


## THREE HUNDRED METHOD: IMPACT ON THE LEARNING OF IMMUNOLOGY – A DISCIPLINE IN THE HEALTH AREA

 <https://doi.org/10.56238/arev6n3-390>

Date of submission: 29/10/2024

Date of publication: 29/11/2024

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### ABSTRACT

The Three Hundred Method is an active teaching-learning methodology that advocates the construction of learning through peer discussion, from the focus on errors, in a collaborative and mutually advantageous way. Both win in the process: helpers and helped. The work was developed from September/2022 (related to the 2022/1 semester) to June/2024 (related to the 2023/2 semester) for students enrolled in the Immunology discipline of three courses in the health area of the main campus of a federal university in the interior of the state of Minas Gerais, and in the academic semesters of 2022/1 and 2022/2 all students from the three courses participated in the Trezentos Method as a procedural recovery strategy in the discipline. In the following academic semesters (2023/1 and 2023/2) the discipline took place, in the three courses, without the use of the method. The results showed a statistically significant difference between the performance of those who participated in relation to those who did not participate in the method. It is concluded, therefore, that the Trezentos Method is an excellent tool to work on procedural recovery in disciplines in the health area, contributing to the reduction of retention (and consequently dropout) rates that link the various higher education courses in the country.

**Keywords:** Three Hundred Method, Procedural Recovery, Retention and Evasion.

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## INTRODUCTION

Traditionally, the training of most health professionals has been based on conventional pedagogical practices, in which learning is transmitted to the student in a coercive way, in order to transfer and replicate values and knowledge from the educator to passive students. This teaching-learning methodology limits the development of a critical and reflective view, which is crucial for personal and professional growth, often resulting in individuals who are unprepared to perform their function fully and efficiently (Berbel, 2011; Hommes et al., 2012, Cotta et al., 2013). The perpetuation of this outdated traditional model, when applied in an integral way, has proven to be poorly suited to contemporary educational challenges.

However, in recent years, there has been a great concern in the area of education to innovate and improve teaching methodologies. Several studies are focused on the active learning method (Bergmann and Sams, 2012; Fragelli, 2015), seeking to understand its impact on student education, as well as aiming at the development of new methodologies that can generate greater engagement and learning. From this perspective, the student ceases to be a passive receiver and assumes an active role in his learning process, assuming greater autonomy over his education.

The active methodology stimulates the construction of knowledge based on critical and reflective thinking, enabling the development of new skills and abilities. In this approach, the teacher no longer holds the domain, assuming the role of content vehicle and elaborator of questions, instead acting as an advisor, supervisor and facilitator of learning (Fragelli & Fragelli, 2017). The big issue is to involve and engage the student, so that he feels responsible and motivated for the search and consolidation of knowledge, counting on the teacher and his peers to facilitate this path.

According to Lovato et al. (2018) active teaching-learning methodologies, in addition to promoting greater engagement, favor creativity and reflection, boost initiative, and also stimulate group work with the objective of developing collaboration, socialization and empathy, giving students the opportunity to develop self-assessment skills.

In this context, the Trezentos Method is an active, collaborative teaching-learning methodology, developed by Professor Ricardo Fragelli, from the University of Brasilia, in 2013 (Fragelli, 2015). The methodology advocates the construction of learning through peer discussion, based on the study of errors, in a collaborative and mutually advantageous way. Both win in the process: helpers and helped.

The Three Hundred Method was inspired by the story of the group of three hundred Spartan soldiers who created a strategic impact of resistance in the war, as they formed a solid group of mutual cooperation and protection. Coincidentally, the group of students and collaborators working the first time the method was tested had a number of three hundred members (Fragelli, 2017). Thus, inspired by these Spartan soldiers, the Three Hundred Method promotes the creation of collaborative groups of students, encouraging the exchange of knowledge and procedural recovery, as well as fostering the development of empathy, solidarity and altruism.

Originally, the application of the Trezentos Method aimed to reduce dropout and retention in exact sciences courses, such as the discipline of Calculus I, in addition to seeking to reduce students' anxiety in assessments, in order to improve performance (Fragelli, 2015).

School dropout is a recurrent problem that directly affects Brazilian educational systems and has impacts on educational institutions and society, with waste of important economic and social resources (Silva Filho et al. 2007). The same author also points out that, in the period between 2000 and 2005, the average dropout rate in Brazilian higher education institutions was high, about 22%. Corroborating these findings, a study developed at the Federal University of the Jequitinhonha and Mucuri Valleys – UFVJM, located in the interior of the state of Minas Gerais, shows that the retention rate in curricular units offered by the Department of Basic Sciences, characterized by the lock/cancellation of enrollment or by failure due to grade and/or attendance, totaled 19.48% of the total enrollments that occurred, during the period analyzed (Alves et al., 2024).

