I put according to the suggestions posted. I added from the item 8 on and some things about the part 2 of the activities." (Student 6) ... "If you guys want, I can put the ppt together and then you add the background, I can do this today	The establishment of social norms and mutual respect between the members.

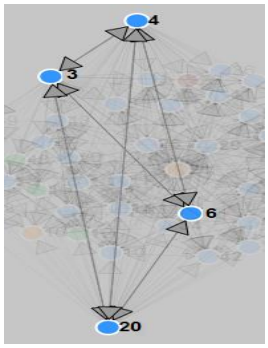
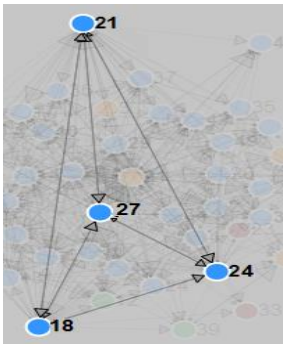
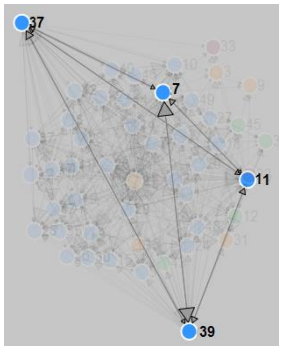
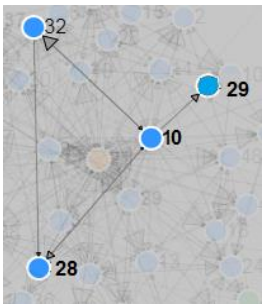
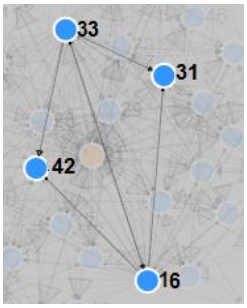
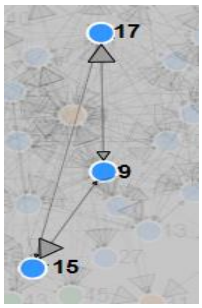
	at night and send it to you guys tomorrow morning. However, I need your approval." (Student 20)	
7. Execution	"I take this opportunity to thank for the partnership. It was great sharing the work's activities with you." (Student 6) ... "It was a pleasure working with you guys" (Student 20)	The posting of the final work was considered execution.

Table 3. Analysis of Group A of the Free Strategy

In the analysis of the free choice strategy, group members had more affinities, causing less conflict and contributing to the use of other communication resources outside the ROODA platform, which meant a decrease in the amount of interactions performed within the VLE.

Recuero [21] points out that "conflict can be highly beneficial to strengthen the groups, but can also disrupt the groups and lead to their rupture".

To clarify group development in the free choice strategy, we have the panorama bellow, built using group maps (see Figure 4).

Social Map Group A – The Free Choice 	Social Map Group B – The Free Choice 	Social Map Group C – The Free Choice 
Social Map Group D – The Free Choice 	Social Map Group E – The Free Choice 	Social Map Group F – The Free Choice 
Social Map Group G – The Free Choice	Social Map Group H – The Free Choice	Social Map Group I – The Free Choice

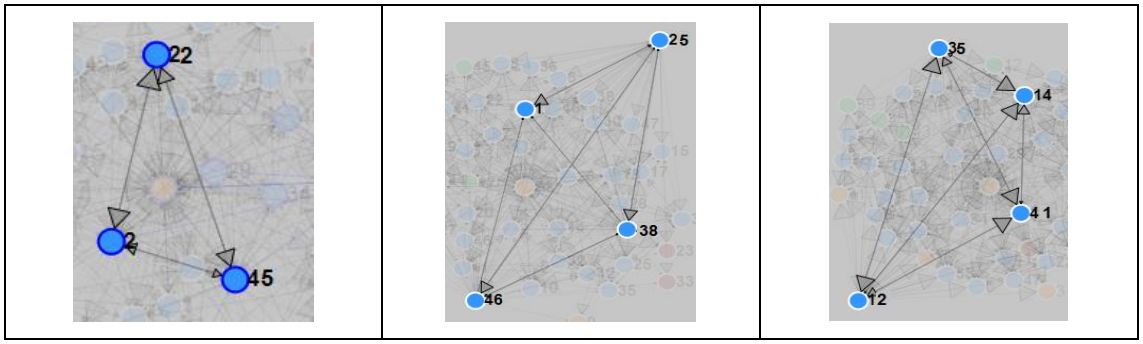


Figure. 4. Group maps of the free choice strategy.

These infographs show members interactions according to the evolution of each group. Group members had more affinities, causing less conflict and contributing to other communication resources, thus decreasing the amount of interaction they had within the VLE ROODA, for they focused on other communication tools such as instant messenger.

It is noteworthy in this strategy, the harmonious work performed by the groups, characterizing the affinity and homogeneity of opinions reflected in the groups' development. In the development analysis, all groups were non-linear, unlike other strategies groups, more cohesive and dynamic. In this context, we understand that the students working in these groups develop greater abilities solving problems and better assimilating the studied material.

For group development, we must understand that participants are independent people and that they need to be in an environment considered safe to collaborate with others for the sake of performing the requested tasks. This study was important to analyze the feasibility of creating effective groups in distance education, using a virtual learning environment, in this case, ROODA. Bellow we have our final considerations.

5. Final considerations

Pon completing this study, we considered it possible to map and classify group development using McClure's[5] stages, identifying how groups work when faced with different formation strategies in a virtual learning environment.

Palloff and Pratt [15] point out that "McClure sees group development as chaotic and self-organized. Thus, the movement between stages is not linear", and from this finding, we understand the trajectory of the stages.

Regarding group formation, we defined these strategies as more pertinent to this research: random, using algorithms to determine groups; teacher's choice, which seeks to analyze each student's profile, and free choice, which is defined by the students' decision.

Soon, we found that group development only occurs when individuals feel safe, embraced by their colleagues and having everyone committed to efficiently performing the activities. Similarly, students need to see that they are a part of the group and can trust their colleagues. Thus, they are able to create stronger ties and interaction, taking a stronger stance towards the completing the work.

For these reasons, strategy analysis allow for data collection, seeking to assist educators with group dynamics in distance education. Following the analysis of the interactions, verified from the results of the

forums and also of the sociograms, it is highlighted as suggestions of educational activities the educator's reflection on the following aspects:

•plan each step of the group work, which includes deciding on each dynamic and how to use them;

•organize the topics, to address the interests of each participant, thus keeping them motivated and interested;

•provide feedback to the groups, while they perform the proposed activities, so the members do not feel abandoned by the teacher;

•assess, in addition to the work submitted, the interaction of these in the development of the groups;

•request role definition, with division of labor, as an evaluative question, so that students are actually able to plan how they will perform each task;

•determine at the beginning of class that any evasion should be notified to the group and to the teacher, so the group is not harmed by the absence.

•planning educational interventions in groups that have a non-collaborating member, so the group does not loose motivation due to the lack of participation by some colleagues.

We consider it noteworthy that the subjects acted differently when faced with each context. Thus, we understand that there are several ways to apply these strategies, only then supplementing with other results. So, we understand that this study is not conclusive, though the results can be used by teachers as a means of analyzing the application possibilities of group dynamic exercises, especially in distance education.

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