

**“CLASSROOM FLOOR” IN HIGHER EDUCATION: TEACHER’S
METHODOLOGY**

**“CHÃO DA SALA DE AULA” NO ENSINO SUPERIOR: METODOLOGIA DOS
PROFESSORES**

**“PISO DE AULA” EN LA EDUCACIÓN SUPERIOR: METODOLOGÍA DE LOS
PROFESORES**

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ABSTRACT: Proposals for teacher formation today are not reaching educational objectives and their results are questioned when evaluating the praxis undertaken by teachers in everyday higher education. These issues have caused concerns among teachers. At this point, the construction of this collaborative critical action the research project called the Teacher Teaching Methodology in the Context of Higher Education arose, in which it investigates a solution for the improvement of teaching in this context. The research is developed from the “classroom floor” in a process of self-investigation, the teacher studies his own work, having the mediation of the researcher teacher. Both work in collaborative critical actions. The methodological design of this research is qualitative in nature and studied the classroom floor in the context of higher education, involving the teacher's teaching methodology. In this article, we will exemplify a part of the research, carried out with one of the research teachers in the area, in this case, exact sciences area, with Calculus and Algebra discipline, involving two classes with high failure rates. At the end of the study, the following analyzes were reached: that teachers in the context of higher education mostly focus their work in the domain of content just by content itself, without context with the academic formation area; that the forms that place this content in the classroom environment and the choice of teaching methodology do not match positive results in academic learning; that teachers forget the differences and individual potential of academics, work in a homogeneous way, disregarding the heterogeneous context of this environment; that when oriented to work in a different way, applying active methodologies, creating possibilities to respect the existing differences in the class, the results appear. Thus, the results and discussions in this article led us to the reflection that the teaching methodology of the teacher in an inclusive perspective and with active teaching methodologies, makes a difference. Thus, it is urgent to bring about changes in the context of the classroom floor in higher education, from an exclusive to an inclusive model. This inclusive methodological path requires “different ways” of carrying out the pedagogical process, involving the ethical, aesthetic and didactic prisms of taking classes. Building new possibilities for the classroom floor in the context of higher education requires a change in the pedagogical paradigm.

KEYWORDS: Differences. Teaching methodology. Teachers.

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RESUMO: *As propostas de formação de professores na atualidade não estão atingindo os objetivos educacionais e seus resultados são questionados ao se avaliarem as práticas empreendidas pelos professores no cotidiano do ensino superior. Essas questões têm provocado inquietações nos docentes. Nesse sentido, surgiu a construção desse projeto de pesquisa-ação crítico-colaborativa denominado Metodologia de Ensino do Professor no Contexto do Ensino Superior, no qual se investiga solução para a melhoria da docência. A pesquisa é desenvolvida a partir do "chão da sala de aula" em processo de autoinvestigação, em que o professor estuda seu próprio trabalho com a mediação do professor pesquisador. Ambos trabalham em ações crítico-colaborativas. O delineamento metodológico dessa pesquisa é de natureza qualitativa e estudou o chão da sala de aula no âmbito do ensino superior, envolvendo a metodologia de ensino do professor. Exemplificaremos neste artigo uma parte da pesquisa realizada com uma das professoras pesquisadoras da área, nesse caso, área de exatas, com disciplina de Cálculo e Álgebra, envolvendo duas turmas com elevados índices de reprovação. Ao final do estudo, chegou-se às seguintes análises: que os professores do ensino superior, em sua maioria, foca seu trabalho no domínio de conteúdo pelo conteúdo sem contexto com a área de formação do acadêmico; que as formas que colocam esse conteúdo na ambiência da sala de aula e a escolha da metodologia de ensino não coadunam com resultados positivos na aprendizagem do acadêmico; que os professores esquecem as diferenças e os potenciais individuais dos acadêmicos e trabalham de forma homogênea, desprezando o cenário heterogêneo dessa ambiência; que, quando orientados a trabalhar de forma diferenciada, aplicando as metodologias ativas, criando possibilidades de respeitar as diferenças existentes na classe, os resultados aparecem. Assim, os resultados e as discussões neste artigo nos levaram à reflexão de que a metodologia de ensino do professor em uma perspectiva inclusiva e com metodologias ativas de ensino faz a diferença. Portanto, urge provocar mudanças no contexto do chão da sala de aula no ensino superior, de um modelo excludente para inclusivo. Esse caminho metodológico inclusivo requer "jeitos diferentes" de executar o processo pedagógico, envolvendo os prismas éticos, estéticos e didáticos de fazer aula. Construir novas possibilidades para o chão da sala de aula no ensino superior requer mudança de paradigma pedagógico.*