Several authors point out the relationship between low academic performance and anxiety during evaluations. Students' concern with tests often arises from the pressure to obtain good grades, the recognition of a performance below expectations, the feeling of inferiority and the fear of being judged by others, with the fear of failure being a central factor (Fragelli, 2015; Thomas et al., 2017; Medeiros et al., 2020).

In this context, the studies of Fragelli (2015) indicate that the Three Hundred Method can be effective in reducing anxiety in moments of evaluation. This is due to both the open collaborative dynamics between students and the possibility of improving performance through a second opportunity for evaluation, which reduces pressure and promotes a more welcoming and conducive environment for learning. In addition to improving the academic performance of the students involved, the Trezentos Method promotes the development of

socio-emotional skills such as empathy, self-esteem, solidarity, self-evaluation, and personal growth.

One of the main advantages of the Three Hundred Method is the possibility for the student to assume a leading role, being able to act sometimes as an assistant and sometimes as a helper. This promotes a break with the traditional and competitive teaching model, favoring active and collaborative learning. By working in groups, with respect and cooperation, students have the opportunity to identify flaws in previous concepts, which is essential for meaningful learning (Fragelli & Fragelli, 2017).

Based on these aspects, the present study aims to analyze the use of the Trezentos Method as a tool to work on the procedural recovery of students enrolled in the discipline Immunology, a curricular unit in the health area, seeking to contribute to the reduction of retention and dropout rates in undergraduate courses at a public university in the interior of Minas Gerais.

## **METHODOLOGY**

For the development of this study, the discipline of Immunology was chosen, a curricular unit that has a high retention rate, due to the complexity of the content and the fact that the subjects are very concatenated, demanding a constant and gradual study by the students throughout the academic semester.

Thus, it was decided to carry out the studies with students enrolled in the Nursing, Physiotherapy and Nutrition courses of the main campus of a federal university in the interior of Minas Gerais. This discipline is offered in the second period of the three courses at this Institution, with a total workload of 45 hours. A total of 239 students participated in the study, distributed as follows: Nursing 2022/2: 30; 2023/2: 21 – totaling 51 students. Physiotherapy 2022/1: 22; 2022/2: 25; 2023/1: 22; 2023/2: 25 – totaling 94 students. Nutrition 2022/1: 19; 2022/2: 27; 2023/1: 25; 2023/2: 23: totaling: 94 students.

Two evaluations of each class (first and second theoretical tests) were analyzed, so that the total number of evaluations contained in Results ( $n=456$ ) is higher than the total number of participants ( $n=239$ ). The Nursing course at this University is annual intake, so only two classes were part of the study. The Physiotherapy and Nutrition courses are semester-based, so that four classes participated in the study.

With the application of the method, it was sought to improve the level of performance of students in the topics worked on in the discipline of Immunology, subjects of

great importance in the professional practice in the health area, due to the need to understand the processes of development of immune responses, vaccination, use of serums, development and treatment of autoimmune diseases, infectious diseases, cancers, the development of immune tolerance, among many other issues inherent to this area.

In addition, we tried to develop the skills of teamwork, empathy, solidarity, learning from problems and from mistakes, which are also relevant issues in this area of professional activity. The Three Hundred Method was applied to the classes offered in the 2022/1 and 2022/2 academic periods, while the classes held in 2023/1 and 2023/2 did not have this opportunity.

To carry out the Three Hundred Method in the three classes, some adaptations were made to the method proposed by Fragelli (2015). Initially, two evaluative activities were prepared for each class, addressing the same content, containing the same number of questions, all essay, with the same complexity and with the maximum value of each question and the total value of the test equal.

The maximum time for applying the tests, on both occasions, was three hours. On the day of the test, the students were presented with the two envelopes and one of them was asked to choose the envelope that would be used in the evaluation, so that the other would be kept for the evaluation of the Three Hundred (of the procedural recovery).

This strategy made students feel more at ease, reducing the anxiety of possible recovery, since they realized that there would be no retaliation against those who had low performance at the first opportunity. They knew that the second assessment would have the same complexity and that it would be worth the extra effort for a possible recovery. Then, the first opportunity evaluation was applied. The evaluations were then corrected in a maximum of 24 hours.

The results of the first assessment were recorded in the computerized academic management system and, subsequently, the students received, through a communication sent by the Google Classroom Virtual Learning Environment, a spreadsheet with the classification of the participants as helped or helped, as well as the study group that would participate in the execution of the Three Hundred Method (figure 1A). The students also received a chart in which their names were preserved, which were cited as numerals, so that they could see their position in relation to the performance of the class.

