Revista Internacional de Educação Superior
International Journal of Higher Education

Challenges for staying in Higher Education: the case of students entering a bachelor of mathematics course

Francisco José de Lima[1] https://orcid.org/0000-0001-5758-5159
Joyce Pereira Oliveira[2] https://orcid.org/0000-0002-0968-3210

Corresponding to Author

[1] Francisco José de Lima
Federal Institute of Education, Science and Technology of Ceará, Brazil
E-mail: franciscojose@ifce.edu.br
CV Lattes
http://lattes.cnpq.br/1164895890806030

[2] Joyce Pereira Oliveira
Federal Institute of Education, Science and Technology of Ceará, Brazil
E-mail: joyce.ifce2@gmail.com
CV Lattes
http://lattes.cnpq.br/4338092206782291

Submmited: Oct. 22, 2021
Accepted: Oct. 02, 2022
Published: Jan. 30, 2023

doi 10.20396/riesup.v10i00.8667417
e-location: e024039

ISSN 2446-9424

Antiplagiarism Check
turnitin

Distributed on

ABSTRACT

Introduction/Objective: The aim of this study is to discuss aspects that hinder the development and permanence of students entering a higher education course. **Methodology**: Anchored in assumptions of the qualitative approach, the research took the case study as a research strategy. Results: The results indicate that the greatest challenges in progressing academically are difficulties with the specific contents of the first semester of the course; difficulty in understanding the methodologies adopted by teachers in Higher Education; formation of elementary concepts of mathematics during Basic Education, as well as socioeconomic difficulties: displacement to the institution, reconciling work and study, lack of time to dedicate to studies, lack of motivation and family problems. Regarding the reasons that may hinder the permanence of the incoming in the institution are: difficulty in the teaching/learning process, financial limitations, not identifying with the course and the expectation of entering another course. **Conclusion**: Thus, it is evident that the factors presented by the freshmen contribute to their difficulties in the course and that measures need to be taken so that students can develop without many obstacles, succeeding in their training path, in addition to a quality teacher training.

KEYWORDS

Mathematics learning. Higher education. Permanence and success.

Desafios para a permanência no Ensino Superior: o caso de alunos ingressantes em um curso de licenciatura em matemática

RESUMO

Introdução/Objetivo: O objetivo deste estudo é discutir sobre aspectos que dificultam o desenvolvimento e a permanência de alunos ingressantes em um curso superior. **Metodologia**: Ancorada em pressupostos da abordagem qualitativa, a pesquisa tomou o estudo de caso como estratégia de investigação. **Resultados**: Os resultados apontam que os maiores desafios em progredir academicamente são dificuldades com os conteúdos específicos do primeiro semestre do curso; dificuldade em compreender as metodologias adotadas por professores no Ensino Superior; formação de conceitos elementares de matemática durante a Educação Básica, como também dificuldades socioeconômicas: deslocamento para instituição, conciliar trabalho e estudo, falta de tempo para dedicar aos estudos, falta de motivação e problemas familiares. No tocante aos motivos que podem dificultar a permanência dos ingressantes na instituição estão: dificuldade no processo de ensino/aprendizagem, limitações financeiras, não se identificar com o curso e a expectativa de ingresso em outro curso.
Conclusão: Assim, evidencia-se que os fatores apresentados pelos ingressantes colaboram para as suas dificuldades no curso e que medidas precisam ser tomadas para que os estudantes possam desenvolver-se sem muitos obstáculos, tendo êxito em seu percurso formativo, além de uma formação docente de qualidade.

PALAVRAS-CHAVE

Aprendizagem de matemática. Ensino Superior. Permanência e êxito.

Retos para permanecer en la Educación Superior: el caso de los estudiantes que ingresan a un curso de licenciatura en matemáticas

RESUMEN

Introducción/Objetivo: El objetivo de este estudio es discutir aspectos que dificultan el desarrollo y la permanencia de los estudiantes que ingresan a un curso de educación superior. **Metodología**: Anclada en supuestos del enfoque cualitativo, la investigación tomó el estudio de caso como una estrategia de investigación. **Resultados**: Los resultados indican que los mayores desafíos para progresar académicamente son las dificultades con los contenidos específicos del primer semestre del curso; dificultad para comprender las metodologías adoptadas por los docentes de educación superior; formación de conceptos elementales de matemáticas durante la Educación Básica, así como dificultades socioeconómicas: desplazamiento a la institución, conciliación de trabajo y estudio, falta de tiempo para dedicar a los estudios, falta de motivación y problemas familiares. En cuanto a las razones que pueden dificultar la permanencia del entrante en la institución se encuentran: dificultad en el proceso de enseñanza/aprendizaje, limitaciones financieras, no identificarse con el curso y la expectativa de ingresar a otro curso. **Conclusión**: Por lo tanto, es evidente que los factores presentados por los estudiantes de primer año contribuyen a sus dificultades en el curso y que se deben tomar medidas para que los estudiantes puedan desarrollarse sin muchos obstáculos, teniendo éxito en su camino de formación, además de una formación docente de calidad.

PALABRAS CLAVE

Aprendizaje de matemáticas. Enseñanza superior. Permanencia y éxito.

CRediT

- **Recognitions**: Not applicable.
- **Financing**: Not applicable.
- **Conflicts of interest**: The authors certify that they have no commercial or associational interest that represents a conflict of interest with respect to the manuscript.
- **Ethical approval**: Yes.
- **Availability of data and material**: Not applicable .
- **Author´s contribuitions**: Conceptualization, Data curation, Formal analysis, Research, Methodology, Project management, Resources, Supervision, Visualization, Writing - original draft: Oliveira, J. P.; revision & editing: Oliveira, J. P.; Lima, F. J.

Section Editor: Andréia Aparecida Simão

1 Introduction

From the last decades of the 20th and the beginning of the 21st century, higher education has been part of the national agenda of discussions. With the democratization of education in Brazil, access to higher education has been recurrent, although it is recognized that many young people do not manage to reach higher education.

As an integral part of the Brazilian educational system, higher education is an essential space for accessing and disseminating knowledge, which is considered socially relevant (GOERGEN, 2002) and indispensable for personal fulfillment, for professional practice, and for the economic strengthening and development of the nation (DIAS SOBRINHO, 2010).

In this context, admission to higher education has increased given the democratization of education. However, institutions must be concerned with the progress and permanence of students in higher education, mainly because the challenges faced in the formative process begin before admission to the university and lasts throughout this process.