PALAVRAS-CHAVE: *Diferenças. Metodologia de ensino. Professores.*

RESUMEN: *Las propuestas para la formación de docentes hoy en día no alcanzan los objetivos educativos y sus resultados se cuestionan al evaluar la praxis emprendida por los docentes en la educación superior diaria. Estos problemas han causado preocupación entre los maestros. En este punto, surgió la construcción de este proyecto colaborativo de investigación de acción crítica llamado Metodología de Enseñanza y Enseñanza en el Contexto de la Educación Superior, en el que investiga una solución para mejorar la enseñanza en este contexto. La investigación se desarrolla desde el "piso del aula" en un proceso de autoinvestigación, el profesor estudia su propio trabajo, teniendo la mediación del profesor investigador. Ambos trabajan en acciones críticas colaborativas. El diseño metodológico de esta investigación es de naturaleza cualitativa y estudió el piso del aula en el contexto de la educación superior, involucrando la metodología de enseñanza del maestro. En este artículo, ejemplificaremos una parte de la investigación, realizada con uno de los profesores de investigación en el área, en este caso, el área exacta, con disciplina de cálculo y álgebra, que involucra dos clases con altas tasas de fracaso. Al final del estudio, se alcanzaron los siguientes análisis: que los docentes en el contexto de la educación superior centran principalmente su trabajo en el dominio del contenido por contenido sin contexto con el área de capacitación*

académica; que las formas que colocan este contenido en el entorno del aula y la elección de la metodología de enseñanza no coinciden con resultados positivos en el aprendizaje académico; que los maestros olviden las diferencias y el potencial individual de los académicos, trabajen de manera homogénea, sin tener en cuenta el contexto heterogéneo de este entorno; que cuando se orienta a trabajar de manera diferente, aplicando metodologías activas, creando posibilidades para respetar las diferencias existentes en la clase, aparecen los resultados. Por lo tanto, los resultados y las discusiones en este artículo nos llevaron a la reflexión de que la metodología de enseñanza del maestro en una perspectiva inclusiva y con metodologías de enseñanza activas marca la diferencia. Por lo tanto, es urgente generar cambios en el contexto del aula en la educación superior, de un modelo exclusivo a uno inclusivo. Este camino metodológico inclusivo requiere “diferentes formas” de llevar a cabo el proceso pedagógico, involucrando los prismas éticos, estéticos y didácticos de tomar clases. Construir nuevas posibilidades para el aula en el contexto de la educación superior requiere un cambio en el paradigma pedagógico.

PALAVRAS CLAVE: *Diferencias. Metodología de la enseñanza. Maestros.*

Introduction

Where does it all begins?

We will start with this statement: people are different. This statement alone says a lot, and we are talking about all kinds of differences, from people's ways of be and being, involving eye shape, hair type, skin color, gender, height and other biophysical characteristics. Differences also permeate the socio-cultural aspects in which our religious choices, principles and values built and / or inherited, family relationships, friendships and affective choices are contemplated. Subjectivity with its ideological choices is expressed in our ways of thinking and acting, making contours in personal life, in society, in access to goods and services and in the different ways of organizing us culturally and socially.

Human difference is understood from the perspective of each person, with respect to identities, beliefs, values and traditions, which determine their way of thinking and feeling in the world to which they belong. Reflecting on the dimensionalities of man, identities and differences, supposes understanding the cultural, multicultural, intercultural studies of human beings in constant transformation, movement, evolution and the economic, political and social influences. Identities, according to Silva (2000), acquire meaning through the language and symbolic systems by which they are represented. They are relatively marked by the characteristics of each person's difference, in the idea of unity and collectivity in which we are involved, interwoven. These marks generate feelings in the collective identities, that is, from the individual to the collective, from the collective to the individual.

In the view of Hall (2000), to think how identities work, it is necessary to understand the contemporaneity in which man lives, seeking to understand the systems and their representations, classifications and dimensions by which it is based, involving traditions, the circuits of culture, beliefs, in which it seeks to build spaces for understanding respect for identities and their differences.

Knowing how to respect the other is knowing how to accept their differences that appear in a daily life built according to the particularities and experiences of each one. The differences are behind the concepts and conceptions that we introduce, based on the normality standards stipulated in our social segment. Society, in general, excludes individuals, groups, communities and ethnic groups, denying them the possibility of developing satisfactorily and adequately according to human rights and values, simply because their differences are outside normal standards.