This graph was updated after the application of the method so that the student could evaluate his performance (figure 1B). Students who achieved a grade lower than 60% of the total value of the test were categorized as helped, while helpers were those who exceeded this index. The number of helpers and helped in each group and class varied according to the number of students enrolled and their performance in the evaluation activity. All the groups formed had students who obtained better performance in the evaluation (assistants) and with low performance (helped).

These attributions could change from one assessment to another, since it depended on the performance in that assessment, so that the same student who performed well in the first assessment could act as an assistant in the first assessment, but if he achieved a lower performance in the second assessment, he could be helped by his colleague. This was also an opportunity to work on empathy and humility, important issues for working with young people, especially those in the health area.

The groups of Trezentos met to carry out the studies, and they were required to hold at least three meetings for the development of the studies. The group was allowed to choose between face-to-face meetings, virtual meetings or both modalities, within the availability and abilities of the students, as well as the type of activities they would perform (list of exercises, classes taught by the helped, discussion, study directed by the texts contained in books, among others).

At the end of the studies, each group should deliver a report containing the dates of the meetings, activities that were developed for the study, as well as photos of the meetings. Only those helped who had completed the three meetings, at least, and whose report had been delivered no more than one day before the evaluation was carried out, received the opportunity to make the evaluation of the Trezentos.

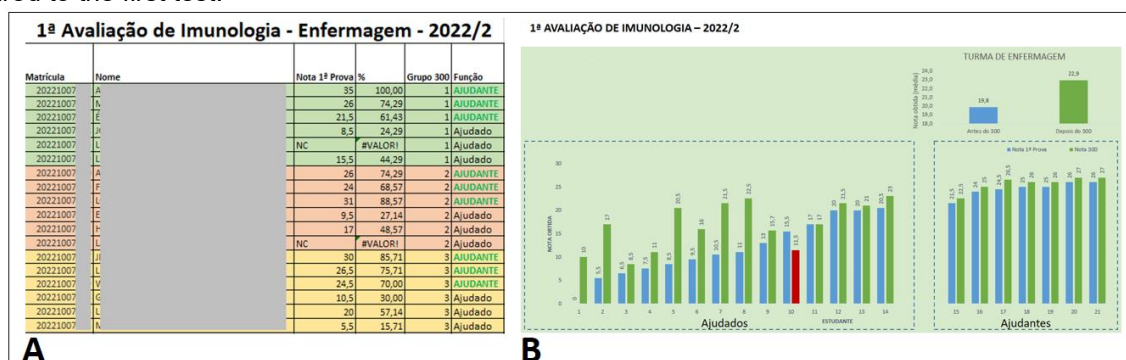
The evaluation of the Three Hundred was then applied to those helped after a period that varied between one and two weeks from the first test. This was corrected, following the same criteria adopted in the correction of the first, so that the highest score prevailed (whether it was the first test or the Three Hundred).

The improvement index of those helped was calculated from the comparison of the grade of the first evaluation and the Trezentos Method. This improvement index was applied so that those helped also received an extra score that could reach up to 3.5 points (which corresponded to 10% of the maximum score of the evaluation). Helpers who had achieved the maximum score in the first evaluation were also encouraged to participate in



the method, even if they did not have the possibility to improve their grade, working on the principles of solidarity, empathy and care, important aspects in the training of health professionals. Again, the students received, through Google Classroom, a graph with the performance of everyone in the class in the activities before and after the execution of the Trezentos Method (figure 1B).

Figure 1. Documents made available to students for the execution of the Trezentos Method in Nursing, Physiotherapy and Nutrition courses offered at the main campus of a federal university in the interior of Minas Gerais, Diamantina, 2024. A) Worksheet for the classification of students between helpers and helped, as well as for the definition of the groups for the execution of the Three Hundred Method. B) Graph showing the results obtained by the participants in the first test (green bars) and in the evaluation of procedural recovery by the Three Hundred Method (blue bars). The red bar represented a lower performance in the Three Hundred compared to the first test.



Source: Prepared by the author.

Students who did not attend the first evaluation could still participate in the procedural recovery (Three Hundred Method), participating as helped in this opportunity.

## DATA ANALYSIS

The organization, analysis and verification of the association between the variables studied were developed through the Epi Info program. The chi-square test ( $\chi^2$ ) was used to compare the application of the Three Hundred Method and the average achievement in the students' evaluation. The average achieved was considered to be the yield equal to or greater than 60% of the total value of the appraisal. A significance level of 5% was also considered.

