ANALYSIS OF THE USE OF THE ROTATION MODE FOR STATIONS IN HIGHER EDUCATION

O USO DAS METODOLOGIAS ATIVAS COMO MEIO DE PROMOVER A AUTONOMIA AO ALUNO DO ENSINO SUPERIOR

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Abstract: *The world is constantly evolving in the technological sense and the educational area must follow these processes so that it does not become outdated and to keep training quality professionals, who attract the attention and interest of the market. As a result, the use of active methodologies has been expanding its space in universities, both to retain the student's focus, as well as to cooperate with the need of the professional market. In addition, with the advent of the pandemic, the emerging condition of making use of Information and Communication Technologies (ITCs) as an allied tool in the teaching-learning process of the higher level was observed, stimulating autonomous action by students. This study aimed to observe the appreciation of students' autonomy in their learning process when using the rotations modality by stations related to active methodologies in remote education. The modality was applied to students of higher undergraduate courses at a private university. Data were collected through observation in the classroom, interaction of the subjects in the proposed activities, narratives of the participants, and questionnaires. There was greater support on the part of the students for the activities, stimulating the autonomy of the students, and consequently, improvement in the process of construction of learning of the proposed concepts.*

Keywords: *Active Methodologies. Autonomy. Teaching and Learning. Rotations by Stations.*

Resumo: *O mundo está em constante evolução no sentido tecnológico e a área educacional deve acompanhar estes processos para que não se torne ultrapassada e para que se mantenha formando profissionais de qualidade, que despertem a atenção e interesse do mercado. Em consequência disto, o uso de metodologias ativas vem ampliando seu espaço nas universidades, tanto para reter o foco do aluno, como para cooperar com a necessidade do mercado profissional. Soma-se a isso que, com o advento da pandemia, observou-se a emergente condição de fazer uso das Tecnologias da Informação e Comunicação (TICs) como ferramenta aliada no processo de ensino-aprendizagem do nível superior, estimulando a ação autônoma por parte dos discentes. Este estudo teve como objetivo observar a valorização da autonomia dos alunos em seu processo de aprendizagem quando utilizada a modalidade rotações por estações relacionada às metodologias ativas, no ensino remoto. A modalidade foi aplicada em alunos de cursos superiores de graduação de uma universidade privada. Os dados foram levantados por meio de observação em sala de aula, interação dos sujeitos nas atividades propostas, narrativas dos participantes e questionários. Observou-se maior adesão por parte dos alunos às atividades, estímulo a autonomia dos discentes, e consequentemente, melhora no processo de construção da aprendizagem dos conceitos propostos.*

Palavras-chave: *Metodologias Ativas. Autonomia. Ensino e Aprendizagem.*

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Introduction

The active-learning processes have stood out in the educational context as a proposal to increase the engagement of students, assisting them in the process of knowledge construction.

Among the modalities of active methodologies, Rotation by Stations offers an important contribution, as it promotes the involvement, proactivity, and engagement of students in the proposed activities. It meets Moran's (2017) discussions and proposed teaching mechanisms in which the student will become the protagonist of his process of knowledge building.

In this sense, this article aims to observe the learning of students of superior teaching when applied to the rotation by Station's modality in the concept of active methodologies.

Initially, the proposed theme is based on discussions about creativity and innovation in education, active methodologies, and the station modality by rotations. Then, in the methodology, we discuss the didactic sequence developed based on Rotation by Stations and applied to students of higher education, remotely. It follows with the presentation of the results and the final considerations of the research.

Theoretical reference - Creativity and innovation in education

The discussion of creativity and innovation in education is common, observed in numerous scientific publications. More and more, different strategies and educational practices are sought, not only as a form of knowledge communication but an increase their apprehension.

Thus, the conceptual understanding of the terms creativity and innovation is necessary for this study. It is assumed that creativity and innovation must permeate both pedagogical objectives, to develop them in the student, as well as in the school of methods to achieve such objectives.

It can be affirmed that creativity is intrinsically linked to innovation, and creativity is the predecessor to the innovative process. Thimóteo and Fontana (2019) show that creativity is related to the potential to generate ideas, while innovation refers to efforts to make them viable.