To be different is not to be better or worse, it is to have a singular difference. According to Fonseca (1998), it is necessary to clarify that the differences cannot be considered totally as deficiencies, defect, failure, insufficiency or lack. These must be understood as singular, personal differences, common to each and every individual, according to the biophysical characteristics, identity profiles, organizing models and ways he developed to represent and act in the environment in which one lives. We all have differences and similarities that must be respected within our potential, since they are imbued with the aspects that define the conscious and unconscious actions that we have to perform, based on behavioral demands.

The standard of perfection worshiped by our society does not prepare us, psychologically, to relate harmoniously with those who, in some way, are considered different. Therefore, attitudes are the most varied, ranging from exacerbated paternalism to the most complete rejection, discrimination, which can be observed through an analysis of the development of personal interrelations among citizens, in which the numerous exclusions and difficulties of engagement due to the limiting aspects of each one, and not of the potentials.

There is disregard for people's differences. In this sense, the determining point of respect for differences starts in personal interrelations and in the field of communication, since people can only get involved in the action and in the relation with others as they integrate into the structure of communication and relation. Certainly, the basis of all individual development is found in interpersonal relations, which are, we know very well, the condition of all individual development.

According to Weil (2000), it is necessary to value multi, pluri and intercultural differences, since they are understandings that must be realized, taking into account that human

beings are in constant transformation and movement in a process of complementarity. This complementarity shapes our view of the idea of non-fragmentation, non-duality, not separateness, favoring the perception of wholeness and fullness of being in search of social inclusion, since we assume that we need to complement each other, and the difference is the motto that sustains this conception. My difference with your difference, in which the marks of potential are the premise, the complementarity of each other, that is, I am in you, you are in me, it is projected the best of both, and something superior can emerge.

Society is determined from an economic and social perspective. The key is production, social surplus value. Man is worth what he produces. In this regard, human beings and their differences are not considered and, therefore, attention does not turn to their needs. This is the reality of a society divided into classes that is not restricted to one or the other, but where millions of citizens live similar situations of rejection, exclusion.

The predominant characteristic of society has always been to exclude, even if indirectly, but today overcoming this exclusion is part of the challenges of national and international public policies. Since the World Conference on Education for All, according to Menezes and Santos (2001), this posture has taken new directions that are striking for including the full range of culturally, socially and economically excluded. When analyzing the relations established up to the present moment, we identified in the beliefs, attitudes and social and educational values impregnated the discriminatory stigmas of separation, demarcating that the separated is not the same. Society uses segregationist and inequality methods to deal with those considered different.

In contemporary thinking, what characterizes the story are the great humanitarian projects in which differences are at the heart of the debate. Proof of this are the international documents that influenced the political and economic stance of all countries. In these documents, the characteristics of the differences support the theory and desires of contemporary man, the difference being placed in a prism of law and human values. The construction of these principles or thoughts has been made by several scholars who look for social and power relations challenges for an education that aims to respect differences. This search goes through the analysis of society and people, and it brings up the discourses about equality, equity, identity, culture, difference, diversity, alterity, among others. It is urgent, at the moment, to obtain a break with the exclusionary processes and to organize in a systemic vision the social and economic restructuring, in a multi, pluri and intercultural dimension that favors the look for difference, and thus establish the paradigms of inclusion.

Therefore, it is necessary for society to include everyone, triggering the concept of equality with equity as a social value, and, therefore, necessary to be experienced. Only from everyday experiences, with their contradictions, hindrances and obstacles, will we look for alternatives that can cope with the dichotomous overcoming between the natural differences of beings in evolution, transformation.

Therefore, we need to fight for ideas that effect inclusion, either in the broader dimensions of the social, or in the specific instances of an educational institution. It is necessary to recognize and understand the changes that are taking place in the 21st century, leaving our daily lives and seeking a more historical-cultural way of thinking, as we will understand that the changes are part of the context, being inserted in dynamic space and time.

However, for this process to become effective, it is necessary to face the existing hindrances and obstacles, involving structural, administrative and attitudinal barriers in the Brazilian education system and society. In this perspective, Brazil, today, faces a great challenge, that of organizing itself to become a nation that welcomes and respects human differences, valuing the individual and collective potential of its people, rescuing important human values, seconded for a long time. The world, with political leaders, intellectuals and researchers, is beginning to understand that the secret to social and economic development lies in the multicultural understanding of its people. In this sense, the readings and actions focus on the perception of the diversity of actors that make up our society and, consequently, our education.

