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Artículos científicos

Diagnóstico de las causas de rezago y deserción en alumnos de la Facultad de Ciencias de la UNAM

Failure and Drop Out in UNAM's School of Science: Analysis of the Causes

Diagnóstico das causas de atraso e deserção em alunos da Faculdade de Ciências da UNAM

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Resumen

Debido a los históricos índices de rezago y deserción que se presentan en las carreras de la Facultad de Ciencias de la Universidad Nacional Autónoma de México (UNAM), la dirección conformó una comisión para que se realizara un estudio de las causas de dicho fenómeno. El objetivo de este trabajo es exponer los resultados del diagnóstico mencionado, así como hacer una serie de propuestas para mejorar los índices de rezago y deserción de los estudiantes de la Facultad de Ciencias. Este diagnóstico se realizó por medio de una encuesta y el análisis de sus respuestas durante las sesiones de los grupos focales que se conformaron para el estudio. Los resultados obtenidos muestran, en términos generales, que, en opinión de los profesores de la UNAM, sus estudiantes no cuentan con buenos hábitos de estudio; no vienen suficientemente bien preparados del bachillerato, y cuentan con habilidades de escritura y comprensión lectora deficientes. Por otro lado, 64 % de los profesores no conocen la oferta anual de cursos de actualización didáctica, y casi 60 % de los profesores considera estos cursos muy necesarios. Al final del estudio, con base en los resultados recogidos, se presentan propuestas para abatir el rezago escolar como alternativas a las clases magistrales que actualmente son la metodología didáctica preponderante en los cursos.

Palabras clave: deserción escolar, evaluación de la educación, fracaso escolar, evaluación del currículo, rendimiento escolar.

Abstract

Due to the historical lag and dropout rates that occur in the careers of the Faculty of Sciences of the Universidad Nacional Autónoma de México (UNAM), the management formed a commission to carry out a study of the causes of said phenomenon. The objective of this work is to expose the results of the afore mentioned diagnosis, as well as to make a series of proposals to improve the lag and dropout rates of the students of the Faculty of Sciences. This diagnosis was made through a survey and the analysis of their responses during the focus group sessions that were formed for the study. In general terms, based on the survey results, professors consider that their students do not have good study habits; they do not come well prepared from their high school courses, and their writing and reading skills are poor. On the other hand, 64% of the professors claimed not to be aware of the annual didactic training courses offered, and almost 60% of the professors consider this kind of courses very necessary. At the end of the study, proposals are also presented to reduce failure and drop

out, based on the results collected in this work, as alternatives to the didactic methodology that is currently the predominant.

Keywords: dropping out, academic failure, educational evaluation, curriculum evaluation, academic achievement.

Resumo

Devido à defasagem histórica e às taxas de evasão que ocorrem nas carreiras da Faculdade de Ciências da Universidade Nacional Autônoma do México (UNAM), a direção formou uma comissão para realizar um estudo das causas desse fenômeno. O objetivo deste trabalho é expor os resultados do diagnóstico supracitado, bem como fazer uma série de propostas para melhorar as taxas de defasagem e evasão dos alunos da Faculdade de Ciências. Esse diagnóstico foi feito por meio de uma pesquisa e da análise de suas respostas durante as sessões de grupos focais que foram formadas para o estudo. Os resultados obtidos mostram, em linhas gerais, que, na opinião dos docentes da UNAM, seus alunos não possuem bons hábitos de estudo; eles não vêm suficientemente bem preparados no ensino médio e têm habilidades de escrita e compreensão de leitura deficientes. Por outro lado, 64% dos professores desconhecem a oferta anual de cursos de atualização didática, e quase 60% dos professores consideram esses cursos muito necessários. Ao final do estudo, com base nos resultados coletados, são apresentadas propostas de redução da defasagem escolar como alternativas às aulas magistrais, que atualmente são a metodologia de ensino predominante nos cursos.

Palavras-chave: evasão escolar, avaliação educacional, fracasso escolar, avaliação curricular, desempenho escolar.

Fecha Recepción: Julio 2021 **Fecha Aceptación:** Abril 2022

Introduction

Academic lag and dropout at the undergraduate level in higher education in Mexico and in Latin America is a widespread and widespread phenomenon. As stated Rochin (2021):

> School dropout is a problem that affects students around the world, hence its consequences end up impacting society as a whole. Some of the causes have to do with the latent flaws in the study plans and programs, the deficiencies in the preparation and updating of the teaching staff, the family difficulties that the student must face or the lack of a goal or life project. (p. 3).

For their part, Seminara and Aparicio (2018) affirm that "university desertion is the subject of profuse research because its repercussions affect the political and economic management of States in matters of education, as well as the well-being of each institutional actor" (p. 44). It is, in effect, a problem of a multifactorial nature that must be examined both quantitatively and qualitatively from an objective perspective and based on solid statistical bases. This document compiles the findings of the Commission for Attention to Lag (CAR) of the Faculty of Sciences of the National Autonomous University of Mexico (UNAM) and proposes appropriate actions to remedy this situation.

The CAR was established at the request of the Directorate of the Faculty of Sciences of the UNAM in early September 2016. Made up of a group of academics and officials of the Faculty, its main purpose was to analyze the causes of the lag and propose mechanisms to increase performance and reduce student lag and dropout.

To face this task, the CAR designed a two-phase study aimed at identifying the factors that, in the opinion of professors and students belonging to the careers of Area I that are taught in the Faculty of Sciences, affect the lag students' school. The results presented in this article correspond to the first phase of the study and focus on the surveys and interviews applied to teachers. It is still pending to develop the second phase, focused on collecting the opinions of the students, which will complete the study and offer a much more precise vision thanks to the contrast and comparison that can be established between what is reported by teachers and students.

