

## Motivation: a challenge in the application of active methodologies in higher education

Motivação: um desafio na aplicação das metodologias ativas no ensino superior

Motivación: un reto en la aplicación de metodologías activas en la educación superior

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**Abstract:** The use of active methodologies has proved to be a tool capable of increasing the level of students learning, especially those with concentration difficulties. A challenge for teachers is to obtain student engagement to carry out activities prior to the face-to-face meeting, such as watching a recorded lesson or reading an article. This work describes an experiment carried out in an inclusive university where, after careful research to choose the most appropriate strategies to the characteristics of the target audience and the institution's restrictions, didactic materials and practical activities were prepared that were used during an entire academic period and applied in three subjects of computing education. The results revealed the main ingredient for the success of this endeavor: the students' motivation.

**Keywords:** higher education; active methodologies; motivation.

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**Resumo:** O uso de metodologias ativas tem se mostrado uma ferramenta capaz de aumentar o nível de aprendizado dos alunos, e em especial aqueles com dificuldades de concentração. Um desafio para os professores é obter o engajamento do aluno para a realização de atividades prévias ao encontro presencial, como assistir uma aula gravada ou ler um artigo. Este trabalho descreve um experimento feito em uma universidade inclusiva onde, após uma criteriosa pesquisa para a escolha das estratégias mais adequadas às características do público-alvo e as restrições da instituição, foram elaborados os materiais didáticos e atividades práticas que foram usados durante todo um período letivo em três disciplinas do ensino de computação. Os resultados revelaram o principal ingrediente para o sucesso dessa empreitada: a motivação dos alunos.

**Palavras-chaves:** ensino superior; metodologias ativas; motivação.

**Resumen:** El uso de metodologías activas ha demostrado ser una herramienta capaz de incrementar los niveles de aprendizaje de los estudiantes, especialmente de aquellos con dificultades de concentración. Un desafío para los docentes es lograr que el alumno participe en actividades previas a la reunión presencial, como ver una clase grabada o leer un artículo. Este artículo describe un experimento realizado en una universidad inclusiva donde, luego de una cuidadosa investigación para elegir las estrategias más adecuadas a las características del público objetivo y las restricciones de la institución, se prepararon materiales didácticos y actividades prácticas que se utilizaron durante todo un período de enseñanza en tres disciplinas de la educación informática. Los resultados revelaron el ingrediente principal para el éxito de este emprendimiento: la motivación de los estudiantes.

**Palabras clave:** educación superior; metodologías activas; motivación.

## 1 Introduction

Most of the reports with experiences in the application of active methodologies are associated with TDIC – Digital Information and Communication Technologies. Arguably, the use of Information Technology (IT) resources to apply the mechanisms and strategies of Active Methodologies makes the experience more dynamic and enriching. However, the application environment described in this work differs greatly from those found in research reports. The experience here was planned and applied in a public university located in the West Zone of Rio de Janeiro. It is admittedly inclusive, as most of its students were users of quotas for admission and come from the local public high school. The lack of basic foundations is clearly perceived, but the teachers of the institution are aware of their social responsibility and seek to fulfill their role as educators, adapting their methods to this public. But the difficulties are many. The graduation rate is low, the dropout rate is high, and it is challenging for the teacher to achieve student motivation. There are few labs available, and there is no wireless internet on campus. As not all students have smartphones with data plans, there is no way to establish as a prerequisite for classes the use of IT tools. This limiting factor led to research in the fundamentals of Active Methodologies, to identify the resources with more pedagogical than technological weight. It is essential that the dynamics can be used in an environment without availability of anything other than the traditional classroom and printed sheets, since the institution has printers, paper, and ink available for printing at each meeting. This goal is not a challenge, since this movement emerged long before the introduction of technology and its resources, with the so-called "new school" of John Dewey (SCHMIDT, 2009). Its basic principle was "learning by doing", which is also used in current techniques, privileging the role of the learner, through his leadership, initiative, creativity, and cooperation with classmates. Freire (1996) is also convergent, introducing challenges based on the problematization of everyday phenomena, to lead students to be motivated to question reality and propose transformations. Regardless of whether we learn inductively or deductively, we learn based on concrete situations.

