



Original article

Diagnosis of self-management of learning in Higher Mathematics I in Accounting and Finance

Diagnóstico de la autogestión del aprendizaje en la Matemática Superior I en Contabilidad y Finanzas

Diagnóstico da autogestão da aprendizagem em Matemática Superior I em Contabilidade e Finanças

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ABSTRACT

Given the need to promote self-management of learning, to aspire to a quality professional, a scientific contradiction is shown between what Higher Education aspires with greater access, entry and exit of the population with the necessary preparation for their successful performance as professionals and the limited methodological didactic procedure for the self-management of learning in the teaching-learning process of Higher Mathematics in the distance education modality, which contributes to the training of professionals in the Accounting and Finance career, this article has as an objective, to show the results of the diagnosis made that allows structuring a scientific result to minimize the difficulties detected. Correspondingly, the research is based on the dialectical-materialist method as a general methodology for the analysis and interpretation of social problems, and a guide for the transformation of society. They were used as methods and techniques for the diagnosis of the current situation, among them the analysis-synthesis, the historical-logical, the inductive-deductive, the documentary analysis and surveys and interviews. The results obtained allow from the theory to define the self-management of learning in the teaching learning process in the Higher Mathematics I subject of the Accounting and Finance career in the distance modality, and specifies the insufficiencies in the direction of the teaching learning process towards independence and self-management of learning, as well as unfavorable evaluations in students and poor development of the necessary skills in the teaching-learning process of Higher Mathematics I.

Keywords: self-management of learning; Accounting and Finance; diagnosis; Higher Mathematics.

RESUMEN

Ante la necesidad de potenciar la autogestión del aprendizaje para aspirar a un profesional de calidad, existe una contradicción científica entre a lo que aspira la Educación Superior con el mayor acceso, ingreso y egreso de la población con la preparación necesaria para su desempeño exitoso como profesionales y el limitado proceder didáctico-metodológico para la autogestión del aprendizaje en el Proceso de Enseñanza-Aprendizaje de la Matemática Superior en la modalidad de Educación a distancia que contribuya a la formación de los profesionales de la carrera Contabilidad y Finanzas. El presente artículo tiene como objetivo mostrar los resultados del diagnóstico efectuado, que permita estructurar un resultado científico para minimizar las dificultades detectadas. En correspondencia, la investigación tiene sus bases en el método dialéctico-materialista como metodología general para el análisis e interpretación de los problemas sociales, y guía para la transformación de la sociedad. Se utilizaron como métodos y técnicas para el diagnóstico de la situación actual: el análisis-síntesis, el histórico-lógico, el inductivo-deductivo, el análisis documental, encuestas y entrevistas. Los resultados obtenidos permiten, desde la teoría, definir la autogestión del aprendizaje en el Proceso de Enseñanza-Aprendizaje en la asignatura Matemática Superior I de la carrera Contabilidad y Finanzas en la modalidad a distancia, y precisa las insuficiencias en la dirección del Proceso de Enseñanza-Aprendizaje hacia la independencia y autogestión del aprendizaje, así como las evaluaciones no favorables en los estudiantes y el pobre desarrollo de las habilidades necesarias en el Proceso de Enseñanza-Aprendizaje de la Matemática Superior I.

Palabras clave: autogestión del aprendizaje; Contabilidad y Finanzas; diagnóstico; Matemática Superior.

RESUMO

Dada a necessidade de promover a autogestão da aprendizagem para aspirar a ser um profissional de qualidade, existe uma contradição científica entre o que aspira o Ensino Superior com maior acesso, entrada e saída da população com a preparação necessária para o seu desempenho bem sucedido como profissionais. e o limitado procedimento didático-metodológico de autogestão da aprendizagem no Processo Ensino-Aprendizagem de Matemática Superior na modalidade Educação a Distância que contribui para a formação de profissionais da carreira Contábil e Financeira. O objetivo deste artigo é mostrar os resultados do diagnóstico realizado, o que permite estruturar um resultado científico para minimizar as dificuldades detectadas. Correspondentemente, a pesquisa baseia-se no método dialético-materialista como metodologia geral para a análise e interpretação dos problemas sociais e um guia para a transformação da sociedade. Para diagnosticar a situação atual foram utilizados os seguintes métodos e técnicas: análise-síntese, histórico-lógica, indutiva-dedutiva, análise documental, levantamentos e entrevistas. Os resultados obtidos permitem, a partir da teoria, definir a autogestão da aprendizagem no Processo Ensino-Aprendizagem na disciplina Matemática Superior I do curso de Contabilidade e Finanzas na modalidade a distância, e especificam as insuficiências no direcionamento do Processo de Ensino - Aprendizagem no sentido da independência e autogestão da aprendizagem, bem como avaliações desfavoráveis nos alunos e o fraco desenvolvimento das competências necessárias ao Processo de Ensino-Aprendizagem da Matemática Superior I.