When observing the context of undergraduate courses, it is clear that the concern can be even greater, since the teaching profession has not been attractive (ALMEIDA; TARTUCE; NUNES, 2014; SOUTO; PAIVA, 2013; GATTI *et al.,* 2010), and
the dropout rates are being high in higher education courses (ETHUR, 2018; BARROS, 2016; RIGO, 2016). In addition, pedagogical, financial, psychological, or social problems add to students' difficulties in developing academically, impacting on their success and permanence in the Degree in Mathematics.

In relation to the difficulties of entering higher education courses, the studies by Santos, Alvarenga, and Sales (2010), Masola (2014), and Peleias (2016) address the analysis of errors and difficulties in relation to the mathematical knowledge of high school students, highlighting their main difficulties. The authors show that the transition from high school to higher education is a period of adaptation and ruptures. They note that the institutions should pay attention to some aspects that contribute to the difficulty of this transition and suggest some possibilities of support for students.

Although these studies contribute substantially to discussions about the difficulties of newcomers, we observe that many challenges permeate pedagogical, didactic, and methodological assumptions. Thus, this research differs from those cited above as it seeks to know not only the aspects mentioned but also other factors that hinder the permanence and success of newcomers in higher education, such as economic and social aspects.

This study was motivated by the anxieties of the first author in her academic experience in higher education, whose development took place in the context of the Interdisciplinary

Research Group on Teaching and Learning (GIPEA)[1], whose efforts are focused on understanding processes, spaces and times that make up the fabric of becoming a mathematics teacher in/for basic education.

In this sense, it is essential to discuss the difficulties students experience in the beginning of their education. Besides contributing to the debate, these considerations can help promote solutions, although it is recognized that the issues go beyond institutional and social ones.

Based on these reflections, some questions guided this work: Which difficulties faced by newcomers to the degree in mathematics course prevent them from progressing academically? Which factors can hinder the permanence of newcomers in the educational institution?

With this, we aim to discuss aspects that hinder the development, permanence, and success of students entering a mathematics degree course at a federal educational institution located in the countryside of Ceará.

2 Development and permanence in higher education: perceptions in the light of literature

The difficulties the students face in their formative processes in higher education have been a recurring theme in the academic context because the problem still remains within higher education institutions (HEI), mainly in teacher education courses, which, in addition to the problems intrinsic to training itself, also need to (re)signify teaching and make the profession more attractive for young people who are completing high school (SAVIANI, 2009; GATTI *et al.*, 2010; CARVALHO, 2017).

Learning difficulties are present at different levels of education and may be related to several factors, whether internal or external to students. From this perspective, when entering a teaching degree in mathematics, students may face some hardships. For Masola (2014), these problems may be related to a lack of prior knowledge, specifically linked to problem solving. The students may be used to performing tasks mechanically without reflecting on the meanings, may lack autonomy, have deficient interpretation, reading, and writing, and may lack generalization, abstraction, and argumentation (MASOLA, 2014).

In this sense, it is important to emphasize that the diversity of students with different skills, interests, and levels of education, where some of these students have deficiencies in terms of mastering content and in their school background, can trigger difficulties for the classroom work both for students and for teachers. These difficulties can compromise the

[1]Research have been financed by internal notices of the Pró-Reitoria de Pesquisa, Pós-Graduação e Inovação (PRPI) and notices of the *Programa de Estudante Voluntário em Pesquisa e Inovação (PEVPI) [Research and Innovation Student Volunteer Program]*

monitoring of the initial subjects of the course and the students' academic development (MASOLA, 2014).

About the mechanicity of performing tasks described by Masola (2014), Lima (2016) shows that students are not creative or innovative in problem solving, just applying formulas and algorithms. This may happen because many teachers still do not know or seek to follow the curriculum guidelines on solving mathematical problems. Thus, the pedagogical practice the students experience in their schooling is often limited to solving a list of similar problems, and the only challenge is to define the mathematical algorithm that will be used to reach a specific solution (MOÇO, 2013).

Those considerations allow reflecting on teaching practices in higher education, as it is believed that the method of solving lists of exercises may not be enough, since it is a teacher education course and it is expected to offer knowledge to subside the prospective teachers. Therefore, besides lectures and resolution of exercise lists, prospective teachers must experience other didactic-methodological strategies that allow learning to teach and learn (SILVA; LIMA, 2020).

In the same line of argument, Lima (2016) and Paulo (2016) indicate that problems are often solved as mechanically as they solve exercises, without further reflections and descriptions. In everyday school life, students just follow previously learned formulas or algorithms and do not try to diagnose the problem, mainly to find creative solutions and alternative possibilities to solve these problem situations. In other words, they just reproduce the contents without understanding or questioning them.

The mechanicity in carrying out tasks addressed by the authors can be evidenced when the students only reproduce acquired knowledge, without thinking in a reflective way because, as it seems, the study experiences in basic education and the teaching practices in mathematics in the initial formation course did not provide other perspectives than the memorization of formulas and application without further discussions.

In the conception of Santos and Mafra (2010), one of the major obstacles to learning mathematics in basic education and in higher education is the difficulty that students have in reading and interpreting mathematical texts. In many cases, this happens because they do not know the meaning of the words or because of the habit of carrying out algebraic manipulations without any meaning. For the authors “[...] the students of the first period of the degree in mathematics demonstrate basic difficulties regarding elementary notions and concepts of mathematics” (SANTOS; MAFRA, 2010, p. 7).

Also in this sense, Bisognin, Bisognin, and Leivas (2016) point out that the greatest learning difficulties in the area of exact sciences are demonstrated during the first mathematics subjects present in the curriculum matrices of the courses. The problems are apparently greater in the degree in mathematics, due to the lack of mastery of basic concepts that they should have learned in basic education.

In the context of high school, difficulties in learning mathematics are related to "negative impressions arising from the student's first experiences with the subject, lack of encouragement in the family environment, the way the teacher approaches, cognitive problems, not understanding the meanings, and lack of study, among others" (PACHECO; ANDREIS, 2018, p. 106). Therefore, when those difficulties are not addressed or resolved during basic education, they will later become evident in graduation (SANTOS, MAFRA, 2010; BISOGNIN, BISOGNIN, LEIVAS, 2016).

Another factor to be considered is the lack of motivation, which, according to Oliveira (2017), is an aggravating factor in the quality of learning and which is also seen as a prerequisite for success. Each individual learns more easily in contexts that stimulate their interest, so the teacher needs to develop methodological practices that arouse the student's interest, such as problem solving and mathematical investigation (Cavalheiro, Meneghetti, and Severino, 2017) because, through motivation, students will be able to overcome obstacles and complete the necessary steps for formation.

Given the above, we add that the difficulties presented so far allow us to reflect on how important the role of educational institutions and teacher educators is, especially in the classroom, where teachers have the opportunity to observe and identify difficulties, and seek guidance from specialized professionals when necessary.