Focus groups of teachers were formed and, with the support of the departmental coordination, particularly Physics and Mathematics, a survey was carried out to find out their perception, in different areas, about the causes of student lag and failure.

The specific objectives of the CAR were the following:

1) Have as precise a knowledge as possible of the causes of failing Actuarial Science, Computer Science, Earth Sciences, Physics and Mathematics.

2) Know the opinions and points of view of the full-time teaching staff and subject of the careers of Area I and groups of subjects in order to particularize the causal elements.

3) Have solid foundations to design and implement strategies that affect the reduction of failure and delay rates

In this proposal, the target population of the study was set as professors of the careers considered. It should be noted that two components were established for the research to be carried out: a qualitative one, based on conducting focus groups made up of teachers, and a quantitative one, made up of a survey applied to a random sample of teachers.

Method

The method used in the data collection processes included qualitative and quantitative techniques. The first were intended to broaden the vision of the problem of academic backwardness of students in the areas of physical-mathematical sciences, its causes and suggested solutions. The second were aimed at systematically and objectively measuring the opinions of a random sample of full-time and subject teachers through a self-administered survey. Specifically, several focus group sessions were held; a questionnaire of 55 questions was designed followed by its application to a random sample of 263 teachers and finally the analysis of the results obtained was carried out.

Focus groups

Four focus group sessions were held. The groups were made up of between 5 and 10 invited teachers. One member of the commission acted as moderator while the other members acted as rapporteurs. The group's attention was focused on various issues that, in the opinion of the CAR, were relevant for understanding and addressing the backwardness and school dropout; the topics were submitted to the free opinion of the participants. The opinions were collected literally, without confrontation of points of view or seeking to adopt a specific position or conclusion. The sessions were held in a room of the Secretariat for Open and Continuing Education, equipped with audio and video recording, and lasted approximately

two hours each. In total, 24 teachers participated in this exercise. And a total of approximately 10 hours of recording was added.

The mechanics of the sessions were as follows: presentation of participants, introduction, approach to the form of development and participation, presentation of terminal efficiency statistics by career and percentages of failure of Area I subjects, topics to be addressed, associated fundamental questions to each theme, and finally conclusions of the session.

The information collected sought to broaden the vision of the CAR, which in the next phase designed a survey to systematically cover a larger sample. This prevented the survey design from being limited to the commission's vision.

Diagnostic Survey on Causes of Academic Gap

A data collection instrument was designed, consisting of a questionnaire with pre-coded questions with dichotomous responses, multiple responses, and open-ended questions. The questionnaire consisted of 55 questions divided into the following areas: 1) general data of the interviewee, 2) study plans and programs, 3) students, 4) teachers and assistants, and 5) administration and facilities.

Sampling frame

There was a file of 981 professors with the subjects they teach, provided by the Division of Professional Studies, from which the subjects of Area I were filtered to validate and eliminate repeated records, etc.

Sample selection

A group of 364 professors was selected by simple random sampling, to which they were given, through students of the Statistics and Sampling courses who were in charge of locating them, a sealed envelope with the printed questionnaire so that the teachers will answer it and return it on the date agreed with the student messengers.

Review, capture and validation

Once the answered questionnaires were concentrated, they were reviewed, captured and validated by a group of students trained and coordinated by the teachers who were in charge of data processing.

Statistical data processing

The survey database was converted to SPSS format for the issuance of the basic plan of tabulations and graphs. The open questions were subjected to an analysis and systematization of texts based on the topics that the answers addressed.

Results

Table 1 breaks down the field statistics results of the questionnaires sent to the selected sample of 364 professors from the Faculty of Sciences from all careers.

Tabla 1. Resultados de campo

Resultado	Número	Porcentaje (%)
Cuestionarios contestados	263	72.3
Cuestionarios rechazados	50	13.7
Profesores no localizados	17	4.7
Cuestionarios no devueltos	34	9.3
Total	364	100.0

Fuente: Elaboración propia

Of the total of 364 teachers selected, there was an effective response of 263, which is equivalent to 72.3% response. The high number of non-response, excluding 13.7% of rejection and considering that it is a closed population, is attributed to the fact that the survey was applied on dates close to the end of the semester, which complicated the location of teachers and recovery of answered questionnaires. until the deadline. Despite this non-response rate, the number of effective questionnaires guarantees a precision of just over 5%

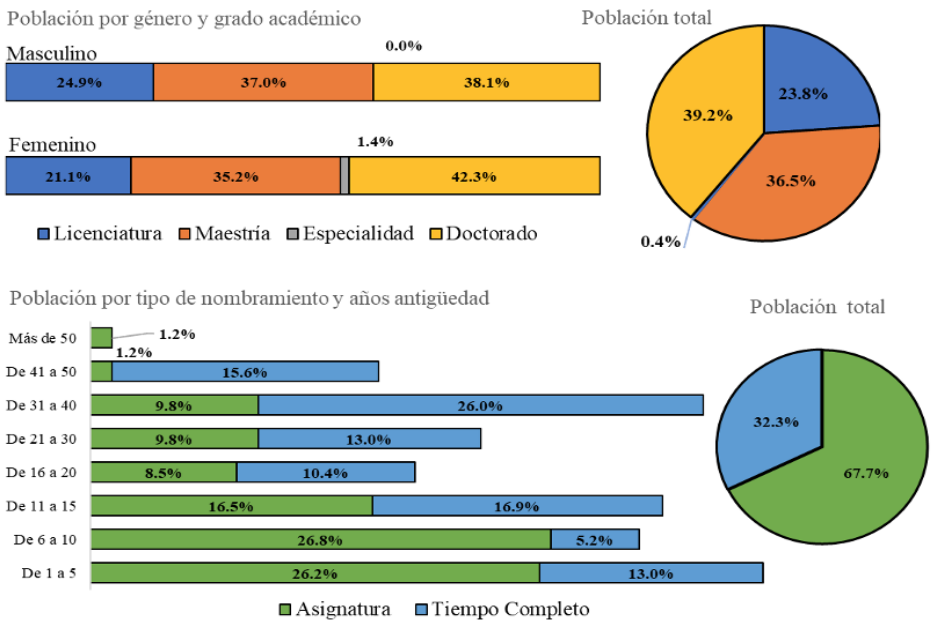
in the estimation of proportions close to 0.50, with 95% confidence and considering the correction factor for finitude.