The first studies on the creative process of the individual stated that creative people were already born with this ability, which is considered a gift that only a few possessed (ACADEMIA PEARSON, 2011). Also, they were focused on measuring the analytical and creativity, intelligence, and learning capacity, using these models of tests.

Contemporary theories of creativity began to discuss the interdisciplinary view conferred on the theme, that all people are creative, but some more than others, for "intrinsic, cultural, socio-emotional or situational reasons" (VANZIN; ULBRICHT; BATISTA, 2015, p. 39).

An important theory proposed by Joy Guilford, considered the mentor of the scientific study of creativity, discussed the differentiation between convergent thinking and divergent thinking in creativity (ACADEMIA PEARSON, 2011).

In this context, Souza, et al (2018) reiterates that in convergent thought a person uses analytical thinking to achieve the logical solution to a given problem, while in divergent thinking several alternative solutions to the same problem are identified.

Therefore, how much less conventional the search for solutions (divergent thinking), the more creative the individual. it is concluded that the two thoughts are complementary in the creative process, after all, l brilliant ideas need organization and objectivity for them to be put into practice (ACADEMIA PEARSON, 2011).

Another discussion of creativity refers to the context. Academia Pearson (2011) shows that creativity needs to be understood not as an isolated concept to an individual, but as a systemic process, involving beyond the person, other dimensions, such as the context in which it occurs.

Stein (1974) apud Colossi (2004) highlighted that creativity is favored when the individual has the chance to have experiences in numerous areas when he is encouraged to innovate, when one values change and originality or when he is socially recognized for his research, and inquiries.

In education we have followed creative and innovative methodologies, which enhance the teaching/learning process, valuing the development of new strategies and contexts that favor the involvement of countless skills, opportunistic to more effective learning to the student.

Saviani (1995) addresses that innovation in education is a process in which the educational

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experience is put at the service of new purposes, and for this purpose, it should be reflected on which educational strategies will suit these purposes. Carbonell (2002) complements this discussion, stating that the perceptions about pedagogical innovation in school, as well as its implementation, are linked to the creation of projects that transform it into a democratic space that is attractive and evaluable.

Nicolau and Nicolau (2013) reflect on the theme of creativity in higher education. For the authors, higher education requires new fundamental characteristics, especially accessibility and creativity, and these needs have been gradually met by the progress in Information and Communication Technologies (ITCs).

Innovative methodologies have emerged as a way of contributing to the teaching/learning process, such as active methodologies. Many of them use IT to achieve their goals since most young people currently use them in their day-to-day lives.

Active Methodologies

Numerous transformations have been observed throughout the years, bringing pedagogical trends with specific characteristics and methodologies.

The traditional pedagogical models, still found in certain school environments, focus on the reproduction of knowledge (LIBÂNEO, 2006). The emphasis is focused on the teacher, usually with classes that the teacher has as the protagonist of the teaching/learning process and, often, students do little to use their experiences for the construction of knowledge. As memorization is one of the bases of this model, the most used methodology is the exhibition class (SILVA; GIORDANI; MENOTTI, 2018).

Babe the reflection on the impact of predominantly using methodologies related to this traditional model for the new generation of students who are, for the most part, connected and with great access to information.

It is necessary to consider that the student inserted in higher education, the focus of this study, has baggage of Knowledge and experiences formed throughout life, making them different individually, and these differences need to be considered in the choice of methodology to be adopted. In addition to individual differences, the teaching-learning process involves many variables that combine in different ways and that are subject to the influence of external, internal, and social factors (CATHOLICO; OLIVEIRA NETO, 2009). Education professionals must discuss all these variables and look for factors that help in collective solutions, such as the use of active methodologies, which have the student as the focus of the teaching-learning process.

Moran (2017, p. 4) and Santos *et al* (2019) address the concept of active methodologies as "guidelines that guide teaching and learning processes, which are realized in specific and differentiated strategies, approaches and techniques" and that emphasize the protagonist role of the student, for their active and reflective involvement in the whole learning process.

Valente, Almeida, Geraldini (2017, p. 464) show that active methodologies:

> They are pedagogical strategies to create teaching opportunities in which students start to have a more active behavior, involving them so that they are more engaged, performing activities that can help the establishment of relationships with the context, the development of cognitive strategies, and the process of knowledge construction.