3 Methodological procedures

To meet the announced objective, this study is anchored in assumptions of qualitative research, as "there is a dynamic relationship between the real world and the subject, i.e., an inseparable link between the objective world and the subjectivity of the subject that cannot be translated in numbers" (PRODANOV; FREITAS, 2013, p. 70).

The research constitutes a case study (ANDRÉ, 1984; SARMENTO, 2011) with emphasis on the uniqueness and particularity of a given context of action with the purpose of formulating perspectives and discussing implications of the analyzed experience. The study took place with students from a degree in mathematics at a federal educational institution, located in the countryside of Ceará, with first semester classes of 2019.2 and 2020.1.

As a data collection instrument, we prepared a semi-structured questionnaire as an "investigation technique composed of a set of questions asked to people with the purpose of obtaining information about knowledge, beliefs, feelings, values, interests, expectations, aspirations..." (GIL, 2008, p.121). The instrument was designed in *Google Forms* and sent to the 61 students[2] by *email* and *Whatsapp* because of the pandemic scenario and the need for

[2]Because it is a study whose methodology involved the participation of human beings, the research was submitted, evaluated, and approved by the Research Ethics Committee with Opinion n. 3.960.279 and Certificate of Presentation for Ethical Appreciation (CAAE): 30306720.0.0000.5589.

social isolation. Of the universe of 61 students, 28 were willing to participate in the study. The questionnaire consisted of surveying the profile of the participants and aspects that imply the process of development and permanence of students in higher education.

As for the data analysis procedures, they were organized according to the content analysis paradigm (BARDIN, 2009). In view of the questionnaire registers, we carried out the exploration of the material and the processing of the data, conducting an attentive and careful reading to identify the answers that were related or differed. Thus, as we explored the participants' answers, considering the objectives proposed in the research, the axis of analysis took shape. For Bardin (2009), this must be relevant, reflecting the intentions of the researcher, being conducive to the objectives intended by him.

In this sense, the approximations and distances of the subjects' answers allowed the organization of the axis of analysis, namely: 1. Progress and permanence in higher education: the case of freshmen in the Degree in mathematics at an educational institution in the countryside of Ceará. To preserve the anonymity of the study participants when analyzing the answers on the form, we identified them with AL (initial letters of the word "aluno" [student]) followed by a natural number (AL01 through AL28).

4 The progress and permanence in higher education: the case of freshmen in the mathematics degree course at an educational institution in the countryside of Ceará

Of the 28 respondents, 15 are female and 13 are male, aged between 17 and 30. Of this universe, 37 were single, depended on their parents with a monthly income of up to one minimum wage, and only one was married, with a family income between one and five minimum wages.

It should be noted that 82.1% of the participants, at the time of the research, did not work, and 17.9% declared to perform sporadic activities in different areas (beauty salon, nursing, school projects, and agriculture). Furthermore, 64.3% commute to study, 25% live in the city with their parents or relatives, in their own or rented house and 7.1% are from other cities but chose to live in the city to be closer to the institution.

As for high school, 82.1% of the participants studied in public schools, and only 17.8% studied in private schools without scholarships, having concluded between 2008 and 2019.

4.1 Implications and difficulty for the development and permanence of freshmen in the mathematics degree course

To understand the difficulties in the progress and permanence of the newcomers in the mathematics degree course, it is worth observing the relationship of those students with

mathematics in basic education. Thus, when observing the individual answers of the participants, we verified what this relationship with the subject of mathematics was like during basic education, as described in the following table.

Chart 1. Student's relationship with mathematics during basic education

Aspects	Code
He/she always liked mathematics during basic education	AL04, AL05, AL06, AL08, AL09, AL10, AL12, AL14, AL15, AL16, AL18, AL19, AL20, AL21, AL22, AL23, AL24, AL26, AL27, AL28
He/she liked Mathematic in Teaching Elementary	AL25
He/she liked mathematics in high school	AL02, AL07, AL11, AL13, AL17
He/she never liked mathematics	AL01, AL03

Source: Own authorship (2021)

From Chart 1, we observed that the group's relationship with math is quite diverse. Of the 28 participants, 71.4% stated that they were always familiar with this subject during basic education, an aspect that can contribute to good academic performance in higher education. On the other hand, 17.9% and 3.6% of the respondents stated that they liked the subject during high school and elementary school, respectively. The other 7.1% declared never having liked mathematics. Even though it is a small percentage, the fact that students do not like mathematics and still enroll in the course can be a factor that hinders learning and even leads to dropping out of the course.

Regardless of the relationship, whether positive or negative, between students and the subject of mathematics, it is important to recognize that it is a science present in people's daily lives and it is knowledge needed for the exercise of citizenship, as it contributes to solving scientific and technological problems and triggering discoveries and constructions, reverberating in the world of work. Thus, mathematical knowledge is indispensable for all basic education students, considering its application in contemporary society and its potential in the formation of critical citizens, aware of their social responsibilities (BRASIL, 2017).

Although recognizing the importance that mathematics has in the scientific, technological, and social formation of students, we note in Chart 2 that some students do not like the subject or only liked it at some stage of their school career. In this regard, we believe that this subjective feeling in relation to the curriculum component may be due to “anxiety, skills, self-efficacy beliefs, social factors and is influenced by parents, is gender dependent, and is affected by attitudes and motivation of mathematics teachers” (DOBARRO; BRITO, 2010, p. 202).

Those factors, often experienced during the formation of the mathematical knowledge, can influence the students' relationship with mathematics and thus weaken the learning of this science. Thus, the attitudes towards mathematics formed by an individual also depend on the beliefs that the subject develops during their school trajectory, either through experience, or through the transmission of beliefs from others who live with them and who have an authoritative role, as parents and teachers. In this sense, it is necessary to deconstruct beliefs

such as “mathematics is difficult” or “mathematics is for intelligent people” present in many students' speeches, so that a new way of seeing and learning mathematics can be developed.

For Silva and Moura (2011, p. 443), one of the ways of working with mathematical knowledge and demystifying these beliefs is through affection, which “can be inserted as an important subjectivation instrument of mathematical knowledge so that it does not appear for the student in its hardness, facilitating the learning of mathematical objects”.

Chart 1 shows that most students express a positive attitude towards the subject of mathematics, which can be a greater incentive for learning, since learning something that one likes is much more motivating. From this perspective, Silva (2017) points out that there is a significant relationship between performance in mathematics and positive attitudes towards mathematics itself. That is, liking the discipline can bring satisfactory results, but it is not enough for the student not to manifest difficulties, as shown in Table 2.