## ETHICAL ASSESSMENT

The development of this work did not require ethical appreciation in view of what is established in item VIII of the sole paragraph, article 1, of Resolution No. 510/2016 of the National Health Council: "VIII – activity carried out exclusively for the purpose of education,

teaching or training without the purpose of scientific research, of undergraduate students, of technical courses, or of professionals in specialization" (Brasil, 2016, p.1-2).

## RESULTS AND DISCUSSIONS

The results achieved by the students were categorized, so that two groups were created for analysis: students who achieved and students who did not achieve an average (grade in the evaluation equal to or greater than 60% of the total value). The groups were analyzed taking into account the participation or not of the class in the Three Hundred Method. The results are presented in Table 1.

Table 1. Performance of students in the Nursing, Physiotherapy and Nutrition courses of the main campus of a federal university in the interior of Minas Gerais, in the discipline of Immunology, with or without the use of the Three Hundred Method. Diamantina, 2024.

Courses	Methodology	Did you reach average?		Total	Statistical analysis
		Yes	No		
Nursing	With the Three Hundred Method	35	22	57	p= 0.0091
	No Method Three Hundred	11	29	40	
	Total	46	51	97	
Physiotherapy	With the Three Hundred Method	54	40	94	p= 0,00115
	No Method Three Hundred	31	61	92	
	Total	85	101	186	
Nutrition	With the Three Hundred Method	42	45	87	p= 0,00590
	No Method Three Hundred	24	62	86	
	Total	66	107	173	
All classes	With the Three Hundred Method	131	107	238	p= 0,00000
	No Method Three Hundred	66	152	218	
	Total	197	259	456	

Source: Prepared by the authors, 2024.

The results expressed in Table 1 allow us to observe that the use of the Trezentos Method contributed significantly to the recovery of the students helped, which occurred in the three classes analyzed, and this association was statistically significant. These results



show that the Trezentos Method has the potential to contribute to coping with the high retention rates, which end up leading to dropout, in the disciplines of the health area.

This conclusion is corroborated by studies by Cunha, Tunes and Silva (2001), as well as Manrique (1997), which highlight the existence of a relationship between retention and dropout, which is not the only causative factor. Yamaguchi and Silva (2019) identify as the main predisposing variables for high retention rates low affinity with the discipline, socioeconomic deficiencies, inadequate study methodology, in addition to training gaps from previous levels of education. In this context, the use of a methodology that promotes a relaxed discussion among peers can facilitate the identification of demands, allowing them to be addressed effectively, consolidating learning.

Another important issue to be noted is that several studies show that student dropout is two to three times higher in the first two semesters of the course compared to subsequent periods (Dias; Theophilus; Lopes, 2010; Silva-Filho et al., 2007).

According to Santos et al., (2022, p. 9-10), "the probability of dropping out in the first four semesters of the course represents 50% or more of the total dropout that occurs" throughout the undergraduate course. These data reinforce the importance of applying the Trezentos Method in disciplines of the first periods of the course, such as Immunology, as it can contribute to the reduction of retention and dropout rates.

It is interesting to note that the use of the method had a greater impact on the Nursing course, although it improved the performance of the students in the three courses evaluated.

This result may be related to the profile required in nursing education, which values characteristics such as empathy, solidarity, creativity, engagement, and the ability to work in a team. These characteristics are essential not only for this profession, but for all courses in the health area.

## **CONCLUSION**

The present research confirmed that the Trezentos Method is an effective tool for the procedural recovery of students in the discipline of Immunology. The results indicate that, in addition to significantly improving the academic performance of students, the methodology also promotes the development of essential socio-emotional skills, such as empathy, solidarity, and teamwork, which are fundamental for the training of professionals in the health area.

These findings highlight the method's potential to reduce retention and dropout rates, which are recurrent problems in higher education, especially in more complex disciplines, such as immunology. The analyses revealed that the impact of the method was more expressive in the Nursing course, which may be related to the collaborative and empathetic profile required by the profession. However, the methodology proved to be beneficial for students from various courses in the health area, evidencing its applicability in different educational contexts.

Thus, it is concluded that the Three Hundred Method is an efficient pedagogical alternative, promoting not only the improvement of academic performance, but also the human and professional development of students. Its adoption is a relevant strategy to face the challenges of retention and dropout in undergraduate courses.

#### **ACKNOWLEDGMENT**

We are grateful to the Tutorial Education Program of the Ministry of Education, the National Fund for the Development of Education (FNDE) and Fapemig (process APQ-04955-23) for their support in the development of this work.

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