The results of the surveys are presented below, divided into the following five sections: 1) general data of the interviewees, 2) study plans and programs, 3) students, 4) teachers and assistants, and 5) administration and facilities.

Data from section one of the questionnaire (general data)

The general data of the respondents (figure 1) show that the teaching staff of the Faculty of Sciences have a high academic degree, since three quarters of the teaching staff have postgraduate studies. However, some have little experience: about a fifth of the faculty have less than five years' tenure. There is also a significant difference in gender distribution: of those surveyed, just over a quarter of the teaching staff is female. Only a third of the teachers surveyed are full time and two thirds are subject teachers. As expected, the type of appointment is related to the number of years teaching. Most of the professors with the greatest number of years of seniority are full-time, of which a third part has more than 30 years of seniority. By contrast, almost half of the subject teachers have less than 10 years of experience and a quarter have less than five years of experience.

Figura 1. Distribución de la población por grado académico, género, tipo de nombramiento y antigüedad (en años de docencia)



Fuente: Elaboración propia

Data from section two of the questionnaire (study plans and program)

In general, the assessment of the study plans was positive. On a scale of 1 to 10, where 1 is "incomplete" and 10 is "complete," 82% of respondents felt that the curricula deserved a rating of eight or higher.

Regarding the updating of the content of the programs, it can be seen that, of the total number of respondents, 72.4% considered that the updating of the content of the study programs of the subjects is adequate, since they gave it a rating of eight or higher.

Finally, 87.6% of the teachers believed that the order of the subjects they teach (seriation) is appropriate with respect to the rest of the curriculum.

The general opinions of the study plans were collected, in which the contents that should be reviewed are specified, as well as suggestions for serialization for some subjects. In addition, it is considered that the serialization must be respected. In total, 76 subjects were represented in the subjects taught in the study.

In addition to the quantitative results, it is important to highlight some of the comments made in question 18 of the questionnaire, where the professors gave free opinions on this second section, related to the study plans and programs.

Within the comments, reference is made to the need to offer students a more practical approach, so that students can have more and better tools, skills and abilities in order to be more competitive in the workplace.

The establishment of a propaedeutic course is recommended for students of the Physics, Mathematics, Actuary and Computer Science careers where problems that combine algebra, analytic and Euclidean geometry, as well as precalculus, are addressed. In more than one comment, the idea of extending the semester is present, even to 18 effective weeks of class without bridges and holidays.

Data from section three of the questionnaire (students)

On a scale from 1 to 10, where 1 is total rejection and 10 is total acceptance, 70.6% of the teachers surveyed stated that students accept to a high degree (with a score of eight or higher) the scientific vision necessary to understand science. matter.

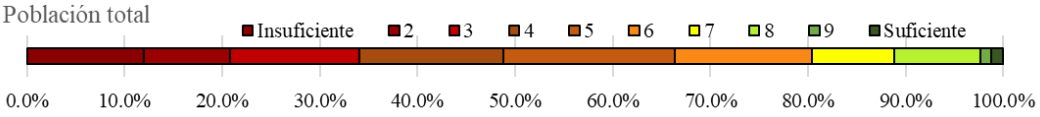
In general, it is considered that the students do not come sufficiently prepared from the baccalaureate. The assessment of the logical reasoning skills acquired in high school and necessary for the degree was negative. Only 8.6% of teachers rated these skills as eight or

higher, on a scale where 1 is insufficient and 10 is sufficient. In contrast, 63% rated these capabilities a five or lower.

In addition, 76.2% believed that these deficiencies affect the performance of the students, assigning an eight or a higher figure in this area, on a scale of 1 to 10, where 1 is little and 10 is a lot.

Likewise, 66.7% rate with five or less the sufficiency of the knowledge acquired in high school to face the subjects of the first semester. Only 11% gave a rating of eight or higher, as reflected in Figure 2.

Figura 2. Pregunta 22. ¿Son suficientes los conocimientos que adquieren los alumnos en el bachillerato para enfrentar las materias del primer semestre?

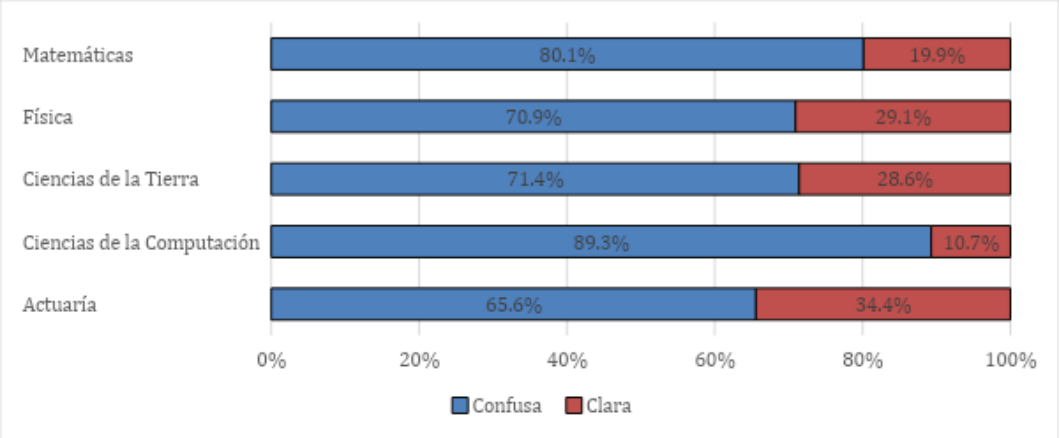


Fuente: Elaboración propia

The sufficiency of the information received by students regarding careers was also rated negatively. More than half, 63%, considered that the information provided is insufficient, as reflected in the grade assigned to it: five or less on a scale of 1 to 10. Only 11.5% rated the information received by students regarding runs with a value of eight or higher.