Chart 2. Did you have difficulties with mathematics in basic education?

Aspects	Code
Only in elementary school	AL07, AL11, AL17
Only in high school	AL04, AL05, AL06, AL12, AL18, AL24, AL26
In elementary school and high school	AL01, AL02, AL03, AL13, AL14, AL15, AL16, AL23, AL28
I never had difficulties	AL08, AL09, AL10, AL19, AL20, AL21, AL22, AL25, AL27

Source: Own authorship (2021)

From what is shown in Table 2, we observed that of the 28 participants, 10.7% reported having had difficulties with mathematics only in elementary school, 25% only in high school, 32.1% had difficulties in both. Which means that most students had difficulty with the subject at some point in their school careers, which may reflect on their academic performance during higher education. We also verified that 32.1% answered that they never had difficulty with the subject, at least until they entered higher education.

Regarding the vast majority who had difficulties in mathematics during basic education, Pacheco and Andreis (2018) point out that for a long time, students have been unhappy with their learning and teachers with their teaching mathematics, a condition identified by the national and international assessments, such as the Sistema Nacional de Avaliação da Educação Básica (SAEB) [National System of Basic Education Assessment] and the Programme for International Student Assessment (PISA).

In addition, some studies (MASOLA, 2014; SANTOS, MAFRA, 2010) show how precarious the mathematical education of basic education students is, and this has reflected in higher education. According to Masola (2014) skills of generalization and abstraction of ideas, notions of logic, argumentation and justification, problem solving involving research attitude and response validation, autonomy, reflection on meanings and concepts and the awakening of students' curiosity in carrying out tasks, are skills that newcomers should have developed during basic education.

Furthermore, one of the major difficulties encountered in the processes of teaching and learning mathematics is the language and symbology that needs to be used so that students can learn and understand this exact science (SANTOS; MAFRA, 2010). In this sense, we understand that difficulties with mathematics go beyond problems related to specific knowledge, as aspects related to language are also presented, mainly interpretation and understanding.

The authors also point out that freshmen students of the degree in mathematics demonstrate difficulties related to elementary mathematical notions and concepts. We note that when students are unable to develop basic mathematics, they may have difficulties in higher education, as shown in the table below.

Chart 3. Do you have any difficulty keeping up, academically, with the mathematics degree course?

Aspect	Code
Yes	AL01, AL02, AL03, AL04, AL05, AL06, AL07, AL08, AL09, AL10, AL12, AL13, AL14, AL15, AL16, AL17, AL18, AL19, AL22, AL23, AL24, AL25, AL26, AL27, AL28
No	AL11, AL20, AL21

Source: Own authorship (2021)

In Chart 3, we observed that 89.3% of the freshmen have difficulty in following the course academically and 10.7% claim to have no difficulty. When relating this to some of the answers already given by the students, some of the 89.3% that had said they had difficulties stated that they never liked mathematics and had problems in basic education, such as students AL01 and AL03. Other students, despite their liking of the subject, also showed difficulties in basic education and now claim to have it in higher education too, as reported by students AL02, AL04, AL05, AL06, AL07, AL12, AL13, AL14, AL15, AL16, AL17, AL18, AL23, AL24, AL26 and AL28. We observe that the difficulty in mathematics during basic education was common to these students and this aspect can give indications of the difficulties of these newcomers in the course. We also observed that some students had a good relationship with basic mathematics and never had difficulty in basic education, but expose having difficulty in higher education, as stated by students AL08, AL09, AL10, AL19, AL22, AL25 and AL27.

With regard to the 10.7% who affirmed that they had no difficulty following the course, it is clear that among this percentage are some of the freshmen who also stated that they had no difficulty in mathematics in basic education. Moreover, they have always liked mathematics, as explained by AL20 and AL21, indicating that this can influence good performance. The AL11 student, despite claiming to have no difficulty in higher education and having always liked mathematics, reveals that he had difficulty with the subject in elementary education.

The fact exposed by the AL11 student leads to the question: What happened in basic education that caused this student to have difficulties? We assume that problems of a family nature or the relationship with the teacher/content/method have had implications for that student's learning. Regarding the participation of the family in the students' learning, it is possible that the parents did not have the opportunity to complete their studies, making it difficult to follow their children's activities. Thus, “without family guidance, students do not

have the necessary organization to study, leaving everything to the last minute. This lack of support can result in a lack of interest in the activities, leading to a low performance rate in mathematics" (PACHECO, ANDREIS, 2018, p. 111).

In this direction, Moro and Siple (2010, p. 1) address that "students enter university with large learning gaps in basic mathematics, which points to a great fragility of fundamental and secondary education in a national character", indicating that these difficulties influence the development of newcomers to higher education.

Some freshmen claimed to have experienced difficulties with mathematics only in higher education, revealing that learning can be a little more complex than in basic education (PELEIAS, 2016) and there are also few who expressed no difficulty so far (in this research). It is also observed that some of the students' difficulties arise during their school trajectory and extend to higher education. Others are faced during the academic journey and these are the ones that will be presented and discussed below.

Chart 4. Difficulties to academically follow the teaching degree in mathematics course.

Aspect	Code
With the specific contents of the first semester of the course	AL02, AL03, AL06, AL07, AL09, AL10, AL13, AL14, AL16, AL17, AL23, AL25, AL28
Understand the methodologies adopted by the teachers	AL02, AL03, AL05, AL09, AL12, AL17, AL18, AL19, AL24, AL25, AL26, AL27, AL28
Basic knowledge of mathematics	AL04, AL05, AL07, AL10, AL15, AL16, AL18, AL23, AL25, AL27
Economic	AL14, AL23
Lack of interest	-
Commuting to study	AL01, AL08, AL14, AL18, AL23
Balancing work and study	AL09
Lack of time to devote to studies	AL07, AL09, AL10, AL18, AL27
Lack of motivation	AL01, AL02, AL03, AL14, AL15, AL22, AL25, AL27
Family problems	AL15

Source: Own authorship (2021)

In Chart 4, one can observe the difficulties listed by the freshmen of the degree in mathematics. We see of the 28 participants, 46.4% have difficulty with the specific contents of the first semester of the course, 46.4% have difficulty understanding the methodologies adopted by the professors. 35.7% have a precarious mathematical base built, 7.1% have financial difficulties, 17.9% say they have difficulty with commuting to the institution, 3.6% in reconciling work and study, 17.9% do not have time to dedicate themselves to studying, 28.6% are unmotivated, and 3.6% answered that family problems can make it difficult.