The education for all movement must really include everyone, and people should not be ignored for their shortcomings, failures, insufficiencies and/or deficiencies, as is already the case. As Stainback and Stainback (1999) tell us, the most important reason for inclusive education is the social value of equality. We teach by example that, despite differences, we all have equal rights with equity.

The research

Given the above, the Federal University of Grande Dourados (UFGD), through the technical cooperation agreement with the Federal University of Rio de Janeiro (UFRJ) and 22 other universities, 18 national and 5 international, created the International Observatory, Inclusion, Interculturality and Pedagogical Innovation (OIIIPe, Portuguese initials) to investigate the context of higher education, promoting research, scientific trades and exchanges, in search of solutions to improve this teaching cycle, involving the compression of teachers'

methodologies and their didactics, avoiding failure, evasion and retention and supporting inclusive actions.

To contribute to the advancement of this process, the research project Teaching Methodology for Teachers in the Context of Higher Education was designed to investigate with UFGD teachers how they develop their classes and the methodologies they adopt and, at the same time, collaborate with enrichment of this inclusive process.

The research is developed from the “classroom floor”, in a process of self-investigation, in which the teacher studies his own work, with the mediation of the researcher teacher. This research methodology involves two researchers: researcher professor of the area and researcher professor of methodologies. Both work in critical-collaborative actions, in which the role of the researcher professor is to help to scientificize the process triggered by the researcher professor of the area, that is, the professor who is being investigated. In this context, the research seeks the transformation requested by the reference group, the research professors of the area.

When starting the project, we raised the following questions as hypotheses: professors of undergraduate courses do not include in their teaching methodologies the usual innovative and active pedagogical practices and do not master the principles of inclusion; when self-investigating, the professors will achieve important conceptual advances, transforming exclusionary pedagogical practices into inclusive ones and, at the same time, will improve the teaching-learning process in favor of the student; OIIIPe research professors, with research professors in the courses, when carrying out the collaborative investigative process, from the classroom floor, will build, through theoretical-practical mediation, pedagogical innovations for teacher formation in undergraduate courses, respecting inclusive pedagogical principles.

The methodological design of this research is of a qualitative nature, since it is adapted to situations in which it is desired to study the *classroom floor* in the context of higher education, involving the teaching methodologies of professors. Bogdan and Biklen (1994) emphasize that, when the objective is to build knowledge, qualitative evidence allows a more profound understanding of the phenomenon, within its own context. Thus, we follow the conceptual aspects of qualitative research involving: data collected from the natural environment; direct contact of the researcher with the environment and the situation investigated in the specific field, in this case, the classroom; detailed description of the material observed and collected involving situations and events, supporting to affirm or clarify the data collected from the investigated reality; then, we analyzed the data and selected the ones that stood out in the results; the data were analyzed confirming or excluding the previously constructed hypotheses, correlating them.

In this article, we will exemplify a part of the research, carried out with one of the research professors in the area, in this case, the exact sciences area, with the Calculus and Algebra disciplines, involving a group of 44 academics with high failure rates. These students are from Production Engineering, Food Engineering, Aquaculture Engineering, Mechanical Engineering, Physics, Chemistry and Information System courses. These academics had more than three failures in the disciplines of Integral Differential Calculus (CDI, Portuguese initials) and/or in the discipline Linear Algebra and Analytical Geometry (ALGA, Portuguese initials), mandatory subjects in courses in the areas of exact sciences and teaching degrees.

The objective of this moment of the research was to investigate the methodology of the researcher teacher in the exact area, trying to understand from a contextualized reading, that is, from the *classroom floor*, how was the teacher's methodology and how it interfered in the students' learning, or vice versa. We developed this work for five months, on Tuesdays and Thursdays, from 7 pm to 9:40 pm, in the second half of 2018, in room 8 of the College of Education building.

Initially, the research professor by area and the research professor of methodologies organized the composition of the class with the support of the Dean of Undergraduate Studies and the course coordinators. They selected academics who had difficulties to overcome the barriers found in these disciplines and succeed in academic life. To the researchers' surprise, the interest of the students who became aware of the project was so great that it was necessary to establish some priority criteria for the selection of those interested.

The selection criteria for class composition are as follows:

- 1.º Academics who were about to be expelled due to failures in these disciplines;
- 2.º Academics who had the highest number of failures;
- 3.º Academics accompanied by the Multidisciplinary Center for Inclusion and Accessibility (NUMIAC, Portuguese initials) of the Federal University of Grande Dourados, who had already taken these courses, but were not successful.