Palavras-chave: autogestão da aprendizagem; Contabilidade e Finanzas; diagnóstico; Matemática Superior.

INTRODUCTION

In the 21st century, profound changes are being experienced in the Teaching-Learning Process (PEA), increased by technological development (Sánchez *et al.*, 2020). Societies are characterized by being more connected, with more information, more publications and greater diversity in all areas of life (Solórzano, E. *et al.*, 2020). This panorama challenges the University, in charge of training professionals, to resize the way of teaching, due to its direct relationship with the new possibilities that allow access and use of technologies in the self-management of learning for the preparation of the teacher and the student. in accordance with current changes.

Scholars such as: Bonet *et al.* (2018); Leyva & Lariot (2019) Zae *et al.*, (2020); Metaute *et al.* (2020) particularize and define self-management of learning and introduce procedures, strategies and technologies that support this process. On the other hand, Sánchez *et al.* (2020) assessed the availability of computers for educational purposes in European and Latin American homes, and particularly in Cuba, where progress continues; But the Cuban reality with a blockade imposed more than 60 years ago, together with the crisis caused by the COVID-19 pandemic, largely prevents its progress. As a consequence, not all people enrolled in Higher Education have the necessary technologies, in the broad sense of the word, to be able to carry out their university studies, despite the enormous efforts of the Cuban State in the computerization of society and its digital transformation. Therefore, it is necessary to reflect on the design of the Teaching-Learning Process with the means to be used, taking into account the digital divide (availability of access and use of technology in all sectors of society). It is necessary to search for alternatives that contribute to overcoming this reality, so that all interested students with the necessary intellectual capacity have access to the essentiality of the content to be studied, with an increase in self-management of learning. In this way, we

can contribute to achieving education for all without exception.

With the massification of education in Cuba, the centers attached to the Ministry of Higher Education have included careers that are studied in distance learning or in meeting courses, such as Accounting and Finance. The Municipal University Center (CUM) of Jagüey Grande, Matanzas, offers and has as a discipline Mathematical Economic Methods, which includes the subject Higher Mathematics I. Regarding the Teaching-Learning Process of differential calculus, a central theme in this subject, They have carried out multiple investigations, recognizing its particularities, its contribution to the development of mathematical thinking and the difficulty of understanding it if the appropriate methods are not used. Naveira & Valdivia (2022) affirm that the latter are important to arrive at theoretical contributions about the demands of this process for Higher Education, particularly for careers such as engineering or others focused on administration, but they do not indicate how the direction of these should occur. contents and do not refer to the importance of the functions attributed to the direction of the process.

The previous approaches are also reflected in the study carried out by the author with surveys and interviews with students and teachers in several municipalities of the province, where she presents it as one of the most difficult subjects to study independently, due to the level of abstraction, logical reasoning and skills that it requires in carrying out its tasks. All of this is resized by expressing that the great challenge for those who teach Mathematics remotely is based on three fundamental aspects: the supporting technological characteristics; the presence and performance of the teacher in terms of assisting them in their learning process and the development of materials that offer access to concepts.

The previous statement was investigated in the investigative process. Teachers allude to their poor theoretical-methodological

preparation to face the teaching-learning process in this subject, due to the high use of technological means and the difficulties due to the insufficient or non-existent availability of technological resources. On the other hand, master's and doctoral theses defended in Cuba were studied, which allowed us to assess that there are few that have the teaching of Mathematics in Higher Education as their object of study. They all address a particular content, but not from the conception of the Teaching-Learning Process of this science with greater blended presence, a process with peculiar characteristics and in which self-management of learning is decisive.

When reviewing the international bibliography, the same situation is presented as in Cuban research, in which the following stand out: Faustino *et al.* (2019); González *et al.* (2018); Radovic *et al.* (2018), among others. It is perceived that, although these authors provide a set of fundamental elements to keep in mind during the process, a system of foundations, principles and laws are not formulated that describe the development of the Teaching-Learning Process of Mathematics in Higher Education in this modality and the previous elements are not studied for distance education and what concerns the self-management of learning in it. Most cases remain on the sidelines, studying some particular situations or cases in a fragmented way.

Research in Mathematics on the topic of self-management of learning through the use of Information and Communications Technologies (ICT) is more aimed at the study of self-management of knowledge; An example of this is the studies carried out by Calcines *et al.* (2017), or the use of ICT by Medina *et al.* (2018), but they are not directed at how the use of ICT will impact the self-management of learning.