In this new model, it is essential to integrate the classroom into the reality of students, promoting the collective construction of knowledge, and leaving aside activities that merely aim at the reproduction of knowledge (MACHADO, 2013).

It is understood that the use of active methodologies places the student in a mobilization status, promoting the use of teaching resources and valuing more adaptable approaches to the learning of this audience referring to each content offered and the objectives that are intended to

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be achieved.

Santos *et al* (2019) show that it is essential to seek new forms of learning, and practices that address those who enhance the knowledge of students, causing them to develop in a critical sense, and active methodologies meet this purpose.

Through active methodologies, the student is encouraged to move. He not only observes the situation but acts, comparing the problem detected with situations of his daily life and relating them to everyday life.

Problematization is the teaching-learning strategy used in active methodologies and aims to motivate the student. This motivation leads to more assertive decision-making.

The student should read, write, ask, discuss or be busy solving problems and developing projects, which makes him more dynamic in the learning process and causes a need for commitment and action with the content being taught (ZALUSKI; OLIVEIRA, 2018).

Another necessary discussion is the relationship between active methodologies and the use of Information and Communication Technologies (ITCs). The incorporation of digital technologies transforms the study models, to the extent that they make it possible to produce, record, and share information and knowledge, "maximizing time, space and ways of processing, producing and disseminating the possible solutions to the problems studied" (FERRARINI; SAHEB, TORRES, 2019, p. 11).

According to Morosov (2008) TICs play a very important role in the educational environment and especially in the context of active methodologies. It is necessary to develop environments that collaborate in the visualization and communication of information, using technology as a mechanism to support transformation in the way of performing tasks in the educational process.

Through them it is possible to create knowledge in different ways, exploring innovative teaching resources and enhancing the interaction between teacher and student in distance courses, hybrids (face-to-face and distance, simultaneously), and even in face-to-face courses. For Morosov (2008) TICs are considered a catalyst for transformations in education, both for teaching and learning.

In this sense, it is essential to rethink the use of TIC in the classroom as an instrument for learning mediation, using them as a way of potentiating active methodologies.

Rotation by Stations

In the active methodologies, the use of innovative pedagogical practices is emphasized, which, unlike traditional pedagogical models, defends the protagonist actions of the students, through an environment that favors the development of critical-reflexive analysis.

In this sense, some modalities have stood out, among them the Rotation by Stations. Christensen, Horn, and Staker (2013) show that Station Rotation was originally conceived as a hybrid teaching model and would focus on offering the advantages of these two environments, i.e., valuing the benefits of online education with the benefits of the traditional classroom:

> Hybrid teaching is the methodology that combines online and offline learning, in models that merge moments in which the student studies alone, virtually, and in parallel, in study centers, in which learning occurs in a person, valuing the interaction between student and teacher (SANTOS JUNIOR; MONTEIRO, 2020, p. 6).

The Rotation model by Learning Stations is understood as "any course or subject in which students alternate - in a fixed sequence or at the teacher's discretion - learning modalities in which at least one is online" (HORN; STAKER, 2015, 37).

And this rotational model consists of creating several stations, a kind of circuit, in which groups of students must pass. In every station, a different activity is proposed on the same central theme. The teacher proposes fixed activities in each of the stations so that the groups can rotate

and experience them (ANDRADE; SOUZA, 2016).