At the end of the selection, the classes were composed of 30 academics in the discipline of CDI and 14 academics in the discipline of ALGA.

From this selection, the contextualized reading of the menus of the two disciplines and their teaching plans started from the Pedagogical Project of the Course (PPC). Then, the planning of the pedagogical work was outlined. The teachers met weekly for four hours to design the actions. Together, the teachers reflected on everything that was happening, analyzed and evaluated the form and the outcome of the application, measuring what they had perceived

in the methodology of the researcher professor of the area and the reflexes on the students' learning.

Research development - some details

On the first day of class, the focus of planning was to understand the reasons for the failure of these students in the disciplines. The strategies used were the conversation circles, followed by a reading of the text “Use of conceptual maps in the discipline of Differential and Integral Calculus 1: a strategy in search of meaningful learning”. From the reflections on the text, the academics showed the following points that hindered their learning: lack of conceptual basis; understanding of mathematical language; lack of skill with logical reasoning. Allied to these difficulties, problems of an emotional nature were evidenced, mainly low self-esteem and lack of motivation to study.

After detecting the students' difficulties, the researchers mapped the order of priorities to be met, thus being established:

- adopt strategies that collaborate with the understanding of mathematical language;
- adopt pedagogical strategies that ensure that the conceptual basis of the contents is met;
- apply strategies that contemplate the development of logical reasoning skills;
- work pedagogically with challenges for understanding mathematical logical reasoning;
- emotional problems will be addressed in individual and collective actions, with the support of specialists.

Regarding the mathematical language, to understand its meaning it is necessary to understand that Mathematics has its own language, it is a different speaking and reading, that is, learning a new language. Mathematics has its own language and communication system, built throughout human history, representing reality. The mathematical language does not survive in isolation, it needs the mother tongue for communication (MENEZES, 2000). Thus, when faced with the difficulties of students in understanding the codes, graphs, symbols of Mathematics, that is, their specific language, it became evident that a detailed work on mathematical language was not carried out in the previous school years, which makes difficult the progress of students conceptually. They do not understand what the teacher is explaining, so there is no communication or learning.

With regard to the lack of conceptual basis, Lopes (1999) emphasizes that the lack of link between high school and university education brings great difficulties for students' teaching and learning when taking the course of Differential and Integral Calculus I, given the lack of conceptual basis.

Mathematical knowledge is layered. You start learning mathematics in the first year of school. If you don't know how to divide, you won't know what a rate is, if you don't know what a rate is, you won't know what a derivative is and so on. This is perhaps one of the main reasons why there are so many failures in Calculus at our universities. In many cases, university students do not know the previous mathematical concepts that are necessary to take the Calculus courses (LOPES, 1999, p. 125).³

Regarding the development of logical reasoning skills, it is necessary to understand the students' difficulties. The teaching of logic is generally presented in the early stages of students' school life in order to ensure learning, in which they must learn to solve problems, which requires three basic skills: reading, writing and learning to solve problems. Thus, logic studies the methods and principles to distinguish correct and incorrect reasoning and helps to think about opinions, inferences and arguments, assigning sense and meanings to thought (COPI, 1978).

Failure to develop logic will negatively reflect on the student's future, who will face high volume of situations in which they will need to act in a logical and organized manner. We found in this group of university students many difficulties to interpret what they were reading, as they did not understand the real meaning of what was written in the text, contextualizing it.

Figure 1 – Students – Classroom



Source: Authors' collection

³ O conhecimento matemático é em camadas. Você começa a aprender Matemática no primeiro ano da escola. Se você não sabe dividir, não vai saber o que é uma taxa, se você não sabe o que é uma taxa não vai saber o que é uma derivada e assim por diante. Essa é talvez uma das principais razões por que existem tantas reprovações em Cálculo em nossas universidades. Em muitos casos, os estudantes universitários não sabem os conceitos matemáticos anteriores que são necessários para fazer os cursos de Cálculo (LOPES, 1999, p. 125).

The difficulties are diverse and involve everything from the interpretation of a text to the expression of ideas in a logical way. It is of great importance that students reason about the idea exposed in the expression, ensuring the correct understanding of the interpretation.

The implications of logical reasoning on logical mathematical reasoning have stimulated several researchers to examine and understand the flaws in students' learning of mathematical content. Studies have been dedicated to analyzing the relation between both, identifying the existence of a causal relation between logic and logical mathematical reasoning. There are researches that have been interested in investigating the relation: between logic and Mathematics; between logical skills and mathematical skills; and between performance on logic problems and mathematical problems.