This work is organized as follows: section 2 succinctly describes the theoretical foundations necessary for the development of the research, which are the active methodologies evaluated before the experiment, as well as aspects about the human motivation for learning. Section 3 presents related research, an important influence on the choice of paths to follow. Section 4 shows the methodology adopted, section 5 analyzes the results, and section 6 concludes the work.

## 2 Theoretical Background

To contextualize the objectives of this research, aspects of the two main components studied are presented in this section: Active Methodologies and Human Motivation, especially in higher education.

### 2.1 The Active Methodologies

One of the biggest challenges for a change in teaching strategy is the motivation of the student and the teacher. All the methodologies evaluated for this experiment presuppose the student's commitment to consume previously available theoretical content, in order to redirect the precious time invested by the teacher in the presentation of concepts that can be acquired by the student autonomously, according to their temporal availability, state of mind and preferred media. In addition, the techniques need to motivate, provoke reflections, be based on the desire to learn.

#### 2.1.1 The Choice of Active Methodologies

The Active Methodologies are characterized by aiming that the student becomes the protagonist of his intellectual development, making the teacher a proponent of activities in which the student applies knowledge already acquired, creativity, capacity for analysis, synthesis, and other desirable characteristics for the construction of his own knowledge (BACICH; MORAN, 2018). It also privileges collaborative work, through activities in pairs or groups. The role of the teacher is also profoundly modified, since the activities need to have very well-defined objectives, with competencies to acquire associated and capable of measuring their effectiveness, but also provide a very clear visibility for the student of their evolution. Traditional methods are typically lacking in these characteristics, since assessment instruments are the rare moments when the student puts his knowledge to the test. According to Bacich and Moran (2018), the learning process is more efficient when students are motivated, and this depends on the identification of the objectives, and the process of each activity until its completion, but mainly on the potential contribution of each one individually to the solution of the proposed challenges.

It is obvious that the ideal is that this behavioral change is *top-down*, with training and motivation for teachers, curricular modifications to align with the new techniques and unconditional support of the management, but it is known that the reality of public institutions is quite different.

## 2.1.2 Techniques Evaluated

The techniques of Active Methodologies have already been exhaustively discussed in the literature, with proven improvement in learning. An obvious perception is that the use of varied techniques can motivate the student more than the use of a single technique during the course. The demand for student engagement, through prior study, seems to be the main challenge. Some techniques that have been selected for evaluation will be briefly described below.

### 2.1.2.1 Inverted Lesson

The *flipped classroom* technique seeks to optimize class time, because the teacher is responsible for anticipating the availability or indication of sources of information about the objectives to be achieved, so that the student can prior to the synchronous meeting prepare to apply the concepts learned, within a context of practical application (BERGMANN; SAMS, 2016). The idea is that what is traditionally done in the classroom is currently done individually by the student at home, and what is traditionally done as "homework" is done in the classroom, effectively representing an inversion in learning paradigms (RIBEIRO; PASSOS, 2020). This can be done with a simple list of questions, and the discussions will highlight the individual needs for the students themselves, but without exposing them to embarrassment. The use of activities of practical application of knowledge in real-world challenges can eventually lead to greater engagement and motivation.

### 2.1.2.2 Problem-Based Learning

The PbL (*Problem-based Learning*) technique was created in the 60's in Medicine (BACICH; MORAN, 2018), and nowadays it is quite common in courses in other areas, due to the synergy that can be achieved when students try to combine their experiences with the theoretical basis in the treatment of a problem-situation. In this context, possible reasons for the existence of the problem can be discussed and a correction of it can be proposed, or a form of treatment for a problem apparently without possibility of reversal. A great positive point of this methodology is that the teacher can use practical situations typical of the professional routine of the graduate of the course in which it is being applied, with great potential to keep students motivated and dedicated to the solution of the proposed challenge. It is considered an educational strategy that contributes significantly to the development of logical reasoning and skills in communication with third parties, essential qualities for success in professional life (RIBEIRO; PASSOS, 2020). The innate competitiveness of the human being also makes this technique interesting for students with attention difficulties.

Another relevant aspect of PbL is its transdisciplinarity, adding knowledge and experiences that involve human, technological, ethical, architectural and several other aspects in a holistic approach.