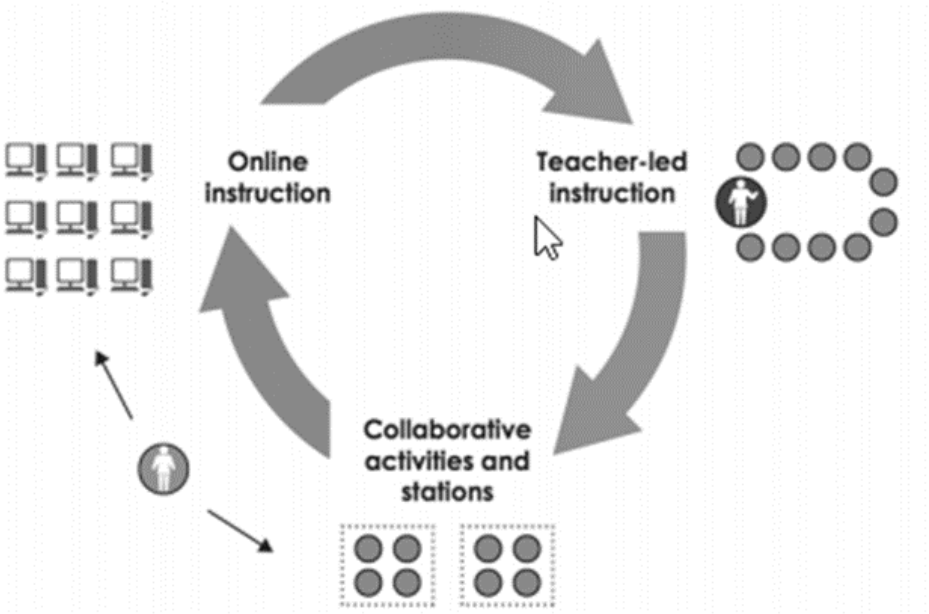
Oliveira e Pesce (2018) shows that the student is motivated to develop learning independently and collaboratively and that the teacher is not the protagonist of the class as in traditional models, being able to pay attention in an individualized way to the student.

The teacher is considered a mediator of the teaching and learning process, allowing the student to learn in a more personalized way, as well as autonomy to design and program their learning based on the appreciation of their skills and competencies.

For the planning of Rotation by Stations, one should observe factors such as the number of stations, types of activities, duration time in each station, which will be online and face-to-face, the technological resources that will be used, and how will be the evaluation of the teaching and learning process (ANDRADE; SOUZA, 2016). All these criteria should be established by the teacher depending on the learning objectives outlined.

Figure 1 presents an example of Rotation by Season. In this case, three stations were organized – in the first, all students receive teacher instructions and are divided into groups, in the second station the groups carry out active collaborating activities and development projects, and in the third, they go to an online task.

Figure 1. Rotation Model by Stations.



Source: Staker and Horn (2012, apud Andrade and Souza, 2016).

When planning the seasons, it is also possible to provoke several meanings of learning, considering that each person has a proper way of learning (SALDANHA; ZAMPRONI; BATISTA, 2016).

Finally, it is understood that the construction of classes with the use of the Rotation by Stations model can contribute to the level of learning of students by provoking critical thinking, through the various activities proposed and by the search for solutions to the problems pointed out.

Methodology

This article is the result of the application of the modality Rotation by Stations, linked to the concept of active methodologies, in students of Private Higher Education Institutions.

The Covid-19 Pandemic was decreed on March 11, 2020, by the World Health Organization, and the decision of the Brazilian government to suspend face-to-face classes, replacing them with remote classes, subsidized by concierge no. 343, of March 17, 2020, of the Ministry of Education and Culture (BRASIL, 2020) limited the adoption of the Model of Rotation by Stations as originally

conceived by the authors, in a hybrid way. Therefore, all stations are designed so that it occurs online and are applied synchronously by the researchers, that is, in real-time. For this, we used an electronic platform, to collaborate.

A didactic sequence has been developed, which according to Kobashigawa et. al. (2008) refers to a set of activities elaborated in a strategic way and with interventions planned by the teacher to understand the proposed content.

The didactic sequence, based on the rotation by stations modality, was then applied to 148 students of higher education at a private university. Of these, 75 (seventy-five) were students of the Technology course in Human Resources Management and 73 (seventy-three) of the Logistics Technology courses. The choice of the subjects was because one of the researchers taught classes in these classes.

As mentioned, all stations were performed considering the remote mode, by the electronic platform collaboration. First, the professor ministered the content for about 30 minutes, with introductory information on the central subject studied, Rotation by Stations, explaining the modality, and making the necessary arrangements so that it could count on the effective participation of all.

To carry out the activities, the teacher requested that the students divide into groups and left the students free to determine the criteria for their training. These groups were accompanied by the teacher during the application of the activities, through constant entries of the teacher in the virtual rooms created for each of them.