It is therefore essential to solve this situation and go in search of more precise theoretical foundations for blended attendance in the Teaching-Learning Process of Higher Mathematics and, with this, the analysis of new didactic resources,

which promote "learning to learn." Mathematics", the development of teaching tasks that lead to the independent activity of the student and that facilitate the learning process, for which it is important to take into account the relationships of the student with the learning object and give the teacher a guiding and mediating role.

Based on the theoretical background presented, a university faculty and students are needed to assume the Teaching-Learning Process (PEA) in this modality for this discipline, so their preparation is a necessity and requires scientific work. intentional methodological approach to the characteristics of blended attendance and the environment of the university center. The bibliographic review carried out, as well as the interviews with the directors and teachers of different Higher Education Centers (CES) in the country, point to the non-existence of research that contributes to the elements raised. In Cuba, teaching materials are offered such as: textbooks (the same as in-person teaching), a program with the thematic plan, an analytical program and the objectives of each subject, workbooks and study guides, videos and activities on the Moodle platform, but they are not always oriented towards the student self-managing their knowledge. Even so, the availability of teaching resources is insufficient, taking into account the limitations they have with access to technologies and the poor preparation of teachers to face it with quality, elements that are obtained from the application of surveys, interviews, review of methodological documents, among others.

In accordance with the country's regulations, the Municipal University Center (CUM) of Jagüey Grande implements blended attendance in the Accounting and Finance degree. Its specificities make it very complex because its application depends, to a large extent, on the technologies and the teacher's preparation to face it. We work to develop education for all with the benefits of the Cuban University, as part of continuous education and for life.

Taking into account the existence of guidelines in the Mathematics subject, a study is urgently needed to ensure graduates at the height of these times and to contribute to solving the deficiencies detected. It is precisely the objective of this work to show the results of the diagnosis carried out, which allowed structuring a scientific result to minimize the difficulties. Correspondingly, methods and techniques were applied that allowed the diagnosis of the current situation; Among them are: analysis-synthesis, historical-logical, inductive-deductive, documentary analysis and surveys and interviews.

Within the development trends worldwide, the strengthening of blended attendance appears. The study of the historical antecedents allowed us to allege that in Cuba it was first organized into: courses for workers, evening, night, by meeting, directed; fundamentally oriented towards independent work and self-preparation. It was supported by written teaching materials aided by audiovisual media such as educational television, radio, audio-cassette and the written press. It emerged as a mixed development model in the Higher Education centers themselves, linking blended education with face-to-face education.

In blended learning, autonomous learning is present through the management and self-management of learning, in which the PEA is distinguished by the separation of the teacher and the student in time and space. It is supported by the use of different educational resources that allow adaptability to the cognitive needs and learning pace of students, as well as multidirectional communication between the different actors in the training process. Tutorial work is essential for its development, as expressed in the Regulations for the organization and methodological work of Higher Education in Cuba.

The Ministry of Science, Technology and Environment (CITMA) states that knowledge management is the set of processes and tools that allow the systemic

integration of actions for the exploitation and use of knowledge, information and experience accumulated in qualitative development. of an organization. In this same document it appears that, for correct knowledge management, it is necessary that the following elements be efficiently linked: adequate information management, appropriate and intensive use of information technologies, innovative approaches to communication practice, correct and modern human resources management.

Knowledge management is frequently related to obtaining information, with the individual or collective ability to generate, disseminate, share and use knowledge from the assimilation of information that is transferred in the form of knowledge and transformed. in experience of individuals; which allows the application of knowledge. This corroborates the importance of each individual self-managing their knowledge to actively contribute to these transformations.

Self-management is classified as a comprehensive process of organizational strengthening, sequence of actions and continuous training, which is to strengthen one's own capabilities before, during and after the delivery of the acquired good, discovering the capabilities, skills, individual abilities and directives of a group of the population. Self-management is revealed in the context of the teacher's professional pedagogical and personal performance from the planning of appropriation, execution and self-evaluation actions, where the interrelationships are evident: student-teacher, teacher-teacher, teacher-society. When the teacher actively seeks the information he needs, he is able to reflect, evaluate, and personally elaborate the information he obtains and articulate it with the information he has; In the same way, it uses intellectual operations in choosing behavioral alternatives and in structuring responses to different situations and environmental demands.

The idea of independent study appears clearly, of being self-taught, which implies a high degree of interest and commitment, of responsibility, who must plan and organize their time to respond to the demands of the course they follow and develop the will to learn. systematic study, which is identified as self-management of learning.

Self-management of learning is the action of systematically activating and maintaining metacognitive, motivational, affective and behavioral processes, in order to achieve learning objectives, in a particular context (Zimmerman, 2008). It involves four distinctive phases: planning, monitoring, control and evaluation, in which the individual must identify their own learning needs, establish their own learning objectives, search for resources (including instructors, classmates and materials), choose and implement their own learning strategies and methods and carry out activities to evaluate the results.