### 2.1.2.3 Project-Based Learning

Projects where various knowledge of one or more disciplines must be applied to the achievement of objectives allow the time between face-to-face meetings to be used for deep reflections, observation in the real world and a process of continuous improvement. Like the PbL, it proposes collaborative work, but demands a more participatory role of the teacher, not only in conducting the phases of the activity, but mainly to highlight issues that represent possible problems in the choice of certain solutions for the project. Among the possible approaches for the use of this technique (BACICH; MORAN, 2018), the simplest and most interesting for a first experience with Active Methodologies is the Exercise-Project, where the activity is applied within a single discipline. The other approaches are the component-project, not articulated to a specific discipline, the project-approach, when there is feasibility of interdisciplinarity between disciplines, and the curriculum-project, where there is no explicit identification of one or more disciplines.

### 2.1.2.4 Aprendizagem por Jogos (Gamificação)

Playful activities usually motivate and hold the interest of people of any age if they are properly conducted. In addition to the human competitiveness already mentioned, the possibility of using adaptive scenarios, dependent on the decisions made throughout the game, have great potential to improve learning. It is possible to observe that gamification concepts are applied in several areas of knowledge (RIBEIRO; PASSOS, 2020). The greatest difficulty in the use of this technique seems to be its preparation, so as not to make the competition more relevant than the learning. According to testimonies collected by the authors of students who use games, the activity brings small rewards that stimulate the continuity of this competitive process. It is important then, when adopting gamification activities, to maintain this strategy, offering cumulative rewards that keep the student motivated to participate with enthusiasm, and with this, achieve the true goal, which is learning.

The next section describes some definitions of Motivation, focusing on the educational area.

## 2.2 Motivation for Learning

Although works on Human Motivation focused on industrial productivity have been known for decades, such as the studies of Maslow and Herzberg, the complexity of the discussion is perceived when it comes to the desire to learn. Motivation can be defined as: "Affective tension likely to trigger a certain activity with the goal of achieving something." (RIBEIRO; SARAIVA; PEREIRA; RIBEIRO, 2019). In another work, the following definition is found: "The Motivation to learn can be understood as a dynamic and multifaceted phenomenon, which has an important role in the acquisition of knowledge and academic performance, at different levels of education." (PEREIRA; CASTILLO; ZOLTOWSKI; TEIXEIRA; SALLES, 2022). For a comparison, one can still find other definitions, such as "Motivation can be understood as an internal state or condition that awakens us to action, directs and persists our behavior and involves us in certain activities." (RIBEIRO; RIBEIRO; PEREIRA, 2022). It is possible to observe in these definitions the subjectivity of the motivating elements, as well as their multidimensional potential.

There are many theories developed, which differ in aspects that have the potential to influence the motivation of an individual. Personal, social, contextual, and other factors are omitted or highlighted, seeking to offer a systematization of the search for student motivation (RIBEIRO; RIBEIRO; PEREIRA, 2022). Among the proposals, the Self-Determination Theory stands out, which classifies stimuli into three categories: intrinsic, extrinsic and demotivation. It is pointed out as promising, for overcoming the dichotomy between intrinsic and extrinsic aspects, indicating that individuals have an innate tendency to develop personally, internalizing their experiences towards personal success (INÁCIO; SCHELINI; NORONHA, 2021).

The next section describes works that contributed significantly to a deeper understanding of the techniques and influenced the decision of the model to be adopted for the research.

### 3 Related Works

Many reports about experiences with active methodologies can be found in the literature. After the systematic review work, where search keys compatible with the characteristics of the intended experiment in this research were used, 304 studies were selected and evaluated, of which 59 have relevant similarities, and their contributions were important for the planning, execution and evaluation of the results obtained. Many of the works generically evaluate the aggregating potential of active methodologies, and were discarded during the selection process, in favor of experiences related to higher education of computing disciplines.

The research of Blaszkowski, Ujii and Claro (2021) evaluate the contribution of active techniques in the teaching practice of university professors. It uses a qualitative approach through a case study, based on research with teachers. The study shows that the importance of active methodologies in higher education is noticeable for teachers, but there is a notable highlight in the difficulties in breaking the so-called "comfort zone" of teachers. The techniques of problem-based learning, rotation by stations, peer learning, gamification and flipped classroom are the most used. The study concludes that teachers agree that methodologies contribute to the effective participation of students as protagonists of their learning, providing the collective construction of knowledge. Regarding the difficulties, it proposes a specialized training in active techniques for teachers, providing a moment of discussion, reflection, and popularization of its applicability.