To achieve the learning objectives of the contents proposed (Table 1), the project was to develop four learning stations. They were the visual feature station, the empathy map station, the feedback station, and the station rubrics. Each activity had fifteen minutes of duration; time designed by the teacher to fulfill each of them.

Table 1 summarizes the didactic sequence developed based on the Station Rotation modality, as well as the research subjects

Were collected data through observation of each stage, analysis of students' productions, and a questionnaire of self-assessment and perception of the method (diagnostic evaluation).

The data obtained are qualitative and quantitative. To this end, the quality-quantitative approach was used, because according to Gerhardt and Silveira (2009) there was a numerical survey of data at the same time that the analysis of aspects of reality that cannot be quantified, such as motivation and student satisfaction during activities, occurred.

Table 1. Synthesis of Didactic Sequence (DS) elaborated based on Station Rotation.

SD Steps	Strategies	Content	Subject
1st. Presentation Professor	Content introduction	Knowledge Management	75 students Human Resources 3rd and 4th semesters
		Exterior Trade and International Logistics	45 students Logistics 3rd and 4th semesters
		Logistics Distribution Management	28 students Logistics 1st and 2nd semester
2nd. Rotation by Stations Visual Feature	The students faced an image and analyzed their relationship with the theme addressed.	What is Knowledge Management?	75 students Human Resources 3rd and 4th semesters
		What is International Logistics?	45 students Logistics 3rd and 4th semesters
		What is logistics distribution?	28 students Logistics 1st and 2nd semester

Third. Rotation by Stations Map of Empathy	The students answered questions about the content addressed and then sought the consensus of the group. Besides, reflection on each student's learning style was promoted (learn more by listening, seeing, by the teacher's examples, by the examples of other colleagues)	Use of electronic tools in learning and transferring knowledge in organizations	75 students Human Resources 3rd and 4th semesters
		Use of electronic tools in the learning of International Logistics	45 students Logistics 3rd and 4th semesters
		Use of electronic tools in the learning of Distribution Logistics	28 students Logistics 1st and 2nd semester
4th. Rotation by Feedback Stations	The students watched a video, relating to the theme addressed and answered two questions proposed by the teacher.	How can HR act to make Knowledge Management happen? What can HR do to transform the tacit knowledge of employees into explicit knowledge?	75 students Human Resources 3rd and 4th semesters
		How are Brazil's relationship and foreign trade today?	45 students Logistics 3rd and 4th semesters
		How is the Distribution Logistics operation in Brazil?	28 students Logistics 1st and 2nd semester
Five. Rotation by Stations Headings	Analysis of concepts on the proposed theme, interpretation, and production based on the group's understanding.	Describe the 4 steps of knowledge in HR Management activities.	75 students Human Resources 3rd and 4th semesters
		Describe 3 relevant factors for building good international logistics	45 students Logistics 3rd and 4th semesters
		Describe 3 relevant factors for building good distribution logistics	28 students Logistics 1st and 2nd semester
6th. Final Activity and Diagnostic Evaluation	Self-assessment, peer, and class assessment through an electronic questionnaire. Students testify synchronously in the chat about their feelings about the method and understanding of the subject. Teacher feedback	The student's opinion on the use of the method of rotation by stations and electronic tools in the theme address and as was his experience in class.	All participants

Source: Prepared by the authors (2020).

In the next section, the results of the application of Rotation by Stations in the form of texts and graphs will be presented, to enable the understanding of its effects on the teaching-learning process of the proposed themes.

Results and Discussions

This research aimed to observe the impact on the learning process of higher education students when applied the rotation by stations modality. The analysis of the didactic sequence elaborated based on the modality did not occur in just one moment but throughout the process.