In general, it was considered that the expectations of the students regarding the careers in Area I and their contents are confusing, as can be seen in Figure 3.

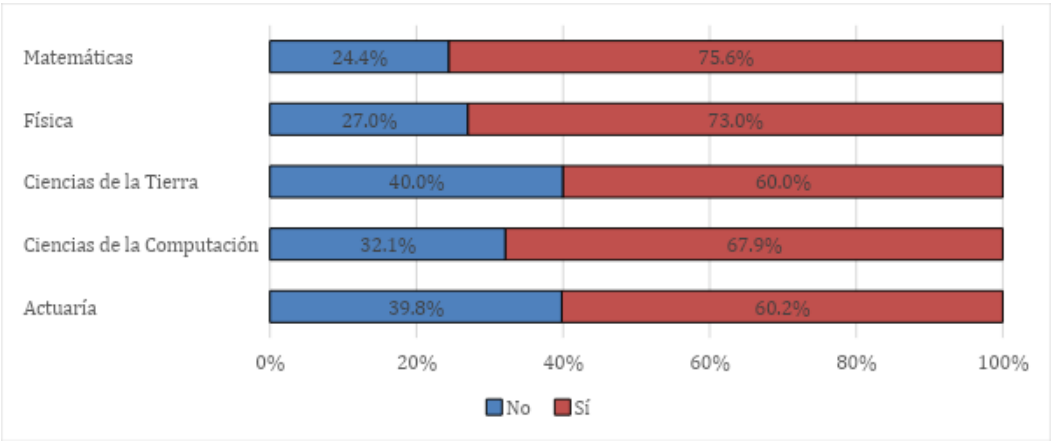
Figura 3. Pregunta 24. ¿Qué tan claras considera que son las expectativas que los alumnos tienen sobre la carrera y sus contenidos al ingresar?



Fuente: Elaboración propia

On the other hand, most of the respondents considered that the students of the careers of Area I had problems of motivation and vocation, which affects the academic performance of the students, as can be seen in figure 4.

Figura 4. Pregunta 25. ¿Presentan los alumnos problemas de motivación y vocación que desalientan su desempeño académico?



Fuente: Elaboración propia

A problem that students face, in the opinion of the teachers surveyed, is that students have difficulties communicating. Indeed, 43% rated the sufficiency of the students' oral and written communication skills with five or one lower grade. Only a fifth of the teachers rated these abilities as a value of eight or higher.

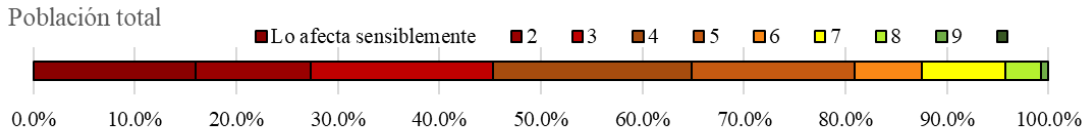
In addition, 81.8% of the total respondents considered that these deficiencies in communication skills do affect the academic performance of the students.

These observations are not limited to the Spanish language, since 79.2% of the teachers observed resistance on the part of the students to consult sources of information in other languages.

In general, the teachers' opinion regarding the students' study habits and discipline was negative. On a scale of 1 to 10, where 1 is inadequate and 10 is adequate, 61.3% of those surveyed rated these qualities as five or less; only 7.4% rated the study habits and discipline of the students with eight or higher.

Teachers also considered that students are affected by having to work to support their studies (see Figure 5). The majority, 80.8%, considered that it should be rated between one and five, and 15.7% of the total gave a rating of one, the most drastic, to express that the students are significantly affected by this situation.

Figura 5. Pregunta 31. Un porcentaje importante de los alumnos trabajan para sostener sus estudios. ¿Cómo influye este hecho en su desempeño académico



Fuente: Elaboración propia

As a result of the qualitative analysis obtained in question 32, where the free opinion of the professors is requested on section three related to the students, the answers were grouped into six large categories: 1) Motivation-vocation, 2) Tutoring, 3) Work and study 4) Distractors, 5) Teaching techniques, and 6) Chronic lag (from educational levels prior to the degree).

Regarding item one, "Motivation-vocation", the teachers believe that, at least in Physics, many students do not have a clear vocation or motivation, have enormous conceptual deficiencies and do not have, in general, abstract thinking (they continue in the concrete) .

It is believed that what "should" be combated is the lack of motivation and discipline as the main obstacles in the Mathematics career. One of the comments maintains that the demotivation comes from the emotionally hostile environment of the Faculty, for which it recommends the incorporation of philosophy or art subjects or workshops that serve to integrate the students.

No less important is the fact that the students know that dropping out of the courses does not have a significant impact on them, and for this reason they do not commit. To this last comment it should be added that at UNAM there is no concept of dropping students for reasons of lag or failure; This is only contemplated in cases in which students expressly request it or have committed a serious misconduct, contrary to university principles.