The work of Garcia, Oliveira, and Carvalho (2022) proposes the construction of personalized teaching plans for algorithmic disciplines with the use of active methodologies. The main motivation was the high failure rate in this discipline, one of the fundamental pillars of computing courses. The authors argue that, since the techniques have different characteristics, there is a demand for careful planning, with precise identification of the objectives to be achieved, necessary auxiliary resources and a methodology for evaluating results very well defined. Six different active techniques were selected, with different purposes. For their selection, a correlation was used between the characteristics of each teaching unit and the cognitive levels of Bloom's Taxonomy. After defining the teaching plan, the experiment was conducted with two groups of 34 students. In one of them, the traditional approach was maintained. In the other, the teaching plan with active methodologies was adopted. The results showed relevant differentials in comparison with other experiences, since, in addition to the statistical gain in the metrics defined for the evaluation of the level of learning, the use of multiple techniques in the same discipline is not verified in most of the analyzed works.



The research of Ribeiro and Passos (2020) is also dedicated to the evaluation of the use of active methodologies in the study of subjects around computing. It argues that the learning challenges in this area demand the development of specific competencies and proposes to evaluate which techniques would be more appropriate for this demand. In the systematic review, they identified the techniques of Gamification, Learning by Problems, by Projects, in pairs and in groups, and inverted classroom. It reports the observation of resistance to the adoption of active techniques by some teachers, which represents a challenge for a wider adoption. Through well-designed research questions, it identified that gamification was prominently the most adopted among the researched works, with 74%, followed by Problem-Based Learning (17%), Projects (9%), Peer Instruction (6%), Inverted Classroom (6%) and Group Learning (3%). He also researched the perception of students regarding the application of active methodologies in the learning of computing topics, mainly to assess the influence on personal motivation to dedicate themselves to learning, since, with the use of active methodologies, the commitment of the student is essential. Among the techniques mentioned above, all were mostly indicated as drivers of satisfaction in learning and motivation to study the theme, however, the inverted classroom technique was not perceived in the studies evaluated as a technique that brings the feeling of mastery of the content. Notifies that the use of active techniques develops new skills, such as initiative, creativity, critical analysis, self-assessment capacity and competencies in collaborative work. It also highlights the difficulties, such as the lack of commitment of students outside the classroom environment, as well as the challenge of maintaining their attention and involvement in face-to-face activities.

An interesting evaluation of the Inverted Classroom technique can be found in the work of Elazab and Alazab (2015). Of the techniques studied in the previous section, this is apparently the simplest and most immediate. In it, the foundation is the inversion of the moments of presentation of concepts and examples with that of fixation activities. In the work, a case study of application of the methodology for students of higher education in technology evidenced interesting points, such as the importance of care not only in the planning of the correlation of asynchronous classes with face-to-face classes, but mainly in the elaboration of this previous presentation. One of the main known challenges is to achieve the motivation of the students, and during the experiment it was concluded that the ideal is short, objective and illustrated classes, with examples of application of the theory, and segmented by well-defined topics. It highlights the noticeable gain in the use of teacher and student time dedicated to the discipline and deepens students' access to the teacher's expertise. There was an increase in the performance of the students of the experimental group of the order of 23% in the tests performed, but challenges were also highlighted in the construction of asynchronous classes for complex contents, and difficulties for the instructors to

understand their new role with the application of the technique and to leave their comfort zone.

Due to the lack of resources in the application environment of the experiment of this work, the work of Ferrarini, Saheb and Torres (2019) was selected, which evaluates the approximations and distinctions between the use of digital technologies and Active Methodologies in higher education. In it, learning techniques were analyzed by projects, problems, by peers, case studies and inverted classroom. Their results indicate that active methodologies do not dispense with the use of digital technologies, despite their indisputable potentiating power. After describing in detail the procedures, didactic steps and technological resources needed, it points out that technologies are the various resources that transform the relations of production and life in society throughout history. Thus, in the educational context, the blackboard, pencils, pens, and notebooks have paper correlated to *tablets* and computers, despite their obvious differences in functionality. It points out that, in education, technologies are all the products, instruments and equipment that teachers and students use to teach and learn. It reports that most of the active methodologies were idealized and initially applied before the advent of digital technologies were accessible to all, so there is no reason to establish a relationship of fundamental dependence between them. It indicates as essential points for the use of any Active Methodology that learning is the center of the process, with a planning that aims at the development of several and complex cognitive flows, always keeping the student as the protagonist of their learning. For this, it indicates the adoption of problems to be solved and themes to be explored, so that the student produces knowledge, instead of just reproducing it, as in traditional education.