The ability to self-manage learning is important and pertinent in education, because this active factor in the learner is what makes it possible to achieve "learning to learn", implying that the person is capable of working as a team, communicating assertively, take advantage of their participation in heterogeneous or homogeneous groups, to behave ethically and sensibly in the community and to share their knowledge. It coincides with the definitions expressed and it is provided that the self-management of learning and with it that of knowledge, are activities that the subjects actively carry out by themselves. Process centered on the student, the main protagonist; that is, less dependent on a teacher or facilitator, manager of their training.

In 2002, changes occurred in Higher Education, considered the most far-reaching university reform, when it proposed to guarantee full access of the population to university processes, through the creation of university centers and branches in the municipalities. These

transformations in education must lead to a rethinking of teaching and learning methods that seek greater flexibility, where "learning to learn" is the key to ensuring that the student reaches the necessary cognitive maturity within a new culture of education. self-training, developing habits that make you more intellectually autonomous (Mendo *et al.*, 2022).

University institutions offer teaching materials, but they are generally those used in face-to-face teaching, without the necessary adaptation to this modality of study, which is why the availability of teaching, digital and printed resources for the self-management learning process is insufficient. and, in particular, in the teaching-learning of Higher Mathematics. Furthermore, insufficiencies persist in the distance PEA that justify the need for teacher and student preparation to take on the challenge. The above makes us reflect on the scientific-research and professional work, because it still does not cover the needs of social impact and relevance that correspond to the problems of blended presence. This implies achieving a higher quality in education, which is why it is necessary for teachers to reach a level of professional development that allows them to apply more effective teaching practices to the pedagogical problems that this modality generates in daily actions and perfect teaching activity. and effectiveness in methodological work. To obtain these results, it is essential to perfect didactic strategies when offering consultations, helping the student to be able to self-manage their learning, even in minimal conditions of the use of technology.

Finally, therefore, the management of necessary actions is required to achieve the objectives proposed by the Accounting and Finance degree, which requires the distance modality to occupy an essential place both in the pedagogical process and in the development of the territory. The work of the University must take into account the improvement of the PEA, with the action of all the factors inherent to this process, through a flexible pedagogical

model appropriate to the characteristics of the students, so that independence and effort are enhanced. staff.

That is why this article aims to: show the results of the diagnosis carried out, which allows structuring a scientific result to minimize the difficulties detected.

MATERIALS AND METHODS

The methodological procedure of the research is based on the dialectical-materialist method as a general methodology for the analysis and interpretation of social problems, as well as a guide for the transformation of society. The theoretical level research methods and techniques were used: analysis-synthesis, which was applied in the bibliographic review process and other relevant documents such as Study Plan E and Resolution No. 47/22 (MES, 2022); the historical-logical method, in the study of the trends that have highlighted the essential moments of its own evolution through which blended attendance has passed, through the analysis of the historical antecedents and different specific ways of manifestation of the problem studied such as: the needs of preparation and skills of teachers and students to take on the PEA of Higher Mathematics I in this way; the inductive-deductive method, used to substantiate the research problem and propose a solution, as well as achieve the generalization of the study and the possibility of implementing a didactic alternative.

Empirical methods were used to verify and substantiate the research problem, as well as to evaluate and characterize the behavior of the dimensions that make up the research variable. Among them are: student surveys, to verify the level of knowledge about the development of blended learning in the PEA, aimed at obtaining data about the preparation needs in the Higher Mathematics I subject; the interview with Mathematics teachers at the

University of Matanzas, aimed at knowing the procedures they use to contribute to the self-management of learning and teach Higher Mathematics I. In the analysis of documents, the following were used as important documents: the Study Program E, governing document of the PEA and Res No. 47/22, preparation of teacher classes, prepared teaching materials, documents on interactive platforms, student evaluations, methodological work plans, teacher evaluations, among others, to study the situation actual and desired of the variable.

In the case of teachers, we worked with the CUM of the province in which the degree is taught in blended conditions, considering that, in the CUM of Jagüey Grande, Matanzas, only one teacher and the author work. The previous experience of the teachers in directing this process remotely is little, since 25% (two teachers) have taught it in this modality five times, another 25% twice and 50% once or never. If it is taken into account that experience contributes to the improvement and deepening of the direction of the Teaching-Learning Process, this is an element that constitutes a weakness in the diagnosed population.

In the case of students, a simple random sample of 168 students was selected from a population of 280. An error of 5% and a reliability of 95% was used. The expression used to calculate the sample size is:

$$n = \frac{NZ^2 P(1-p)}{e^2 (N-1) + Z^2_{\alpha/2} P(1-p)}$$

Where:

n: sample size,

N: population size: 280 (1- 100%:
reliability: 95%),

Z $\alpha/2$: normal value for a given reliability:
1.96

P: expected proportion of the percentage to be measured: 0.5 e: error: 5%

14 consultations were observed, belonging to the differential calculus topic and four methodological activities in the CUM and the preparation of the Higher Mathematics I subject in each university center was reviewed, prior to the development of the Teaching-Learning Process of the topic in which the queries.