Regarding the relationship that exists with the students who work (item three), it is believed that the Physics degree is very difficult to cope with a work activity. In these groups where the student works there is more desertion or their attendance levels are low. It is argued that there is an affectation in the studies of those students who work and live far from the university, and if the fact that it is difficult for them to concentrate is added, the problem is aggravated.

In a proactive spirit, it is believed that there should be courses that allow working students to accredit the subject with criteria and activities that are different from one hundred percent face-to-face classes. In this sense, the alternative of teaching online courses is proposed, as well as increasing the offer of electives for the last two semesters in the evening hours, from six in the afternoon to nine at night.

One aspect that some teachers point out as the main distraction problem (item four) is the use of cell phones. In addition to the fact that the passivity of the students is very evident, they do not ask questions, they refuse to go to the blackboard, they do not read, they do not have independent study habits and they only do what is strictly necessary.

Although it did not correspond to the section, some teachers made critical comments about the type of teaching they teach. In this sense, they believe that it is necessary to implement new pedagogical strategies that help generate greater interest, commitment on the part of the students, as well as see the need to motivate the knowledge they acquire with situations to applications inside and outside the academy.

The largest number of opinions, however, focused on the chronic lag, or the lag that they bring from educational levels prior to the bachelor's degree (item six). In this sense, it refers that the students enter the high school very poorly prepared and without study discipline; they depend a lot on electronic elements; they are used to missing a lot of class; they do not deliver homework; they do not ask questions, and many of them do not know how to do basic operations such as multiplication, division or addition of fractions.

On the other hand, as previously indicated, the students arrive at the degree with many deficiencies from the basic levels of both analysis and expression and oral and written communication (in Spanish and English).

It is believed that the educational system, at the basic and upper secondary education levels, is very paternalistic and accustoms students to being very little involved in their learning.

It also refers to the fact that the educational system in Mexico produces passive students, they are not taught to do their research by themselves, they expect everything to be given to them in class, which causes unmotivated students with the expectation of passing the course just to attend it.

In an effort to provide solutions to this condition, there is a need to offer students courses or workshops where they are trained in study techniques, as well as oral and written comprehension and expression in Spanish, before beginning any career in the Science Faculty.

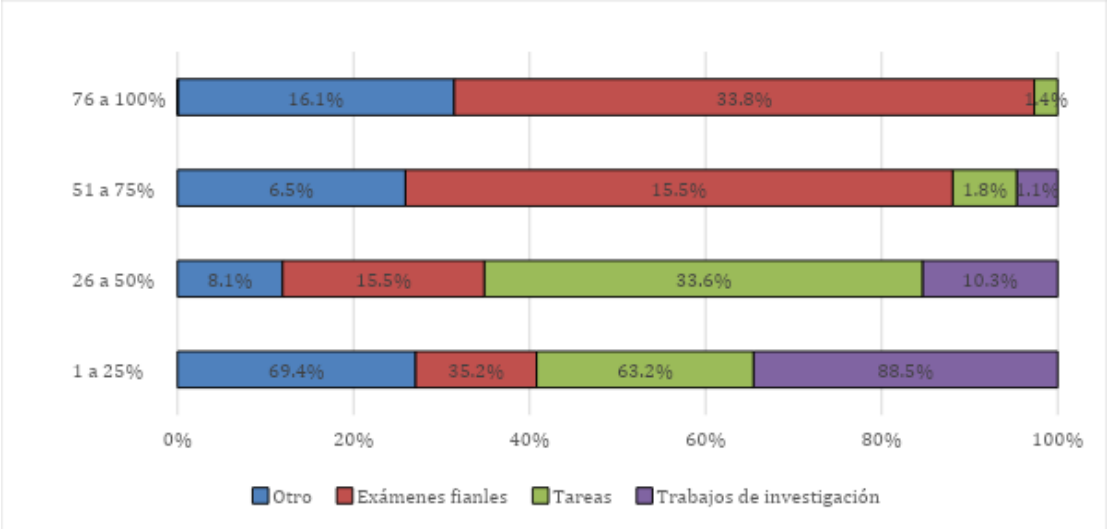
Data from section four of the questionnaire (teachers and assistants)

The next section of the survey focuses on the teachers themselves and their assistants. It stands out that 98.1% of the respondents said that they do deliver the program and the basic bibliography at the beginning of each course.

Regarding whether the importance of the topic is raised at the beginning of each class, most of the respondents rated themselves positively: 85.5% of the respondents rated themselves eight or higher.

Teachers were questioned about the use of midterms, final exams, homework, research papers, and "other" to grade students. Of the additional elements to qualify, the most frequently mentioned was participation (24%). Figure 6 shows the percentages of the use of each instrument. It is observed that midterm and final exams have a much higher weight than research papers and homework.

Figura 6. Pregunta 35. ¿Qué elementos considera, y qué porcentaje les otorga aproximadamente, para calificar a los alumnos?



Fuente: Elaboración propia

Course accreditation varies. Most of the respondents (47.4%) estimated that between 26% and 50% of the students pass the course, while only 14.6% thought that the majority of the students, between 76% and 100%, pass. Regarding students who do not pass the course despite taking final exams, 75.4% of those surveyed estimated that this group of students is between 1% and 25%. A significant number of respondents, 39.5%, believed that 26% to 50% of students do not take final exams, while 35.9% placed this estimate between 1% and 25% of students.

The relationship between assistants and teachers is generally good: 82% say they communicate weekly with their assistant to coordinate class work, while 16.5% do so every two weeks.

In addition, 90.6% responded that the assistants dedicate specific sessions to the resolution of doubts prior to the exams.