In the work of Arbelaitz, Martin and Muguerza (2015), an experience in a Computer Architecture course conducted over three years is described. In it, the methodologies of collaborative learning and project-based learning are used. The choice is justified by the demand for developing team problem-solving skills. It emphasizes the relevance of engaging students in tasks compatible with real-world challenges, with several possible solutions, since they have great potential to generate motivation. The measurement of the results was made through three questions regarding the influence of the methodologies adopted: how the techniques influence the behavior of the student in the time of dedication to the discipline, how they impact the grades in the exams and how they affect the satisfaction of the students. The indicators were compared with the history of previous years. In the first question, there was an increase in the time dedicated, which may represent a higher level of engagement and motivation. In the second, in the three years of conducting the discipline with the active methodologies, the averages obtained were higher than those of the historical one, and the perception of the students was significantly positive,

reaching levels of more than 80% of satisfaction and desire for the approach to expand, compared to rates of approximately 60% in other courses. More than 70% of the students stated that the use of active techniques helped them to better understand the theoretical concepts, and more than 90% consider them relevant in establishing relationships between theory and practice. It is important to highlight that, despite the encouraging numbers, a large portion of students expressed concerns about the lack of management of the challenges by the teachers, which made the authors expressly recommend that ways be planned to conduct the activities without the need for excessive tutoring, to ensure that the leading role remains with the students.

In line with the main concerns at the beginning of the planning of the realization of this work, the research of Mota and Rosa (2018) makes reflections and proposals on the use of Active Methodologies. Using concepts from cognitive psychology and metacognition, it suggests practices to achieve the involvement of the student actively in the classroom, aiming to develop competencies such as: intellectual autonomy, critical thinking and the ability to learn to learn. It points out that traditional teaching environments are eminently passive, based almost exclusively on exposure by the teacher. This makes learning ineffective, due to the complexity of organic (cognitive) processes, as well as the difficulty in keeping students' minds active in the classroom. It emphasizes that meaningful learning does not require the student to build their own knowledge, and if the state of attention during the class varies, students study only in the moments of assessments, tending to provoke memorization instead of understanding. The Active Methodologies seek exactly to change this scenario, creating an environment where the student represents a more active, communicative, and investigative role. The teacher changes his role to that of monitor during the lessons, with the duty to create diverse activities within his learning environment. As good practices, it suggests the use of some strategies, among which we can mention:

- a) Prepare short lessons, with well-defined objectives and compatible with this time;
- b) Always try to contextualize the content, associating it with knowledge already acquired;
- c) Use collaborative teaching, because, according to constructivist social theory, it favors attitudes of listening, expression, negotiation, respect, and tolerance;
- d) Constantly evaluate and give quick feedback, to allow adjustments on the part of the student before the formal assessments;
- e) Always be focused on motivating students. Motivation is an essential element to gain attention, and consequently promote learning;

- f) In the evaluations, adopt a gradual complexity and in increasing order of complexity, aiming to follow the process of maturation of the concepts.

In the end, it regrets that, despite decades of discussion and numerous reports of success in student satisfaction and noticeable improvement in assessment results, the adoption process by institutions is slow. He attributes this phenomenon to the resistance of teachers to experimental environments, due to the demand for personal investment in the preparation of activities and the difficulty in perceiving, in a timely manner, the gain in learning with this type of classes.