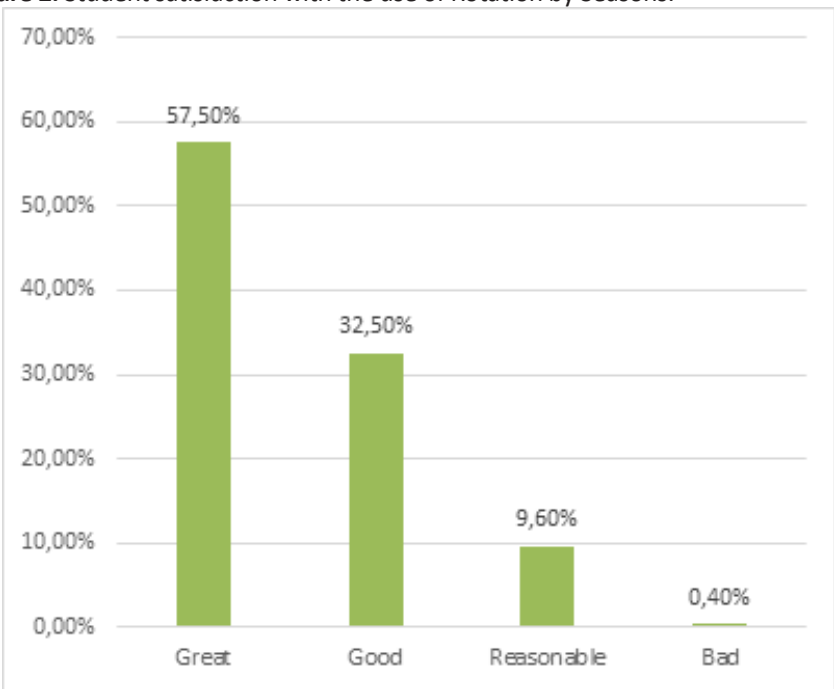
It was possible to observe the active participation of the students in the four seasons, evidenced in the involvement of the teams in the activities proposed in each station, in the sequence of time and tasks, and participation and answers given in the diagnostic evaluation.

The students did not have previous knowledge of the methodology, nor the contents that would be treated, therefore, it was of paramount importance to the exhibition class held by the teacher before the beginning of the activities, serving as a basis for its realization.

In each season, the groups developed a finishing activity, allowing the teacher to monitor the absorption of the content. The students all carried out the final evaluation in which they could evaluate not only the concepts but also the method, their participation, and the participation of their colleagues.

Regarding the students' perception of the use of the Rotation by Station modality, it was possible to observe a high satisfaction index, shown in Figure 2.

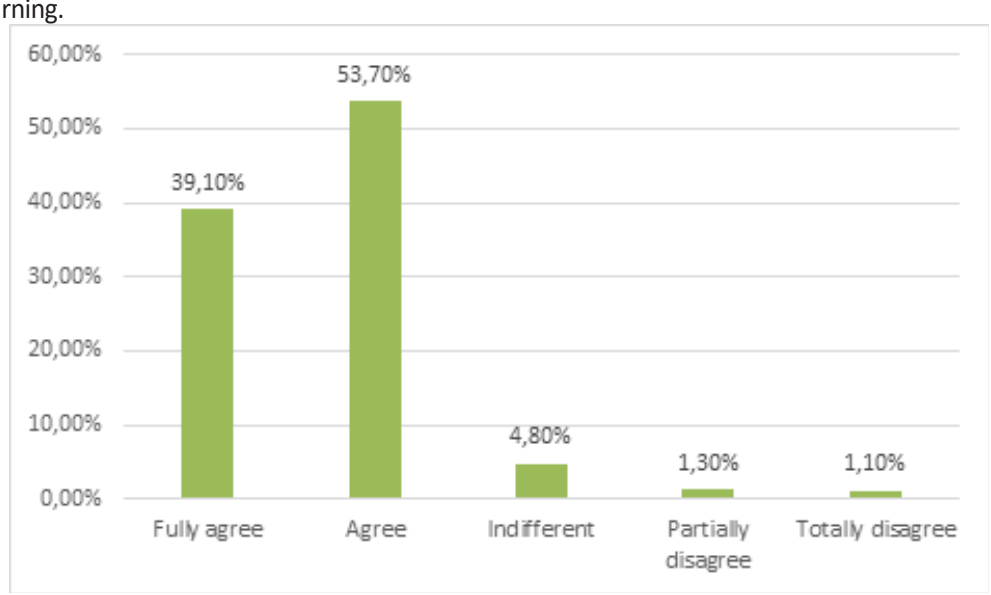
Figure 2. Student satisfaction with the use of Rotation by Seasons.



Source: Authors (2020).