Of the professors, 64% do not know the annual offer of didactic updating courses; Of the 36% who do know about them, 56% consider that the offer is not enough.

Regarding how necessary they consider these courses, the majority consider them necessary, 59% rated them as eight or higher.

In addition, 67% said they were interested in taking didactic updating courses, seminars or diplomas.

In general, it was considered that there are not enough incentives for teaching. Of the total teachers, 67% thought that these activities (preparation of textbooks, manuals, digital

resources, advice for students) are not adequately considered in the incentive, hiring and promotion commissions. And 83.7% of those surveyed consider that these activities should have more weight.

In addition to the numerical results, it is equally important to refer to some of the comments that the teachers made in question 47, where they were asked to write a free comment on the aspect referring to the teachers and assistants.

Free comments were grouped into three main categories: 1) Updating and training in didactics, 2) Student responsibilities, 3) Teacher evaluation, and 4) Institutional support for teachers (particularly subject teachers).

In the first category, "Updating and training of teachers in didactics", the comments are consistent with the numerical data, since teachers require training and updating in this area that has not been developed in the Faculty of Sciences.

It is generally recognized that training in didactics should be mandatory for teachers, although some believe that it should only be mandatory for assistants, since they consider that teaching experience is acquired over time.

The opinion is gathered that there should be a system of visits to professors teaching their classes to qualify their performance, although it does not refer under what criteria or indicators said evaluation would be made.

The idea of conducting teaching seminars or periodic meetings where the subject is discussed among peers who offer the same or related subjects is also raised.

There is also the indication that this type of updating courses in didactics do exist at UNAM, but that they are not given sufficient diffusion or promotion.

Some of the opinions are in the sense that, although the courses on didactics are necessary, it is recommended that they be taught by personnel with a deep knowledge of the careers that are taught in the Faculty or by top-level professionals with a specialty in matter.

Contrary to what was expressed in the previous paragraphs, the idea persists that the performance and learning of students depends on their own commitment, motivation and responsibility. For example, it is stated that making didactic proposals for teachers will not help solve a problem that is not largely attributable to teachers. In the same way, it is stated that "as a fundamental part of the training of competent professionals, students must learn to work independently, but the current system places all the responsibility on the teachers, not on the students, which is at the upside down" and "unfortunately it should be noted that the majority of students are not willing to develop tasks and presentations".

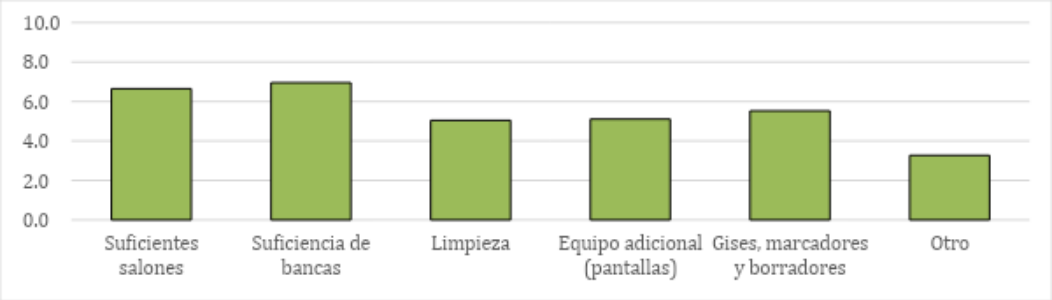
Regarding the aspect of giving greater importance to teaching activities, it is stated that in the Faculty, at least in Mathematics, greater weight is given to research than to teaching; there should be a balance and that the teaching activity should be better valued for the stimuli that teachers receive.

Finally, some opinions are collected that point out the importance of giving greater institutional support to teachers (increase in salary or incentives), particularly to those of the subject, so that they can dedicate more time to consultancies outside of class, to their academic training and preparation for their classes. Finally, the idea of remunerating the time it takes for teachers to prepare teaching material is proposed.

Data from section five of the questionnaire (administration and facilities)

This section begins with the teachers' evaluation of the classrooms. In general, the qualifications of the installations are not encouraging (see figure 7).

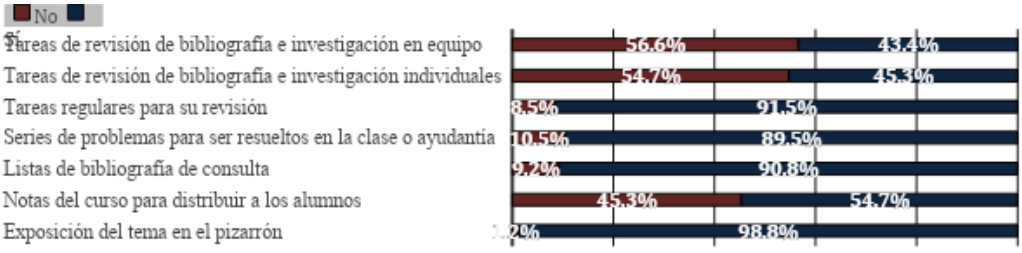
Figura 7. Pregunta 48.¿Cuál es su calificación para los salones de clase en cuanto a…?



Fuente: Elaboración propia

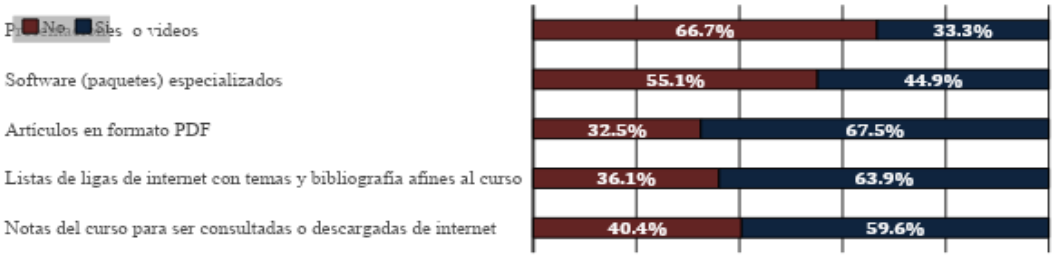
Finally, figures 8 and 9 show the auxiliary materials used by teachers in the development of their courses, including teaching strategies and applications of information and communication technologies.