Finally, the paper by Brandl *et al.* (2021) makes an important reflection on curricular flexibility, to promote inclusion. As previously described, the universe of research development and application of the experiment of this work is a public educational institution honestly concerned with inclusion. Policies of quotas and isolated entrance exams, in addition to the location in a deprived area and surrounded by several communities, allows the achievement of encouraging numbers regarding the inclusion of students. In the article, the authors emphasize that the planning of an inclusive education needs to look at different subjects, who have different times and modes of learning. It is necessary to adopt methodologies that meet the expectations and needs, to ensure the learning of all students. Inclusion is more than putting students with disabilities in the classroom because it is necessary to insert all students fully and completely. They point out that the inclusion process brings to light possibilities and opportunities for changes in the current social logic, demanding practical modifications in the *status quo* of education, whose conception is intended for "normal" people. It indicates that the greatest difficulties in inclusion are not related to the possible deficiencies of each one, but to the opportunities and possibilities offered to all. It concludes this reasoning indicating that it is necessary that the school offers new teaching and learning resources, but it is also fundamental that teachers engage in this process. As a basic orientation, it suggests that pedagogical practices overcome the use of activities that encourage the memorization of a decontextualized content and without connection with the students' experience. Active Methodologies propose precisely to create contexts, engage, work collaboratively, in short, learn by practicing, and in a context in which inclusion is firmly desired, it is an excellent resource to be evaluated.

## 4 Methodology Adopted

The choice of techniques to be tried followed the following requirements:

- a) It is not possible to choose activities in which internet access at the time of the activities is essential in all classes. Whenever there was a laboratory available, it would be used preferentially.
- b) It is not feasible, due to unavailability of financial resources, to use applications with limitations for free use; and
- c) It is possible to submit the student to previous readings, videos, and other online instruments since the institution has collective laboratories with internet access.

The subjects chosen were Computer Networks, Cisco CCNA Elective, Information Security, and IT Management. Due to the limiting factors listed, the techniques chosen were listed below, in addition to the inverted classroom, used in all:

- a) Computer Networks - PbL and Gamification.
- b) Elective Cisco CCNA and Information Security - PbL; and
- c) IT Management - Project-Based Learning.

For all subjects, theoretical classes were recorded, well illustrated with examples and fixation exercises at the end of each class, a technique used in the inverted classroom. A VLE environment - Virtual Learning Environment - based on Moodle was installed, where, in addition to the recorded classes, an exercise covering all topics was made available for each class, with the schedule to be available only during the class week, worth 20% of the grade in each cycle - AV1, AV2 and AV3. The intention was to create the habit of dedicating regular weekly time to each subject, avoiding the common procedure of studying only for the exams. In the disciplines of Computer Networks and Information Security, each class was distributed printed questionnaires with problems, and students were grouped in pairs to develop solutions. At the end of a variable time according to the complexity of the challenge, the students were invited to present their solutions and the teacher enriched the propositions with theoretical foundations and practical illustrations. The Gamification adopted in Networks was made possible by the allocation in the laboratory, where a free and free traffic analysis application was used by the students to capture samples of frames with the characteristics of the subject under discussion, with participation score for those who were successful and explained the process to the other colleagues. The Cisco CCNA Elective course was also taught in the laboratory, but a different model was adopted from the traditional one. The environment provided by the Cisco company for

education is complete, with all the didactic material already organized for the classes. However, different problems were adopted from those available, leading the student to use the knowledge acquired in solving the proposed problems. The discipline of IT Management was challenging because the model chosen was, during the period, to develop a complete IT project for a company known in the market. In the classes, specific topics of the project methodology were discussed by all students, who after the discussion needed to outline the adaptation of these concepts in their respective projects.

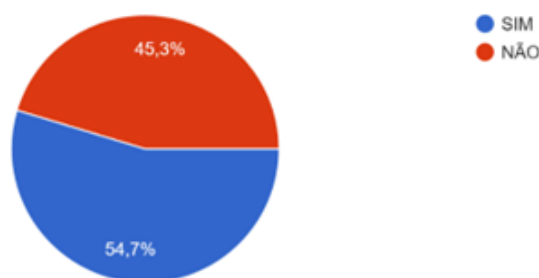
At the beginning of the period a questionnaire about the expectations of the students was collected, as well as at the end of the disciplines, another about the perception of the student regarding his own participation in the experiment. The results obtained are described in the next section.

## 5 Results

At the beginning of the experiment, to measure the level of motivation of the students for a change in the way they learn, an anonymous questionnaire was collected after three weeks of class. Among the answers, the following stand out:

Figure 1 – Capture of the student's perception of their ability to concentrate in face-to-face classes

Você acha que tem dificuldades de concentração em aulas tradicionais presenciais ?  
75 respostas

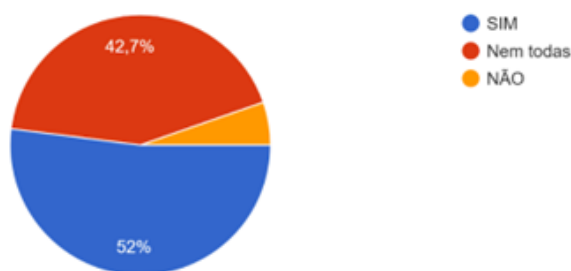


Source: Own elaboration (2022).