The interview was applied individually to the directors of the municipal university centers and department heads, and to those responsible for the Mathematics subject in the Municipal University Centers. 100% have degrees in Education and have more than 20 years of teaching experience.

Two surveys were administered, one of them to 100% of the teachers. Of them, five have degrees in Education in the specialty of Mathematics (62.5%) and three are university graduates of other specialties such as engineering (37.5%). The other survey was applied to the random sample of 168 students, representative of the population of first-year students of the Accounting and Finance degree in the distance modality of the University of Matanzas.

In the analysis of documents, the following were taken into consideration: base curriculum, Study Plan E for the Accounting and Finance course for blended course, Study Program for Higher Mathematics I, plan E for course by meeting, class plans (corresponding to each one of the teachers who gave consultations in the first year of the Accounting and Finance degree), Resolution 47/2022, specializing in what is related to blended attendance and the distance education modality.

As a pedagogical test, the questions on applications of differential calculus to economics from the final exams of the second year of Accounting and Finance were considered, in which the diagnosis was made.

In the statistical processing, the median of the data obtained with the applied instruments was calculated. In the case of the student survey, the Kolmogorov-Smirnov statistical test of goodness of fit was applied, with a significance level of 1%, which allowed the determination of trends in the students' opinions.

RESULTS

It was confirmed, through the review of the methodological and organizational documents of the course, observation of teaching activities, interviews and surveys with teachers, students, graduates, department heads of different CES in the country, among others, that there are difficulties in the implementation of the E study plan with emphasis on blended attendance. Theoretical gaps are revealed in the didactic, methodological and theoretical work, which affect the self-management of learning in the Teaching-Learning Process of the degree, with emphasis on the Mathematics discipline: difficulties in learning the contents of the subject Higher Mathematics I, based on the insufficiencies with the basic knowledge of previous levels; weak development of skills in the use of technology to address the contents of the Higher Mathematics I subject; limited integration of the contents of the Higher Mathematics I subject, based on a fragmented study of it; few cognitive skills for working with teaching media and materials that allow self-management of learning; existence of difficulties in planning and organizing the Teaching-Learning Process in this modality of study for the Mathematics discipline, in which the selection of teaching methods, means and forms of organization to achieve the learning of Higher Mathematics I is not always in correspondence with the distance modality; presentation of decontextualized mathematical tasks in the study guides, which are neither motivating nor meaningful for students; the solution of complex tasks is carried out by the teacher, in the guide or in the consultation activities,

without stopping to stimulate the students to carry them out independently; control and evaluation is almost non-existent, it was observed very limited throughout the process, so the levels of help are scarce and sometimes lead to failure; difficulties in the development of support materials that allow greater autonomy and self-management of learning by students; dispersion of literature, with limited access to the essentials of the contents.

Based on the situation described, and when dealing with the reality linked to the need to strengthen self-management of learning in order to aspire to quality professional performance, a scientific contradiction is demonstrated between what Higher Education aspires to with greater access, income and graduation of the population with the necessary preparation for their successful performance as professionals and the limited didactic-methodological procedure for self-management of learning in the Teaching-Learning Process of Higher Mathematics in semi-presential conditions, which contributes to the training of students. professionals in the Accounting and Finance career at the University of Matanzas. To characterize the self-management of learning in the Teaching-Learning Process of the Higher Mathematics I subject in Accounting and Finance in blended learning, the first year of training, the starting point was the analysis of the Professional Model and the training programs. To achieve this, the following actions were carried out: operationalization of the variable, sample selection, application of empirical methods, analysis of dimensions and indicators, and final assessment of the current state of the variable.

From the systematization carried out of the object of study and the field of action, the definition of the research variable and the operationalization of the variable in dimensions and indicators resulted.

For the study variable, three dimensions were identified: actions of the teacher as a tutor, student performance and learning

results. Below are the indicators determined for each of the dimensions.

Dimension 1. Teacher actions as tutor.

1.1. State of the structuring of the didactic components.

1.2. Quality of tasks.

1.3. Relevance of your didactic procedure to promote developmental learning.

1.4. Efficiency in the configuration of student-teacher relationships to promote "learning to learn" Mathematics, through self-management of learning.

Dimension 2. Student performance.

2.1. Level of motivation to learn differential calculus.

2.2. Appropriation mode (active, reflective and regulated).

2.3. Level of self-management of learning.

Dimension 3. Learning results.