The researchers, based on the collected and systematized data, sought to understand the students' difficulties and analyzed which methodologies would be appropriate to help them along the teaching-learning process. They sought an alternative that would create possibilities and perspectives for these students, using active methodologies, for example: inverted classroom; gamification; problem-based learning (PBL); case study; learning between peers or teams; project-based learning; experimentation learning; hands-on learning; challenge learning; and game-based learning, among others.

Figure 2 – Groups – Classroom⁴



Source: Authors' collection

The active teaching methodologies chosen and applied by the researchers favored the teacher to develop his work plan in an innovative way, as they took into account the students' differences, verifying how they learn and what they have already learned; made the procedures and pedagogical resources more flexible; defined short-term objectives and ways of evaluating the process. Using these principles, several different approaches were made in each class, in the

⁴ We read on the first Picture: Behaviors, habits, attitudes and values.

presentation, development and review of the contents and their concepts, as well as in their evaluation.

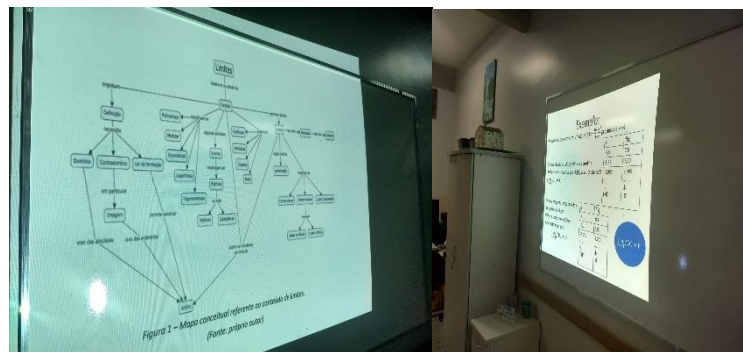
Academics, through active methodologies, expressed their ability to grasp the contents, their differences were respected and the teachers observed their achievements. The strategies used by the researchers were to guide them in the construction of their own knowledge, as well as to make them realize the importance of each concept studied in the areas of performance of each academic participating in the research.

During the classes, the methodology professor did individual interviews with academics, in order to stimulate and revert their low self-esteem, making them understand that they were able to overcome the barriers that prevented them from achieving success in learning.

A little bit of everyday research

In the first activity of Linear Algebra, academics were asked to construct conceptual maps of the content on matrices (since these students had already seen the concepts studied in that discipline three or more times). The objective of this activity was to detect gaps in the learning of concepts, prerequisites for the specific content of the discipline.

Figure 3 – Activities



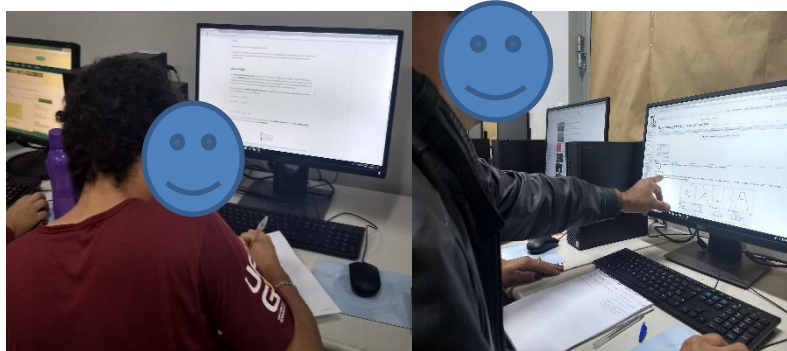
Source: Authors’ collection

Detecting the conceptual difficulty and the students' learning process, the researchers' methodological proposal was to review the methodologies and adapt them to the care of subgroups and individuals, given the diversity of situations to be resolved. The guidelines given to these academics in relation to individual studies as prerequisites were well evident throughout the process, that is, students should assume a position of protagonists in their academic path, embracing with more responsibility the executions of the activities requested

by the teacher. A certain lack of commitment by the student with the activities requested in studies outside the university was perceived.

In order to overcome this initial barrier, many activities were developed and applied, aiming to overcome the initial gaps.

Figure 4 – Activities



Source: Authors' collection

During the classes, the researcher professor of methodology realized that the students had difficulties to understand the mathematical language used by the researcher professor of the area of knowledge. It is worth mentioning that the mathematical language of the research professor in the field was “perfect” and “charming”, as she used all terms correctly, aiming at the students' conceptual advancement. The problem was that the students did not have the prerequisites nor mastered that language. Asked about a phrase "mathematical logic" that the teacher used, it was noticed that the vast majority had not correctly interpreted the meaning of that phrase in the applied expression.