The Rotation by Station's modality, by enabling the development of learning through scenarios for investigation, challenges the student, making him an active character in the process of building knowledge and improving the absorption of content (SKOVSMOSIS, 2000), which is reinforced by the perception of the students. When asked if the use of the modality contributed to them learning more about the content, almost 93% agreed or fully agreed (Figure 3).

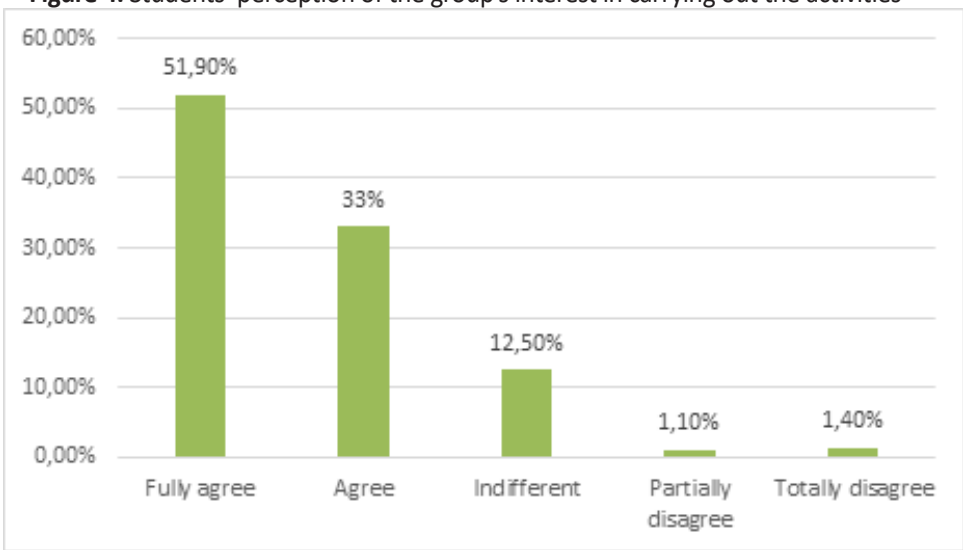
Figure 3. Students' perception of the contribution of Rotation by Seasons to better content learning.



Source: Authors (2020).

The student's interest was also the object of analysis during the process and questioned in the final evaluation. For Santos (2008, p. 33) "learning only occurs if four basic conditions are met: motivation, interest, ability to share experiences and the ability to interact with different contexts." All stations sponsored the interaction between the participants and 85% agreed or fully agreed that there was an interest of the group components in the resolution of the activities, as shown in Figure 4.

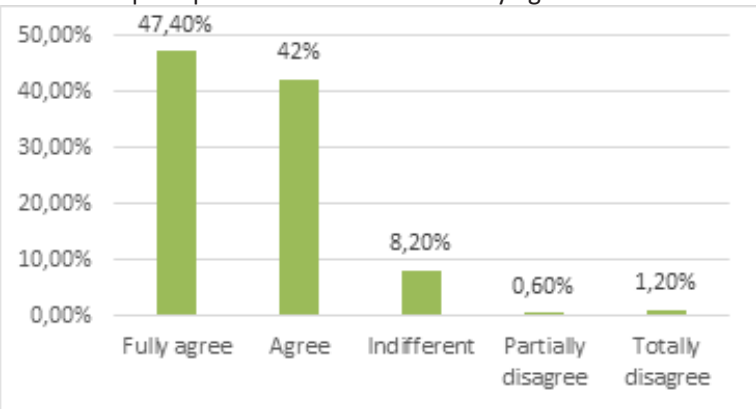
Figure 4. Students' perception of the group's interest in carrying out the activities



Source: Authors (2020).

Regarding the interest and individual dedication in the class in which The Rotation by Seasons was used, it was observed that 89.9% fully agreed or agreed that they dedicated themselves to performing the tasks, which leads us to identify that the Rotation by Station's methodology has held the interest of students in the class (Figure 5).