Figure 1 shows that more than half of the students assume concentration difficulties, a problem to achieve motivation.

Figure 2 – Capture of student engagement in the commitment to attend previously the recorded classes

Após algumas aulas usando essa metodologia, você tem assistido as aulas gravadas com antecedência ?  
75 respostas



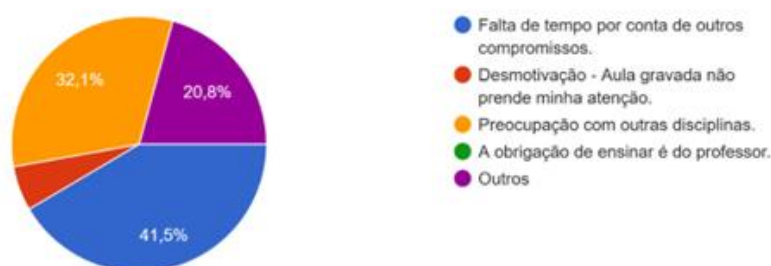
Source: Own elaboration (2022).

Figure 2 illustrates that half of the students admit not to be attending classes in advance, corroborating the initial perception that motivation is the central problem.

At the end of the period, anonymous perceptions were again collected, from which the following responses stand out:

Figure 3 – Capture of the student's perception about the reasons why he did not attend the recorded class in advance

Caso você tenha deixado de assistir alguma aula gravada previamente, marque a opção que mais se aproxima da razão disso ter acontecido  
53 respostas



Source: Own elaboration (2022).

Figure 3 suggests that the choice of reasons manageable by the student, such as "lack of time" or "concern with other disciplines" is a possible indicator of demotivation.

At the end of the research, the student was invited to give suggestions, and among them can be highlighted:

Figura 4 - Capturing the perceptions of some students about possible improvements to provoke engagement

### **Student 1**

Presentation of more real environments putting into practice the applied concepts. There is a huge deficiency in relation to what is learned at the University and the job market, as the student understands that the taught concept is useful, he will dedicate himself more to learning, as this action will act directly in his future.

### **Student 2**

Practical group activities in the classroom, promoting cooperation among students.

### **Student 3**

I have ADHD so I have a hard time paying attention outside of class, the best way for me to understand is with someone actively communicating with me.

### **Student 4**

We could expand the practices of active methodologies to other disciplines.

### **Student 5**

More activities in the classroom like gamification, inverted rooms, etc., were great classes, it would be really cool to have even more classes like this.

### **Student 6**

The material in the lists is of excellent quality, the video explanation conveys the concepts in an intuitive way and the possibility of reviewing the lessons helps a lot in the process. My suggestion is that this methodology be widespread.

Source: Own elaboration (2022).



The results obtained allow us to conclude that the aggregating potential of Active Methodologies is undeniable. However, special attention needs to be devoted to the motivation of students. The *feedback* given by the students anonymously was also essential, as it indicated improvements in the strategy adopted, for example:

- a) Make videos of shorter lessons, limiting themselves to a single topic of each discipline.
- b) Plan activities always in pairs or groups, aiming at the engagement of students with attention deficit; and
- c) An even greater effort to demonstrate the practical utility of the concepts discussed.

## 6 Conclusions

The Active Methodologies represent an indisputable advance in the relationship between teacher and student, reversing the protagonism of the class. Even in a resource-poor setting, the techniques can be applied and increase student engagement.

This paper described an experience in an inclusive public university, with a high dropout rate, where, with goodwill and minimal resources, classes became trips to the interior of complex subjects, made simple through practice and the exchange of experiences among the students themselves. The records made in surveys at the beginning and at the end of the classes, always anonymously, allowed us to assess that the satisfaction of the students was massive, and the few criticisms were fair and have already become requirements for the strategy of the next periods.

A concern that has existed since the intention of adopting this disruptive model of teaching remains how to motivate students to engage, attend previously recorded classes and, with this, increase their level of understanding of the concepts of each discipline.

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