Figure 5 - Application



Source: Authors' collection

Therefore, the researchers' proposal was to propose the construction of a mathematical glossary of terms not understood during the classes, and the teacher of the area began to question in each approach the understanding of the language used, verifying what they did not

understand. This procedure adopted by the researchers ensured good results in the communication between teacher and student.

One of the activities was considered a final assessment, in which the research professor in the area selected specific problems in the student's education and applied Linear Algebra or Calculus. The students used the concepts studied by area of knowledge and the contents of Linear Algebra and Calculus to solve the problem. It was possible to favor students the reasoning of applicability of the contents studied in their areas of formation.

This activity was evaluated by a commission made up of mathematics teachers, chemists and academics from the last year of the mathematics course. Throughout the evaluation, the testimonies of the teachers were interesting, such as:

[...] "I didn't know he knew";

[...] "how did he learn?";

[...] "I thought he would never be able to handle it";

[...] "this student is very weak, how did he manage to explain?".⁵

It was evident the degree of learning achieved by academics, when they expressed the knowledge acquired with ease and confidence.

Figure 6 – Students and activities



Fonte: acervo dos autores

Partial results and some analysis

During this stage of the research Teacher Teaching Methodology in the Higher Education Context in question, it was possible to understand how important the use of active

⁵ [...] "não sabia que ele sabia";

[...] "como ele aprendeu?";

[...] "pensei que ele nunca daria conta";

[...] "esse aluno é muito fraco, como ele conseguiu explicar?".

methodologies is, creating possibilities for students to exercise their learning styles, their knowledge organizing models, their higher mental functions, giving the opportunity to be active in the process of learning to learn.

When we talk about learning styles, we clarify that they are forms, ways or manners that human beings use to be able to learn what is taught, that is, proposed. Such styles are unique and personal, as each person presents ease with a certain style and difficulty in another (SCHMITT; DOMINGUES 2016). The styles involve: the visual/spatial, the musical/auditory, the kinesthetic body, the logical/mathematical, the auditory, the logical, the naturalistic/verbal/linguistic, the interpersonal/intrapersonal and the spiritual.

When analyzing the *modus operandi* of academics throughout the methodological development of the disciplines, it became evident that the styles of learning to learn are unique to each one, and when the teacher builds a learning environment that values these styles, the result in learning appears significantly.

With regard to the organizing model of thought, it allows us to visualize how the subject thinks and structures reality, things. We had the opportunity to observe that the academics involved in the study presented totally different ways to solve the problem situations, the cases, the challenges, the experiments. They were able to give the right answers in different ways. However, among academics who were unable to identify themselves, the problem was the lack of mastery of the content and the inadequate use of higher mental functions.

The brain controls the higher mental functions, which consist of the processes of memory, perception, thought, language, attention, emotion, human motor skills and language, through which individuals seek knowledge of themselves and the world around them. When the teacher knows and respects the higher mental functions in favor of learning, the organizational atmosphere of the environment changes, due to considering the learner's ways of operating. These pedagogical attitudes of the teacher, from the moment that he respects the differences of the students, bring proactivity to the context of the classroom.

In individual consultations with students in favor of a better understanding of how they perceived themselves during the investigation, they issued important opinions, as follows:

[...] when the teacher asks us to solve problems, cases, and others, our capacity is stimulated;⁶

[...] with differentiated activities it is possible to show what we learn more easily, we are not stuck;⁷

⁶ *[...] quando o professor nos coloca para resolver problemas, casos, e outros nossa capacidade é estimulada;*

⁷ *[...] com atividades diferenciadas é possível mostrarmos o que aprendemos com mais facilidade, não ficamos parados;*

*[...] the teaching methodology adopted by the teachers is very demanding, but it helps a lot and respects the student's effort;*⁸

*[...] the student has a lot of responsibility, it's not just taking tests, he needs to apply what he learned in different ways;*⁹

*[...] intellectual autonomy, the student's skills are tested all the time;*¹⁰

*[...] it was possible to realize that theory and practice went together, it was significant, I understood why there is calculus in my area of formation;*¹¹

*[...] I felt very unmotivated, I thought I would never be able to overcome these challenges at the academy, I felt 'dumb'; in doing the discipline in this way, I understood that I am capable and improved in all other disciplines;*¹²

*[...] the day-to-day of the classroom is dynamic, we never know exactly what will happen, several pedagogical activities were given and we had to make the way, that is, either learn or learn;*¹³