3.1. Level of assimilation of the system of knowledge and skills related to differential calculus.

3.2. Level of achievement achieved in solving economic problems that require differential calculus.

3.3. Level of development acquired in self-management of learning throughout the entire Teaching-Learning Process.

3.4. Level of student-teacher communicative relationship.

Analysis of the status of dimensions and indicators

To comprehensively evaluate the indicators, the mode of the results obtained in their evaluation was calculated for each of the instruments applied. This was

possible by establishing an equivalence between the scales used in the instruments and the scales determined to evaluate the indicators.

Dimension 1. Teacher actions as tutor.

1.1. The state of the structuring of the didactic components in the Teaching-Learning Process of Higher Mathematics I, so that students carry out self-management of learning, was evaluated as not very adequate, which is evident in the fact that sometimes teachers structure in their consultations the didactic components, so that students carry out self-management of mathematical learning, based on the guidelines so that they can solve economic problems. In the methodological activities, the treatment given to the structuring of the didactic components is insufficient, depending on the students' self-management of learning.

In the consultations observed and their revised plans, insufficiencies were revealed in: the mastery of the didactic components by the teachers and the little correspondence of the individual study oriented with the objectives of the program and the levels of assimilation; in the selection and application of methods, in order to achieve greater motivation of the students and the reflective, evaluative and independent search for knowledge and the fulfillment of the objectives; in the tasks, depending on the interests of the students and practical situations in their professional environment, which contribute to the development of self-management of learning mathematical content. In the orientation of independent study, undemanding tasks are proposed where, for example, economic problems are not promoted where the results are obtained by the students themselves.

The subject program does not respond to the distance course but to the meeting course, because the didactic components are not directed to the essentiality of the contents. The location of the contents and the number of hours/consultations

assigned is insufficient, which does not favor the development of the assimilation of the contents.

In resolution 47/2022, article 19, autonomous learning is included as a requirement, supported by the use of different educational resources that allow adaptability to the cognitive needs and learning pace of students, as well as multidirectional communication between different students. actors in the training process, where tutorial work is essential; For this, the materials prepared by teachers are insufficient. In the books: *Mathematics for Economic Analysis I and II* (Sydsaeter, Hammonnd, 2003) and *Mathematical Laboratory IY II* (Marrero *et al.*, 2010), the contents are not focused on better understanding, as sometimes steps are omitted. algorithms assuming that students master it, which does not favor self-management of learning and therefore motivation towards "learning to learn" Mathematics to solve problems of the profession.

1.2. The quality of the tasks for carrying out self-management of mathematical learning was evaluated as not very adequate, which is manifested in that:

- They are almost never related to the context; Even though they sometimes refer in a general way to social practice, the specific context of the profession is not taken into account. They are not very varied and do not require increasing levels of assimilation, since they are limited to the resolution of mathematical problems without links to economics.
- It does not always promote the search for information in different sources and media.
- The establishment of interdisciplinary relationships with the other subjects of the curriculum and the performance of collective work with individual implications is rarely required.

1.3. The relevance of his didactic procedure to promote developmental learning was evaluated as not very adequate, manifested in that:

- Teachers almost never achieve, with their didactic procedure, that students can self-manage mathematical content, since they do not consider the individual possibilities and differences of students, nor do they combine individual and collective work using different forms of organization; The methods and procedures do not guide the student towards searching, independent of knowledge in various sources and media.
 - The orientation towards objectives is weak, because there are few activities aimed at helping the student recognize the objective of the consultation and the steps necessary to achieve it, by carrying out actions that encourage reflection and assessment of the content.
 - Generally, learning strategies that favor the assimilation and fixation of the new subject are not applied.
 - The control exercised over student learning lacks systematicity and does not always aim to verify the results of self-management of learning.
 - The study programs are directed towards the blended modality, in course by meeting, so they lack the essentiality of the contents for the modality being studied, which affects the didactic procedure of the teachers for the proper development of the Teaching Process. -Distance learning.
 - In the methodological activities, the work with teachers is insufficient to prepare them to promote learning strategies and individual work for self-management of learning. No guidelines are offered to diagnose the potential and difficulties in content related to the profession, nor is it planned how to treat it.
- In the consultations observed and the revised plans, it became clear that the new contents are related to the previous ones, but very little to daily life and the profession. There are few actions aimed at preparing students to self-manage the learning of mathematical content, because the tasks do not include actions to carry out learning strategies. The teacher's work towards motivation for learning is not done from tasks with content from daily life and the profession.