With regard to students who have difficulty with the specific contents of the first semester of the course, this gap is certainly related to the difficulties brought from basic education, since the same students pointed this out, except for students AL09, AL10 and AL25. In this sense, Moro and Siple (2010) point out that the deficiencies brought from basic education reflected in higher education, especially in the subjects of basic education of exact sciences.

There are also those who, even though they have not faced problems with mathematics in basic education, experience difficulties with the specific contents of the course. This may be associated with the fact that formal mathematics requires the use of argumentation constructed through rigorous mathematical language of mathematical demonstrations with which many students are not familiar (PELEIAS, 2016). Another reason given by freshmen is the difficulty in understanding the methodologies adopted by teachers in the classroom. As discussed by Peleias (2016), the difference in methodology from high school to higher education can be a reality shock for students since the students are much more demanded in the academic environment than in high school. Moreover, the author considers that the contents are more difficult and requires greater dedication to studies.

HIgh school graduates who are used to their former professors' methodologies tend to feel out of place with the new reality, as in higher education there is some independence towards learning and this situation "can make the student feel lost, helpless, since he has to deal with different situations that do not correspond with the previously learned knowledge" (PINHO *et al.*, 2015, p. 35). In this sense, it is interesting to observe that this transition can provide a change of attitude and demand actions that bring personal growth to the student. On the other hand, these new responsibilities can also influence students' performance, as they need time to understand the new environment and through this process of understanding changes and responsibilities, they cannot keep up with the pace of the course.

Still with regard to the methodology used in initial education, teacher educators tend to require of students more in-depth knowledge of the content taught, especially in specific subjects, since they are now in the academic environment and need to develop skills, often disregarding the initial level at which these students enter higher education. In this direction, Silva and Lima (2020, p.4) point out that "in the context of mathematics teacher education, it is precisely the teaching of mathematics itself that needs to be discussed, since undergraduate knowledge often distances itself from school reality".

In this sense, it is interesting that teacher educators, during their mathematics classes, establish a relationship between formal mathematics and school mathematics, since both are essential for teacher education and for students to develop their practice in the basic educationclassroom.

> It is necessary that educators perceive themselves as facilitators, that is, professionals who propose teaching situations carefully planned to meet teaching and learning objectives, so that they can allow pre-service teacher [often in-service teachers] to reflect on their own learning and, mainly, on the implications of that learning for their pedagogical practices (SILVA; NICOLLI, 2011, p. 74).

Thus, by placing themselves as facilitators in the learning process, teachers will be able to offer quality teaching, even if some students have difficulties when entering. In this way, the student will also be more confident to seek the teacher when they encounter problems in their learning.

Other common practices used by teacher educators are expository classes involving demonstrations of theorems and postulates, without many applications in the student's daily life. In this sense, it is necessary to consider the connections that exist between themes, concepts or specific parts through the presentation of contentes (SILVA; NICOLLI, 2011), thus making it possible to relate the contents studied with real problems, and their applications in everyday situations, opening space for questions that involve the group and creating diverse and pleasant experiences, as well as promoting meaningful learning. In addition, Silva and Lima (2020) point out that the specific components insist on a certain lack of articulation with practical development, which can compromise the exercise of the profession, since the student takes to their professional practice what was offered them in their graduate course.

Another point to be observed is the application of lists of exercises defended as a means to help in the assimilation of the contents, but that in some occasions only serve for the student to reproduce what he saw in the classroom, without much reflection. With this, it is clear that with this practice “students learn to calculate, but they are not led to reflect on the meanings of the concepts involved in them and or even their applications either in other sciences or in mathematics itself” (LIMA, 2013, p. 11). Thus, we can see that even in the academic environment, teacher educators must adopt methodologies and teaching resources in their teaching practices that facilitate student learning, seeking, when possible, to adapt them to the reality of students, so that they can build a significant knowledge, also providing practices that can be adopted by those students when they become teachers.

In this regard, Gonçalves and Lima (2020) infer that the practices in degree courses must point in other directions, as they consider that initial education influences teaching practice. They also point out that GeoGebra can be used as a “methodological tool used as a resource to assist in exposing and exploring the study of function” (GONÇALVES; LIMA, 2020, p. 1068) and that this tool is an important didactic resource with a variety of functionalities, making it possible to expand the study of functions to promote the exploration of algebraic and geometric approaches in a dynamic way. In this sense, we believe that working with these tools can promote learning, especially digital resources that can help visualize concepts, making classes more dynamic and less formal.

Another factor exposed by some students is the lack of motivation, which may also be related to the learning difficulties faced by freshmen. In this sense, we agree with Oliveira (2017, p. 218) when he states that “learning and motivation are two interconnected factors. Failure to comply with one will result in the non-compliance with the other”. Even so, developing motivational strategies in higher education is not something that many professors believe necessary (OLIVEIRA, 2017). This type of thinking of some professors does not contribute to pre-service teachers' education and may have an impact on failures and dropouts when they feel they cannot meet the standards. The teachers' educators cannot, though, be held responsible for all the students' failures, but they can have a great influence on the student's learning by doing or not doing a good job.

It can also be considered that the lack of motivation is related to the choice of course since some do not like mathematics, nor did they choose a teaching degree course freely, giving reasons such as: living close to the institution, studying while unable to enrol in the course of their preference, or that the teaching degree was the only option considering their performance in the Exame Nacional do Ensino Médio (ENEM) [National High School Examination.

In this sense, Carvalho (2017) says that many choices are limited, in many cases, by family members' expectations, the viability within their reality, and social recognition, which often causes choices that differ from people's true ambitions. It is worth mentioning that these factors presented are those that can lead students to drop out, since many enter the course without liking mathematics and not knowing how to teach.

Among the factors that can also hinder academic performance are family problems, financial difficulties and commuting to the institution since 64.3% of students do not live in the same city as the *campus*, some live in the city in student-shared residences but need a monthly allowance from their families since the majority (82.1%) did not have a paid job at the time of the survey. Affirmative action policies, specifically financial aid, can collaborate in this sense so that students can experience the graduation period with more dedication to their studies, besides contributing to the student's permanence in the course. In addition, affirmative action policies "must be associated with the specific contents of the subjects, classroom practices, organization of the university environment, study strategies, in short, with a diversity of educational subjects" (SILVA, 2016, p. 1212).

Regarding family problems pointed outby one of the freshmen, we understand that the emotional aspects brought from the family environment, such as separation from parents, fights, and changes in habits, can cause lack of motivation and interest in learning. Other factors such as reconciling work and academic activities and problems managing study time were also mentioned by some students. In this direction, Vargas and Paula (2013) point out that the difficulty in adjusting to the demands of schooling and the need for work experienced by most students must be taken into consideration because work makes schooling difficult and the absence of work precludes schooling.