Figura 8. Pregunta 49. Auxiliares didácticos utilizados en el desarrollo de los cursos



Fuente: Elaboración propia

Figura 9. Pregunta 50. Aplicaciones de TIC utilizadas en el curso



Fuente: Elaboración propia

In general, the frequency of software use is low. However, full-time teachers report using it considerably more frequently.

Regarding the collection of the library, the teachers indicated that the students say they have no problem getting the books (45%), although an important fraction shows that the book of interest is not available (37%).

Regarding this same library collection, most of the subject teachers expressed not having received emails requesting recommendations for book acquisitions (71%). For the same reason, it is not surprising that a small fraction have recommended books. On the other hand, 43.7% of full-time professors indicated that they had done so.

As was done in the preceding sections, this section summarizes the comments that the professors made in question 55 regarding the topic of administration and facilities. For this section, the comments were divided into the following seven items: 1) Library, 2) Technological infrastructure (internet and equipment), 3) Assignment of rooms, 4) Software; 5) Conditions of the facilities, 6) Responsibilities of the students and 7) Teaching update in didactic strategies.

In the same way, several professors insist on the importance of strengthening, managing and having adequate digital resources, although it is also pointed out that students have access to the entire collection of digital books and magazines that UNAM has, but that students they don't know how to access that information.

Discussion

In view of the results of the study carried out on the phenomenon of high rates of failure and lag, in this section it is worth opening a window of proposals that could be elements of value to retain and offer opportunities for success for those who have presented difficulties to pass the most complex subjects.

In the same way, the possibility of generating other solutions to the problems that are stated in the questionnaire is exposed. Among them, the opening of optional subjects or workshops aimed at first-year students could be considered, aimed at developing the generic skills of students, such as expression and comprehension of texts in Spanish, autonomous and self-regulated learning skills, as well as Information search skills in printed and digital media. In line with the above, Juárez and González (2018) mention:

> Generic competences are transversal in the study plan of any career and therefore must be addressed by teachers in any of the subjects. The generic competencies include the personal skills, attitudes and universal and ethical values of the future professional.

It would also be desirable to launch orientation campaigns or improve the means of communication where the high school students and the psychopedagogue counselors that the institution has are informed of what the careers consist of, what are the work areas in which they can develop the graduates, the minimum knowledge required, as well as the study requirements that a student of the Faculty of Sciences is expected to have. All this in order to publicize the real expectations of the Faculty of Sciences towards its applicants, as well as motivate them or guide them towards other options more in line with their interests, expectations and possibilities.

It is also suggested the revision of the study plans and programs from an approach that considers the real duration of the semesters, the series of the subjects that require it, the updating of the programs according to the current state of the art of the subject and the knowledge , skills and abilities required in the professional field, as well as the inclusion of an interdisciplinary approach, to the extent possible.

As observed in the results of the survey, there is no policy or education or training programs in the area of didactics in the Faculty of Sciences, which has caused teachers to not have tools, strategies or didactic methods. nor specialized in teaching science.

The laboratory practices are, for the most part, scripts pre-established by the professors with previously prepared materials that become routine and do not pose a problem to be solved by the student and, for their part, the classes of the theoretical subjects are eminently expository, where the most active and participatory actor is the teacher, and the students are limited to having a role as receivers of information, and where practically the only learning verification controls are summative evaluations, applied and graded by the teacher or his assistant, in a traditional individual written exam scheme.

The master class is one of the most used teaching strategies in classrooms with a large number of students due to the great advantages it presents over other methods, such as: less investment of time for the teacher to prepare his class; it is effective in providing a large number of people with the greatest amount of information in a short time; Its main purpose is the transmission of knowledge and it allows condensing information that is difficult to access, or that which is scattered in too many documents and supports that would take students too much time to put together, organize and systematize on their own. However, the use of this methodology as the only didactic alternative is not recommended. As they refer Sánchez, Barhoum, Escudero and Muñoz (2018):

> It is evident that the traditional teaching model, based solely on the transmission of information by the teacher, has more disadvantages than strengths. During the theory class, the students listen to the lectures given by their teachers, trying to assimilate the information that the teacher transmits through explanations on the blackboard, Power Point presentations, or even, in recent times and thanks to new technologies, reproduction of videos (p. 713).

However, it should be noted at this point that the change in teaching does not happen from one day to the next and they usually encounter a lot of resistance:

> Alternatives to the traditional teaching model are increasingly on the rise. However, for teachers and students accustomed to the traditional methodology, neither can the master class be dispensed with so easily, nor can new teaching methodologies such as flipped learning be implemented so simply. (Sánchez *et al*., 2018, p. 713).

For the student, some of the most palpable disadvantages of having the expository method as the predominant approach lie in the fact that their opportunity to "learn by doing" is limited and, therefore, to develop skills, abilities and research skills, problem solving or conjecture. In the same way, the opportunities to promote collaborative learning are limited, that is, the discussion between peers on certain topics, in times and conditions pre-established by the teacher, in which it is promoted to reach conclusions, argue and learn from the successes. and peer mistakes.

The expository method, being focused on the teacher's activity, tends to become routine and boring for students, in addition to the fact that the variety of points of view is

usually limited, and therefore, the critical spirit, of contrasting, discussing and discovering others. approaches other than what the teacher is presenting.