Figure 5. Students' perception of their interest in carrying out activities

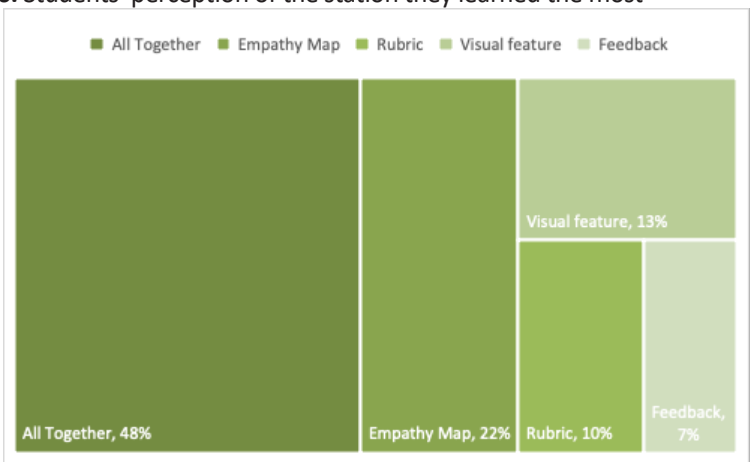


Source: Authors (2020).

In the elaboration and application of this modality, the stations can cause several meanings of learning with the use of numerous resources, such as texts, videos, mages, and case studies, considering that not all students learn in the same way (SALDANHA, ZAMPRONI, BATISTA, 2016).

In this research, the activities elaborated in the seasons considered these learning differences. Each station sought to contemplate the learning that occurs through what one feels (station rubric), what is seen (visual resource station), and what is heard (feedback station). Besides, participants were asked which station they learned the most about. 48% of respondents demonstrated that the seasons together provided better learning. On the other hand, 21.8% were closer to the Empathy Map that worked on reading and interpreting (Figure 6).

Figure 6. Students' perception of the station they learned the most



Source: Authors (2020).

During the rotations, the activities sought to stimulate both divergent and convergent thinking, both linked to the discussion on creativity (Pearson Academy 2011). The students were led to explore divergent thinking by seeking several alternatives for the solution of the problems presented, as well as analytical thinking, to achieve the logical solution for them. It is also emphasized, the creative process of the teacher in the elaboration of the stations so that the determined objectives were achieved.

Another aspect considered refers to the student's understanding of the creativity and innovation of the methodology adopted in the class. More than 92% of the students pointed out that the class with the use of Rotation by Stations is creative and innovative, also evidenced in the interest and statements of the students, who cited that it was the first time that a teacher used this methodology and that they liked the experience.

Although the Rotation by Stations was used in only one class of each class, it demonstrated efficacy in the potentiation of the students' learning verified in the activities produced after the

passage in each season, in the evaluation at the end of the class, and, also, in the feedback received.

The modality proved to be dynamic and with several possibilities for learning strategies, contemplating the diverse cognitive needs of the group, and promoting reflective thinking in the participants.

Final Considerations

This article aimed to observe the learning of students of the superior teaching when applying the modality Rotation by Stations in the concept of active methodologies.

The Rotation by Stations model was applied to higher education students to investigate the impact on their learning process.

As presented, active learning methodologies stand out for increasing students' engagement and assisting them in the process of knowledge construction, which was observed in this study.

The rotations allowed the students to work collaboratively and encouraged individual and collective reflexivity. Autonomy was also present throughout the process since the teacher did not need to control the performance of the activities, just clarifying at the beginning of the class. The doubts demonstrated by some students at the initial moment were quickly resolved as soon as the teacher explained the didactic sequence and what was expected of them at each stage. The involvement and interest of the groups corroborate this view.

It is worth mentioning that the Rotation by Stations model allows flexibility in its elaboration, valuing the different learning styles with the use of various resources and strategies.

Another important aspect refers to the creative and innovative characteristics of the model that proved to be effective enough to engage the student and make him better absorb the content.

Its implementation proved to be a sustained and representative innovation, presenting itself as a substitute model for traditional class models and can also be used entirely in a virtual way, unlike the hybrid approach with which it was conceived.

However, it is worth noting that certain weaknesses should be considered when choosing the model. It is understood as limitations, the accessibility of a part of students to technologies, as well as the difficulties of infrastructure, such as equipment and internet bells.

However, the Station Rotation model presented potentialities in many aspects, as demonstrated in this study, providing a flow of creation, and construction of knowledge, and encouraging the student to assume an active and reflective role in their learning process.

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