The following chart identifies the reasons listed by freshmen that may interfere with their permanence in higher education.

Chart 5. Freshmen's beliefs regarding their difficulties in persevering in higher education.

Aspect	Code
Difficulties in the teaching and learning processes	AL02, AL03, AL05, AL07, AL09, AL15, AL16, AL18, AL20, AL23, AL25, AL26, AL27, AL28
Financial difficulties	AL08, AL10, AL13, AL14, AL19, AL21, AL22
Not identifying with the course	AL01
Expectation of joining a desired course	AL04, AL12, AL17, AL24
Other reason(s)	AL06, AL11

Source: Own authorship (2021)

With regard to the reasons that could make it difficult to stay in the course, we observe that 50% of the freshmen answered to have difficulties in the teaching and learning process, a significant percentage, since a large number of students have already stated that they have difficulties because they recognize a precarious mathematical base, difficulties with specific contents of the first semester of the course, and difficulties understanding the methodologies adopted by the professors. Thus, it is possible that these reasons may lead students to drop out of the course if actions are not taken.

Fritsch, Rocha, and Vitelli (2015), when dealing with evasion, address that the more approval student has during their academic career, the lower the percentage of evasion in the course tends to be. Likewise, as the percentage of failed activities increases, evasion also increases. That is, the more difficulties students have in academic progress, the easier it becomes for this student to drop out of the course. In this sense, the faster these problems in relation to teaching and learning are resolved, the better it will be for the student to develop academically and complete the course.

Of the participants, 25% believe that the reasons for dropping out are financial difficulties, 14.3% for having joined an unwanted course, and 3.6% do not identifying with the course. In this sense, Pereira (2016) points out that the difficulties of adherence to higher education permeate the socioeconomic situation of the students, whose inequalities imply social, cultural, and pedagogical aspects. As for financial difficulties, public policies were created to make this experience in higher education more equitable. Decree N. 7.234 of July 19, 2010, is one of them, which provides for the Programa Nacional de Assistência Estudantil (PNAES) [National Student Assistance Program]. Article 1 expresses the purpose of expanding the conditions for young people to remain in federal public higher education. In addition, Article 2 addresses the objectives of the program, which should democratize the conditions for young people to remain in public higher education, try to reduce retention and dropout rates, and contribute to the promotion of social inclusion through education (BRASIL, 2010) .

It is also observed in Chart 5 that 7.1% of newcomers have other reasons for possible dropping out of the course, such as “poorly educated professors who do not think about the students” (AL06) and “lack of resources for the course, such as: professors, teaching quality, dynamics, etc." (AL11). There is a consensus based on the speeches of these freshmen that their biggest concerns are related to methodological and pedagogical aspects. Thus, we believe that good pedagogical practices are essential when it comes to education professionals for teaching, as it is also “crucial that professors, who can choose their assessment practices freely, use diverse and innovative methods to assess their students' learning, articulating summative and formative assessment.” (SADA, 2017, p. 326).

5 Final Considerations

This research, instigated by the researcher's anxieties that emerged during her academic experience, made it possible to study the factors that contribute to the difficulty in the progress and adherence of students who enter the teaching degree in mathematics, also considering the importance of the theme for teacher education. It is also evident that, although it is a case study, the results achieved can be portraits of many other higher education courses. Thus, the reflections raised can play a significant role in the academic community, especially in the aforementioned course.

The study aimed to discuss aspects that hinder the development and permanence of students entering a teaching degree in mathematics. The results indicate that most of the freshmen, despite the good relationship with mathematics during basic education, recognize having difficulties with the subject that were taken to higher education. The few students who said to ignore having had difficulties in mathematics in basic education began to face obstacles in their formative path.

As for the aspects that hinder the progress of students entering the teaching degree in mathematics, it seems that they are difficulties with the specific contents of the first semester of the course, limitations in understanding the methodologies adopted by professors in higher education, poor training in basic concepts of mathematics during basic education, and financial difficulties, commuting to an institution, reconciling work and study, lack of time to dedicate to study, lack of motivation and family problems.

Concerning the reasons that may hinder the newcomers' adherence to the course are: difficulty in the teaching and learning processes, financial difficulties, not identifying with the course, and the expectation of entering a desired course.

Thus, it is evident that the factors presented by freshmen imply difficulties in the course and that measures need to be taken. Actions such as carrying out a diagnostic evaluation with newer classes based on identified difficulties, and proposing solutions such as revisions of basic mathematics content, short courses, tutorials, and organization of study groups should be considered. Furthermore, promoting methodologies that stimulate student interest and collaborate with their learning in class, with good teacher/student relationships and promoting activities that awaken the students' motivation and leadership can enable significant learning and development.

Finally, institutions should reinforce the importance of affirmative action policies, especially student assistance that operates within higher education institutions, promoting financial aid that directly impacts the permanence of many students in the course. Moreover, professors of the teaching degree in mathematics should submit more research projects to the scientific initiation notices of the Pró-Reitoria de Pesquisa, Pós-Graduação e Inovação (PRPI) [Pro-Rector of Research, Graduate Studies, and Innovation], which could contribute

substantially to the academic development of the freshman and their finances. Other measures can also be studied by the educational institution.

With regard to the obstacles to carrying out this study, data collection stands out. Due to the Covid-19 pandemic, the questionnaire had to be applied remotely and, therefore, it is believed that the lack of face-to-face contact between researcher/participant made it unfeasible for most entrants to participate in the research, since only 28 out of 61 students participated. With the development of the study, other questions emerged and may serve for future studies, such as: Which specific subject(s) of the teaching degree in mathematics offer students greater difficulties in the first semester? What strategies to use to improve the newcomers' performance?

Therefore, we expecte that this study will contribute to the academic community, especially with the teaching degree in mathematics, and that the discussions raised here can be a basis for measures to be implemented to help entrants advance in the course without many obstacles, being successful in their educational path, and enjoying quality teacher education.

References

ANDRÉ, Marli Eliza Dalmazo Afonso. Estudo de caso: seu potencial na educação. **Cadernos de Pesquisa**, São Paulo, n.49, p.51-54, maio, 1984. Available on: http://educa.fcc.org.br/pdf/cp/n49/n49a06.pdf. Acess on: Oct. 29, 2021.

ALMEIDA, Patrícia Albieri de; TARTUCE, Gisela Lobo B. P; NUNES, Marina Muniz Rossa. Quais as razões para a baixa atratividade da docência por alunos do Ensino Médio? **Psicologia Ensino & Formação**, Brasília, v. 5, n. 2, p. 103-121, 2014. Available on: http://pepsic.bvsalud.org/pdf/pef/v5n2/v5n2a07.pdf. Acess on: Oct. 29, 2021.