That is why it is essential to look for other alternatives, approaches, methodologies and didactic strategies suitable for the development of research, argumentation, expression and oral and written comprehension skills in the teaching of scientific subjects taught in the Faculty of Sciences. , collaborative learning and work, situated learning, innovation, creativity, connection with other disciplines and problem solving, to expose some of the most important.

In this context, it will be necessary to create a strategy of reflection, awareness, training, updating and collegiate work to seek teaching alternatives that provide more and better training elements to students, while ensuring retention and better ways of delivering learning.

Among the methodological strategies that are proposed to be explored to implement educational innovation processes and that could contribute to the interest of students in continuing with their university studies and not falling behind, are the following:

a) Problem-based learning (PBL), which in itself entails the principles of constructivism and the development of competencies. This methodology, which entails several methodological changes in the classroom and which consists of presenting a problem to the students without having previously given them any kind of information, and which, due to these same characteristics, requires accompaniment and prior planning, presents, according to Gil-Galván (2018), the following advantages:

1) Promote the leading role of the student in the teaching-learning process.
2) Promote the development and optimization of skills aimed at the professionalization of students.
3) Involve the student actively in their learning.
4) Facilitate self-regulation of learning.
5) Teachers act as guides or facilitators who organize and stimulate learning.

b) The inverted classroom, where part of the content is offered on a virtual educational platform and where students must carry out autonomous, self-regulated work, often based on research. For Fidalgo, Sein and García (2020), "while in traditional education the lesson is done in class and then the homework is done at home, in the flipped classroom method the lesson is done at home and the homework is done in class" (p.1).

c) Gamification, which is a didactic technique consisting of bringing the dynamics of games to the educational field (Corchuelo, 2018), is very attractive for students since it implies facing, in teams or individually, challenges and challenges in which they get rewards as positive stimuli, all in a playful way, without losing academic rigor.

d) Science, technology, engineering and mathematics (Steam) education is one in which an interdisciplinary approach is contemplated between science, technology, engineering (applied knowledge, in the latter two) and math. In Steam projects, the completion of the projects infers the participation of groups or teams of students who have the task of developing a project and reaching a result. This scheme has led in various projects to promote competition between the various teams and reward the team that has achieved the best product. In this case, the emphasis is on learning and the development of individual and team skills, so competition between teams is not a priority, since it can lead to adverse or undesired effects that could interfere with the process. learning itself.

It is a fact that these methodologies, particularly PBL and the STEM scheme, require not only much longer class preparation time than the master class, but the process of assimilation of learning by students also requires of more time. The advantage of these methods over those of the master class is that they allow an interdisciplinary approach, the development of skills, abilities and skills on the knowledge that is being transmitted, but also on other aspects that can be very useful for the dimensions. labor, social, metacognitive, procedural and attitudinal, among many others.

In this sense, it would not be a question of eliminating the master class, but of searching, knowing and experimenting with other didactic methods to combine and apply them as required for the different types of learning considered in the subjects and programs of the different careers. offered in the Faculty of Sciences.

It is also worth mentioning, as an epilogue to this discussion, that the results presented in this paper are the product of the opinions expressed by the teachers in Area I, but that it would be desirable to carry out a similar study aimed at compiling the opinions of the students, so that a much more comprehensive image of the exposed problem can be obtained. The foregoing, taking into account that between the two studies it will be necessary to take into account the effects produced by the COVID-19 pandemic, which significantly transformed the face-to-face teaching scheme, which at the time of conducting this study was the only existing learning modality.

Conclusions

The developed strategy allowed a rigorous work that resulted in an overview from the point of view of teachers on the possible causes of dropout and lag.

It is important to have the counterpart of the analysis that results from the opinion of the students to have the complete picture. However, in this first stage of the investigation there are elements to implement actions that favor progress in the school career.

In summary, from the perspective of the teachers surveyed, the main challenges that must be overcome to reduce the academic lag of students include various factors such as reviewing the contents of some subjects, as well as their serialization with respect to the rest of the study plan. and encourage respect for the existing serialization; the deficiencies that the students present in terms of logical reasoning, vocational orientation, expectations regarding the career they are pursuing, motivation, oral and written communication skills, study habits and discipline; the distraction that the need to work while studying represents for students; the few incentives and institutional recognition for teaching, as well as the lack of didactic and pedagogical tools on offer for teaching staff.

The review and study of the relationships between all these elements allows us to propose their grouping into four large areas: a) Individual (expectations, motivation, self-esteem), b) Academic (logical reasoning, communication, study habits and discipline), c) Institutional (study plans, recognition of teaching, infrastructure) and d) Labor (employment, vocational guidance, career guidance).

This conceptualization of the results offers us a comprehensive view of the problem and a series of guidelines for action. Regarding the first, it highlights the fact that all these areas, their elements and relationships affect both students and teachers, although in different ways and intensities, and their effects can be mitigated by our efforts. Regarding the latter, it is evident that any strategy that seeks to reduce the lag must consider the four areas considered, paying special attention to the first two, that is, the individual and what we have called academic here.

Contributions to future lines of research

In order to face the problem raised, the following lines of research should be considered, intended as strategic proposals to mitigate lag, among which the possibility of offering workshops or optional subjects for first-year students to stimulate the development of language skills, learning autonomous and search for information. It would also be desirable to develop orientation campaigns for high school students, review study plans and programs, as well as provide teachers with alternative teaching tools to the expository method, such as PBL methodology, gamification, the flipped classroom and Steam education. .

These strategies should seek to complement the current teaching system in the Faculty of Sciences and are, in the opinion of the authors, punctual and realistic proposals to help solve the problem expressed by the professors about desertion and lag.

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