*[...] when doing it alone or in a group, it started to make sense to learn and not to do activity to earn grades basically;*¹⁴

*[...] so far I have had good teachers, but some no comment. I had a teacher who asked this to the class at the beginning of the semester: Who is repeating this discipline, raise your hand? Many students raised their hands and he said: you are really 'shit'. That already told me I couldn't do it. I was dismayed. I took this discipline nine times. Today I see that the problem was not only mine, but also in the way of teaching to learn of many teachers.*¹⁵

The use of active methodologies by the choice of researcher teachers throughout this specific investigation in the area of Mathematics favored understanding in the following aspects:

- the learning was smooth for the academics, they managed to solve the problems;
- academics have improved their self-esteem;
- academics became protagonists of their learning;
- the pedagogical ambience became attractive, stimulating teachers and students;
- students were frequent and enthusiastic about the process;

⁸ [...] a metodologia de ensino adotada pelas professoras é muito exigente, mas ajuda muito e respeita o esforço do aluno;

⁹ [...] o aluno tem muita responsabilidade, não é só fazer prova, ele precisa aplicar o que aprendeu de diversificadas maneiras;

¹⁰ [...] a autonomia intelectual, as habilidades do aluno são testadas o tempo todo;

¹¹ [...] foi possível perceber que a teoria e a prática caminharam juntas, ficou significativo, entendi por que do cálculo em minha área de formação;

¹² [...] me sentia muito desmotivado, achava que nunca conseguiria superar esses desafios da academia, me sentia 'burro'; ao fazer a disciplina dessa forma, entendi que sou capaz e melhorei em todas as demais disciplinas;

¹³ [...] o dia a dia da sala de aula é dinâmico, nunca sabemos exatamente o que vai acontecer, várias atividades pedagógicas foram dadas e tivemos que fazer o caminho, ou seja, ou aprende ou aprende;

¹⁴ [...] ao fazer sozinho ou em grupo passou a ter sentido de aprender e não fazer atividade para ganhar nota basicamente;

¹⁵ [...] até o presente momento tive bons professores, mas alguns sem comentário. Tive um professor que perguntou assim para a turma no início do semestre: Quem está repetindo essa disciplina, levante a mão? Muitos alunos levantaram a mão e ele disse: vocês são uns 'bostas mesmo'. Isso já disse para mim que não conseguiria. Fiquei em desalento. Fiz nove vezes essa disciplina. Hoje vejo que o problema não era só meu, e sim também na forma de ensinar a aprender de muitos professores.

- academics demonstrated that they had learned and for those who still lagged, possibilities were created.

Final considerations

The *classroom floor* in the context of higher education needs to be revised with regard to the formation of teachers who work in it. In this study, it was possible to perceive the distance from inclusive paradigms, that is, respect for differences and human potentials.

In the context of higher education, teachers are not prepared to act as “inclusive teachers”; what we see are “bachelors” acting as teachers. The *classroom floor* with its academics in this specificity is really impaired, since it excludes marking the deficit, the lack and the failure.

It is known that *stricto sensu* formation in master's and doctorate courses has the role of developing this profile of professor, however we have identified the marked development of the “profile of the researcher”, and not of “researching professors”, who will deal in a large part of his work in the context of higher education with the *classroom floor* in undergraduate courses. There is a pedagogical deviation in this teacher formation, let alone a teacher with an inclusive view.

It is noteworthy the fact that teachers in the context of higher education, for the most part, focus their work on the content domain by content itself without context with the academic formation area. In no way should they disregard the mastery of content, as it is the beginning and the end of the process, however the ways that put this content in the classroom environment and the choice of teaching methodology do not agree with positive results in academic learning, in view of the investigation we have described.

Teachers forget the differences and individual potential of academics, work homogeneously, disregarding the heterogeneous context of this environment. When oriented to work in a different way, applying the active methodologies, creating possibilities to respect the existing differences in the class, the results appear.

Therefore, the results and discussions in this article have led us to the reflection that the teaching methodology of the teacher in an inclusive perspective and with active methodologies makes the difference. It is not easy to break away from crystallized models, because change generates conflict, knowledge and various reflections, except certainties. Thus, it is urgent to bring about changes in the context of the *classroom floor* in higher education, from an exclusive to an inclusive model. This inclusive methodological path requires “different ways” to carry

out the pedagogical process, involving the ethical, aesthetic and didactic prisms of taking classes. Building new possibilities for the *classroom floor* in the context of higher education requires a change in the pedagogical paradigm.

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