BARDIN, Laurence. **Análise de Conteúdo.** 4 ed. Lisboa: Edições 70, 2009. ISBN 978-972-44-1506-2

BARROS, André Matias Evaldt de. Efeitos de poder e subjetivação dos discursos de evasão de cursos de Licenciatura em Matemática do IFRS**.** 2016. 181 f. **Dissertação** (Mestrado) - Universidade de Caxias do Sul, Caxias do Sul, 2016. Available on: https://repositorio.ucs.br/xmlui/handle/11338/1375. Acess on: Oct. 29, 2021.

BISOGNIN, E.; BISOGNIN, V.; LEIVAS, J. C. P. Aprendizagem de sequências numéricas: pesquisa sobre dificuldades de Licenciandos em Matemática. **Zetetike**, Campinas, SP, v. 24, n. 3, p. 361-377, 2017. Available on: https://periodicos.sbu.unicamp.br/ojs/index.php/zetetike/article/view/8648090. Acess on: Oct. 29, 2021.

BRASIL. **Ministério da Educação**. Base Nacional Comum Curricular. Brasília: MEC, 2017. Available on: http://basenacionalcomum.mec.gov.br/. Acess on: Oct. 29, 2021.

CARVALHO, Luiz Fernando. A escolha da licenciatura em matemática na UNESP: o que dizem os ingressantes. 140 f. **Dissertação** (Mestrado), Universidade Estadual Paulista,

Presidente Prudente, 2017. Available on: https://repositorio.unesp.br/handle/11449/153602. Acess on: Oct. 29, 2021.

CAVALHEIRO, Gabriela Castro Silva; MENEGHETTI, Renata Cristina Geromel; SEVERINO, Augusta Teresa Barbosa. Concepções de licenciandos em matemática sobre as metodologias de resolução de problemas e investigação matemática. **Hipátia**: **Revista Brasileira de História, Educação e Matemática**, [*s. l*], v. 2, n. 2, p. 1-12, 31 dez. 2017. Available on: https://ojs.ifsp.edu.br/index.php/hipatia/article/view/745. Acess on: Oct. 29, 2021.

DIAS SOBRINHO, José. Democratização, qualidade e crise da educação superior: faces da exclusão e limites da inclusão. **Educação e Sociedade**. Campinas, v. 31, n.113, p. 1223-1245, out./dez. 2010. Available on: https://www.scielo.br/j/es/a/dFtMDqfdWm75WSc5vKXHCtq/?format=pdf&lang=pt. Acess on: Oct. 29, 2021.

DOBARRO, Viviane Rezi; BRITO, Márcia Regina Ferreira de. Atitude e Crença de Autoeficácia: relações com o desempenho em matemática. **Educação Matemática Pesquisa** São Paulo, v. 12, n. 2, p. 199-220, 2010. Available on: https://revistas.pucsp.br/index.php/emp/article/view/2180. Acess on: Oct. 29, 2021.

ETHUR, Felipe Batista. Evasão discente em cursos de graduação do Campus Itaqui da Unipampa: análise das causas e propostas de ações. 2018. 216 f. **Dissertação** (Mestrado), Universidade Federal de Santa Maria, Santa Maria, RS, 2018. Available on: https://repositorio.ufsm.br/handle/1/15177. Acess on: Oct. 29, 2021.

GATTI, Bernardete Angelina. *et al*. A Atratividade da Carreira Docente no Brasil, **In: Estudos e Pesquisas Educacionais**, n. 1, São Paulo, FVC/Fundação Victor Civita, 2010, p. 139-210. Available on: http://www.zerohora.com.br/pdf/15141177.pdf. Acess on: Oct. 29, 2021.

GIL, Antônio Carlos. **Métodos e técnicas de pesquisa social.** 6. ed. São Paulo: Atlas, 2008. ISBN 978-85-224-5142-5.

GOERGEN, Pedro. A instituição universidade e sua responsabilidade social: anotações críticas. **Quaestio, Revista de estudos da educação**. Sorocaba, v. 4. n. 1, p. 9-25, 2002. Available on: https://periodicos.uniso.br/quaestio/article/view/1393. Acess on: Oct. 29, 2021.

GONÇALVES, Bruna Maria Vieira; LIMA, Francisco José de. Aprendizagem Docente e Desenvolvimento de Estratégias Metodológicas no Contexto do PIBID: reflexões sobre o GeoGebra como recurso para o ensino de funções. **Bolema**: Boletim de Educação Matemática, Rio Claro (SP), v. 34, n. 68, p. 1056-1076, dez. 2020. Available on: https://www.scielo.br/j/bolema/a/PgJX3sfYdvTYdsHgZmtYVjh/abstract/?lang=pt. Acess on: Oct. 29, 2021.

LIMA, José Luciano Santinho. Solução de problemas de matemática: um estudo sobre os procedimentos usados por estudantes universitários em questões baseadas no ENEM e nos vestibulares da Unesp e Fuvest. **Tese** (Doutorado), Universidade Estadual Paulista, Bauru, 2016. Available on: https://repositorio.unesp.br/handle/11449/144585. Acess on: Oct. 29, 2021.

MASOLA, Wilson de Jesus. Dificuldades de aprendizagem matemática dos alunos ingressantes na educação superior nos trabalhos do X Encontro Nacional de Educação Matemática. **Dissertação**, Universidade Cruzeiro do Sul. São Paulo, 161f., 2014. Available on: https://repositorio.up.edu.br. Acess on: Oct. 29, 2021.

MOÇO, Priscila Pedroso. Discussões sobre a resolução de problemas enquanto estratégia metodológica para o ensino de matemática. 2013. 114 f. **Dissertação** (Mestrado), Universidade Federal do Rio Grande, Rio Grande, 2013. Available on: https://repositorio.furg.br/handle/1/4801. Acess on: Oct. 29, 2021.

MORO, Graciela.; SIPLE, Ivanete Zuchi. A Influência da matemática básica no ensino de cálculo diferencial e integral. In: Encontro Nacional de Educação Matemática. Salvador/BA. **Anais**... SBEM, p. 1-11, 2010. Available on: https://www.sbemmatogrosso.com.br/eventos/index.php/enem/2019/schedConf/presentations. Acess on: Oct. 29, 2021.

OLIVEIRA, Êmila de. Motivação no ensino superior: estratégias e desafios. **Revista Contexto & Educação**, v. 32, n. 101, p. 212-232, 6 jul. 2017. Available on: https://www.revistas.unijui.edu.br/index.php/contextoeducacao/article/view/5924. Acess on: Oct. 29, 2021.