1.4. The effectiveness in the configuration of student-teacher relationships to promote "learning to learn" Mathematics, through communication, was evaluated as not very adequate, evidenced by the fact that sometimes the use of methods and procedures by students is stimulated from the consultation; that these contribute to their development, in particular, to organize, plan, control and evaluate their work, that they stimulate confidence in their own abilities, the establishment of goals, reflection, the application of strategies to learn, the positive assessment of errors, cooperative work and the development of positive attitudes. The actions to guide teachers in actions to achieve relevant communication between the protagonists of the process are insufficient. In the consultations observed and their revised plans, it became clear that learning and mental work strategies specific to the Mathematics subject are not promoted.

In the dimension "Actions of the teacher as a tutor" the following difficulties can be pointed out in general terms: the structuring of the didactic components is sometimes not adequate; The tasks are of little interest to the students, since most of them are not linked to the profession and the didactic procedure of the teacher and the teacher-student relationships do not allow them to carry out self-management of learning, nor "learning to learn." Mathematics. Among the potentialities of the dimension, the willingness of teachers to improve themselves in the contents

related to the applications of differential calculus in economic problems and its didactics can be considered.

Dimension 2. Student performance.

2.1. The level of intrinsic motivation to learn Mathematics content is moderately adequate, which is manifested in that:

- Sometimes the intrinsic motivation to learn is achieved and the consequent understanding of the role of Mathematics in the economy and, in turn, in society, in the Teaching-Learning Process.
- The teacher's work towards motivation for learning lacks tasks related to the applications of differential calculus in economic problems and of interest to students.
- The selection and application of methods is insufficient, in order to achieve greater motivation of the students and the reflective, evaluative and independent search for knowledge and the fulfillment of the objectives.
- There are insufficient tasks based on the students' interests and practical situations in their professional environment, which contribute to the development of skills and their autonomy. Lack of interest in carrying out learning activities and exchanges with peers in the group.

2.2. The mode of appropriation (active, reflective and regulated) of the mathematical contents was evaluated as not very appropriate, evidenced by the fact that:

- They almost never or never solve problems by using different solution paths and reflection on the path used to resolve them is limited.
- 75% of teachers and 56.8% of students consider that they almost never achieve active, reflective and regulated appropriation of

mathematical content, which justifies that students do not demonstrate skills to analyze economic problems of the profession, since most of the time they only come to propose what is given and what is sought without finding the way to a solution.

- Generally, they show little independence, flexibility, rationality, and originality in thought processes and problem solving.

23. The level of self-management of learning was evaluated as not very adequate, manifested in that:

- Self-management of learning mathematical content is almost never achieved. 75% of teachers consider that students do not have the technologies, in the broad sense of the word, to work independently, without the presence of the teacher. They almost never apply previous knowledge in solving the economic problems of the profession, which means that students tend to fail to self-manage their learning. They solve very few problems related to their professional context and almost never related to their personal interests.
- Rarely do students independently carry out different types of tasks in which they integrate the contents, which respond to different levels of assimilation and which require the search for preceding contents.
- In 67% of the consultations observed, it was evident that a psychological climate towards autonomous learning is not favored, giving students the possibility of expressing their opinions and judgments to contribute to the development of their mode of action and motivation and motivation are not achieved. willingness towards autonomy.
- In the consultation plans, there is almost no orientation towards objectives through reflective and

evaluative actions of the students, taking into account why, what, how and under what conditions they are going to learn.

- In the "Student Performance" dimension, the following difficulties can be pointed out in general terms: students are not sufficiently encouraged to get involved autonomously and independently in the mathematical content and in the search for the necessary knowledge and not always Necessary relationships are established between the contents, nor are the different ways of obtaining mathematical concepts and definitions distinguished by students. Among the potentialities of the dimension, it can be stated that students do not reject Higher Mathematics I.

Dimension 3. Student learning outcomes.

3.1. The level of assimilation of the system of knowledge and skills related to Higher Mathematics I was evaluated as not very adequate, which is evident in the teachers' opinions; Students almost never demonstrate the knowledge and skills of Mathematics in the different types of tasks, which does not allow them to integrate and systematize the contents to solve economic problems of the profession.

The trend in the students' opinion is that they almost never achieve the assimilation of the system of knowledge and skills related to Higher Mathematics I.

The actions carried out by the teacher in consultations to control and evaluate learning are insufficient and give students few possibilities to demonstrate the assimilation of the content.

Good results are not achieved in the pedagogical test, the content evaluated is not simple and it considers previous skills to analyze economic problems of the profession, applying differential calculus.

3.2. The level of achievement achieved in solving economic problems of the profession, which require differential calculus, was evaluated as inadequate, which is evidenced by the fact that students rarely adequately develop the tasks where they must develop skills related to differential calculus. , according to the opinion of the teachers.

The tendency is that they almost never have achievements in solving tasks that require differential calculus, which is manifested in that they do not have the skills, nor the level of development of their logical reasoning and personality qualities to comprehensively carry out the analysis. of the problem.