PACHECO, Marina Buzin; ANDREIS, Greice da Silva Lorenzzetti. Causas das dificuldades de aprendizagem em Matemática: percepção de professores e estudantes do 3º ano do Ensino Médio. **Revista Principia** IFPB, [*S.l.*], n. 38, p. 105-119, fev. 2018. Available on: https://periodicos.ifpb.edu.br/index.php/principia/article/view/1612. Acess on: Oct. 29, 2021.

PAULO, Jessé Valério de. Resolução de problemas, habilidades e a matemática escolar: dificuldades e perspectivas. In: Encontro Nacional de Educação Matemática. São Paulo. **Anais**... SBEM, p. 1 -10, 2016. Available on: http://www.sbembrasil.org.br/enem2016/anais/autores-J.html. Acess on: Oct. 29, 2021.

PELEIAS, Thiago Augusto Corrêa. Um estudo de caso, com ingressantes de 2015 do curso de Licenciatura em Matemática do IME-USP, sobre a transição do Ensino Médio para o Superior. 2016. **Dissertação**, Universidade de São Paulo, São Paulo, 2016. Available on: https://teses.usp.br/teses/disponiveis/45/45135/tde-10072019-003210/pt-br.php. Acess on: Oct. 29, 2021.

PEREIRA, Patrícia Maciel. As dificuldades de permanência nas Universidades: uma experiência dos jovens do programa de apoio estudantil da associação de assistência ao adolescente. **Dissertação** (Mestrado), Pontifícia Universidade Católica do Rio de Janeiro, Rio de Janeiro, 2016. Available on: https://www.maxwell.vrac.puc-rio.br/28068/28068.PDF. Acess on: Oct. 29, 2021.

PINHO, Ana Paula Moreno *et al*. A transição do ensino médio para a universidade: um estudo qualitativo sobre os fatores que influenciam este processo e suas possíveis consequências comportamentais. **Revista de Psicologia**, Fortaleza, v. 6, n. 1, p. 33-47, jul. 2015. Available on: http://www.periodicos.ufc.br/psicologiaufc/article/view/1691. Acess on: Oct. 29, 2021.

PRODANOV, Cleber Cristiano; FREITAS, Ernani Cesar de. **Metodologia do trabalho científico: métodos e técnicas da pesquisa e do trabalho acadêmico.** Novo Hamburgo: Feevale, 2013. ISBN: 978-85-7717-158-3

RIGO, Júlia da Silva. **Percursos de formação de estudantes de licenciatura noturna na UFV: Enem, Sisu e Evasão.** 2016. 119 f. **Dissertação** (Mestrado), Universidade Federal de Viçosa, Viçosa (MG), 2016. Available on: https://www.locus.ufv.br/handle/123456789/24269. Acess on: Oct. 29, 2021.

SADA, Claires Marcele. A avaliação da aprendizagem na licenciatura em matemática: O que dizem documentos, professores e alunos? 342 f. Tese (Doutorado) - Curso de Educação Matemática, Pontifícia Universidade Católica de São Paulo, São Paulo, 2017. Available on: https://tede2.pucsp.br/handle/handle/20790. Acess on: Jan. 01, 2021.

SARMENTO, Manuel Jacinto. O Estudo de Caso Etnográfico em Educação. In: ZAGO; M. P. C.; VILELA, R. A. T (Orgs.). **Itinerários de Pesquisa** - Perspectivas Qualitativas em Sociologia da Educação. 2. ed. Rio de Janeiro: Lamparina, 2011. p.137-179. ISBN-10: 859827187X

SANTOS, Jarbas Mendonça dos. ALVARENGA, Karly Barbosa. SALES, Macelo Santana. Dificuldades em geometria dos estudantes recém ingressos na Universidade do Agreste Sergipano. In: Encontro Nacional de Educação Matemática. Salvador/BA. **Anais**... SBEM, p. 1 -10, 2010. Available on: https://www.sbemmatogrosso.com.br/eventos/index.php/enem/2019/schedConf/presentations Acess on: Oct. 29, 2021.

SANTOS, Vangela Azevedo dos; MAFRA, José Ricardo e Souza. Dificuldades na linguagem e interpretação da simbologia matemática como obstáculo no ensino e aprendizado de matemática. In: Encontro Nacional de Educação Matemática. Salvador/BA. **Anais**... SBEM, p. 1 - 9, 2010. Available on: https://www.sbemmatogrosso.com.br/eventos/index.php/enem/2019/schedConf/presentations Acess on: Oct. 29, 2021.

SAVIANI, Dermeval. Formação de professores: aspectos históricos e teóricos do problema no contexto brasileiro. **Revista Brasileira de Educação**, Rio de Janeiro, v. 14, n. 40, p. 143-155, abr. 2009. Available on: https://www.scielo.br/j/rbedu/a/45rkkPghMMjMv3DBX3mTBHm/?format=pdf&lang=pt. Acess on: Oct. 29, 2021.

SILVA, Patrícia Alves da; LIMA, Francisco José de. Interlocuções formativas no contexto da licenciatura em matemática: reflexões sobre os componentes curriculares para a formação e o desenvolvimento profissional docente. **Revista Cocar**, *[S.l.]*, v. 14, n. 30, p. 1-20, set. 2020. Available on: https://periodicos.uepa.br/index.php/cocar/article/view/3002. Acess on: Oct. 29, 2021.

SILVA, Vilma Conceição da; MOURA, Francisco de Assis. A relação com o saber e suas implicações no desempenho escolar em matemática. **Estilos da Clínica**, *[S.l.]*, v. 16, n. 2, p. 442-459, 2011. Available on: http://pepsic.bvsalud.org/pdf/estic/v16n2/v16n2a10.pdf. Acess on: Oct. 29, 2021.

SOUTO, Romélia Mara Alves; PAIVA, Paulo Henrique Apipe Avelar de. A pouca atratividade da carreira docente: um estudo sobre o exercício da profissão entre egressos de uma Licenciatura em Matemática. **Pro-Posições**, Campinas, v. 24, n. 1, p. 201-224, jan./abr. 2013. Available on: https://periodicos.sbu.unicamp.br/ojs/index.php/proposic/article/view/8642669. Acess on: Oct. 29, 2021.

VITELLI, Ricardo Ferreira. Evasão em cursos de licenciatura: perfil do evadido, fatores intervenientes no fenômeno. 2013. 121 f. **Dissertação**, Universidade do Vale do Rio dos Sinos, São Leopoldo, 2013. Available on: http://www.repositorio.jesuita.org.br/handle/UNISINOS/4778. Acess on: Oct. 29, 2021.