In the observations of consultations, it was observed that in 58% of these, very few tasks are developed that promote, in their implementation, that students evaluate the results obtained and reach conclusions.

3.3. The level of development acquired in the self-management of learning throughout the entire Teaching-Learning Process was evaluated as inadequate, manifested in that, from the survey of teachers, it was obtained that 88% of them recognized that in the resolution of the tasks, students do not arrive at the solution to the problems adequately using the concepts, terminology and symbology of mathematics and differential calculus in particular. The trend in the students' opinion is that they almost never achieve the solution of tasks, they are not able to correctly perform the problems using the concepts, terminology and symbology of mathematics and differential calculus in particular.

From observation to consultations, it was found that in these it is not possible for students to explain the tasks with the concepts, terminology and symbols of mathematics, and differential calculus in particular, in solving economic problems of the profession.

3.4. The level of manifestation of positive qualities in the students and the group was evaluated as inadequate, which can be seen in the fact that they do not always manifest positive attitudes and values during the Teaching-Learning Process; They barely demonstrate their positive qualities and those of the group, which coincides with the teachers' opinion and is justified by the fact that they are almost never able to identify, value and overcome the mistakes made and show it in the group's work. They do not expose the different tasks, independence and responsibility in their resolution nor do they demonstrate perseverance and a critical spirit; Furthermore, they do not always demonstrate industriousness and responsibility in the tasks they perform and show respect for the judgments and results obtained by their colleagues. In the observation of consultations, the insufficient actions that teachers develop to guide towards autonomy, independence, responsibility, perseverance and creativity were confirmed.

In the dimension "Student learning results", it is confirmed that students achieve a minimum mastery of the contents of Mathematics, present difficulties in the interpretation and resolution of economic problems and cannot put their knowledge and skills into action in the solving problems that require the use of differential calculus.

DISCUSSION

The analysis of the literature consulted allowed us to specify that authors such as Faustino *et al.* (2019); Gonzalez *et al.* (2018); Radovic, Black, Williams & Salas (2018), Naveira & Valdivia (2022), among others, provide fundamental elements for the Teaching-Learning Process of Mathematics, but they do not particularize for Higher Education in the distance modality and only study some situations or cases in particular, so deep action is needed to structure the guidelines of all the

contents of the Higher Mathematics discipline for the different university careers, in this type of study. In the same way, it agrees with what was expressed with Bonet *et al.* (2018); Leyva & Lariot (2019); Zae *et al.* (2020); Metaute *et al.*, (2020), who define and characterize self-management of learning, which is not addressed for the teaching of Mathematics, but it is agreed that self-management of learning is individual, it depends on the challenges and aspirations of people, as well as their responsibility for the tasks they must carry out. The authors of this article add that the preparation of the teacher and the student is necessary to face the challenges in this modality of study in which the use of ICT as mediators also appears, with greater force, according to its development in the knowledge society, to facilitate self-management of learning in the Teaching-Learning Process developing Higher Mathematics I.

The above allows us to define the self-management of learning in the Teaching-Learning Process in the Higher Mathematics I subject of the Accounting and Finance degree in blended conditions, as a comprehensive, planned, organized and correctly oriented process, essentially asynchronous, with employment. of Information and Communications Technologies, which favors the active participation of the student in the Teaching-Learning Process. This requires a high degree of interest, commitment and responsibility that allows you to respond to the demands of developing differential calculus skills to solve the accountant's professional problems. The previous definition points to the necessary preparation of the actors in the process to face it successfully and specifies that it must be in correspondence with the modes of action of the professional future and respond to the demands of society.

The results obtained in the diagnostic process on the current state of the research variable allowed us to conclude that the Teaching-Learning Process of Higher Mathematics I in the distance modality, in first-year students of the Accounting and

Finance degree, is characterized by insufficiencies in the direction of the Teaching-Learning Process towards independence and self-management of learning, conditioned by difficulties in the structuring of the didactic components so that students can achieve autonomy and thus be able to solve economic problems through calculation. differential; as well as in the methodological preparation and mastery of the essentiality of the knowledge system of Higher Mathematics I by teachers, to plan, organize, execute and control/evaluate the Teaching-Learning Process of Higher Mathematics I.

Student learning, verified through the results of the evaluations that are applied, is not favorable, looking at the process. It presents deficiencies in terms of self-management of learning, the search for the preceding and following content, which must be known to solve economic problems through differential calculus, arriving at the solution and the economic interpretation of the result, as well as with the skills, processes of thinking and personality qualities required for Mathematics.

The results obtained allow us to assess the need to look for alternatives that improve the diagnosed situation.

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Conflicts of interest:

The authors declare that they have no conflicts of interest of any kind.

Authors' contribution:

The authors participated in the design and writing of the work, and analysis of the documents.

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