









The lack of terminal efficiency of the students of the 2018-2022 generation of the Faculty of Engineering of the Universidad Autónoma de Campeche



La falta de eficiencia terminal de los alumnos de la generación 2018-2022 de la Facultad de Ingeniería de la Universidad Autónoma de Campeche

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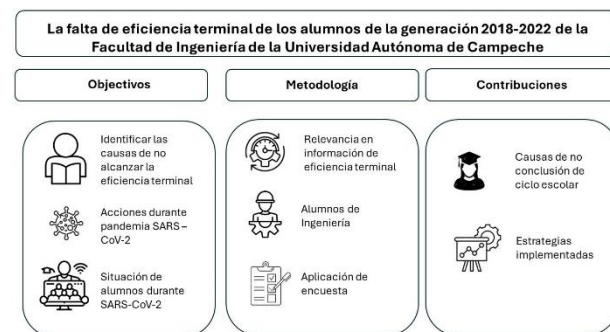
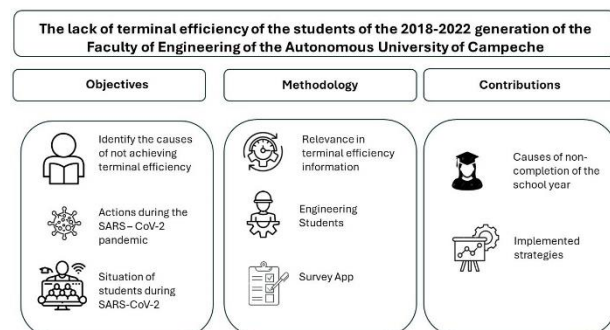


Abstract

The research addresses academic completion in the Faculty of Engineering of the Autonomous University of Campeche (UAC) during the 2018-2022 generation, especially affected by the COVID-19 pandemic. Despite the reputation of the UAC and its efforts to maintain educational quality, several causes are identified that contribute to low terminal efficiency. A quantitative and descriptive approach was used, surveying 200 students about various factors such as academic support, study conditions, and the effectiveness of online classes. The results indicate that many students faced difficulties such as lack of devices, internet connectivity problems, and loss of family employment, which impacted their ability to complete their studies. In addition, the lack of teaching support and emotional problems were also relevant factors. It is concluded that, despite the UAC's efforts to mitigate the impact of the pandemic, the combination of internal and external factors limited the terminal efficiency of this generation. Possible solutions are suggested to improve the academic situation of students in the future.

Resumen

La investigación aborda la terminalidad académica en la Facultad de Ingeniería de la Universidad Autónoma de Campeche (UAC) durante la generación 2018-2022, especialmente afectada por la pandemia de COVID-19. A pesar de la reputación de la UAC y sus esfuerzos por mantener la calidad educativa, se identifican varias causas que contribuyen a la baja eficiencia terminal. Se utilizó un enfoque cuantitativo y descriptivo, encuestando a 200 estudiantes sobre diversos factores como apoyo académico, condiciones de estudio y la efectividad de las clases en línea. Los resultados indican que muchos estudiantes enfrentaron dificultades como la falta de dispositivos, problemas de conectividad a internet y la pérdida de empleo familiar, lo que impactó su capacidad para completar sus estudios. Además, la falta de apoyo docente y problemas emocionales fueron factores relevantes. Se concluye que, a pesar de los esfuerzos de la UAC para mitigar el impacto de la pandemia, la combinación de factores internos y externos limitó la eficiencia terminal de esta generación. Se sugieren posibles soluciones para mejorar la situación académica de los estudiantes en el futuro.



Terminal efficiency, Education, Campeche

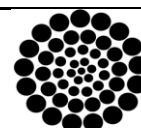
Eficiencia terminal, Educación, Campeche

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Introduction

Currently, educational institutions are in an area of constant opportunity, which is their school enrollment since thousands of students enter each educational period and few complete. Universities play a primary role in the development and improvement of the terminal efficiency of students and that is why the Autonomous University of Campeche (UAC) is among the school institutions that constantly works to achieve terminal efficiency.

The purpose of this research is to identify the causes that influence the lack of terminal efficiency among students of the Faculty of Engineering of the UAC of the generation. Despite the prestige and principles of this educational institution, which for decades has trained young people with leadership and initiative skills in each of its faculties, it is examined why in the year 2022 it has been affected by the phenomenon of efficiency terminal in university students. It is recognized that this period coincided with the pandemic, and in response, the Autonomous University of Campeche prepared its teaching staff and improved its infrastructure by implementing a support model to guarantee the continuity of academic services.

Likewise, this article investigates and searches for the causes that led to not achieving the desired terminal efficiency, taking as a parameter the number of students who entered and had to graduate from the generation studied, this despite the UAC having carried out actions to combat the problem that was arising due to the SARS-CoV-2 pandemic.

Methodology

Terminal efficiency is a very relevant topic for any educational institution and even more so for the Autonomous University of Campeche, so before delving into the topic it is necessary to know what the words terminal efficiency mean; It is observed that the term efficiency is not a new concept since within the administrative language, in the first years of the 20th century, Frederick Taylor, the greatest precursor of scientific administration, established a theory that focused on work management, through the study of times and movements of execution of the working day of workers in factories, in this way it was possible to increase productivity, thereby increasing efficiency in the processes. The same author defines efficiency as the orientation towards the best way to execute or carry out things or work methods, using resources such as people, machines, raw materials, in the most rational way possible (Chiavenato, 2007).

Likewise, there are other definitions of terminal efficiency such as that of the Ministry of Public Education (SEP) in Mexico, which in numerical terms states that it is “the proportion between the number of students who enter and those who graduate from the same generation, considering the year of entry and year of graduation according to the duration of the study plan” (Pérez, 2016). Likewise, (Martínez, 2001, as cited in Pérez, 2016) defines terminal efficiency as the proportion of students who finish a degree in relation to those who started it and considers that it is a dimension of quality that must be considered since the cost of education depends on it. the products of higher education (Domínguez *et al.*, 2014).

Applying Taylor's theory at educational levels, it would then be said that the main function of higher-level educational institutions falls mainly on all the participants involved in it, such as: director, academic secretary, coordinators, teachers, tutors and parents. ; then the magnitude of the commitment that each of them has will be the impact on the achievement of the proportion of students who manage to graduate in relation to those who entered, thus reaching the appropriate terminal efficiency (López *et al.*, 2008).

There are factors that can influence the terminal efficiency of young university students, such as internal and external factors. Internal ones refer to those that the institution must focus on to increase what is called terminal efficiency, that is, the number of enrolled students is the same as the number that completely completes their level of studies.

Starting from the situation that afflicts the UAC in question of the terminal efficiency term, it is important to mention the following. The Autonomous University of Campeche is an institution whose mission is to train capable professionals who can develop in the environment of our country and towards other borders; Therefore, one of its main objectives is to have greater enrollment and have terminal efficiency on par.

The methodology of this study has a quantitative and descriptive approach, it seeks to describe, explain, and predict the phenomena that occur around the research, in the same way it was analyzed what the strategies would be to resolve such a situation that afflicts the institution. For this topic, the students of the 2018-2022 generation of the UAC Faculty of Engineering were chosen at random. It must be emphasized that in 2019 the country was in a SARS-CoV-2 pandemic situation.

When starting the investigation on the terminal efficiency of the students of this generation, it is important to know that according to the statistics of the beginning of courses of the 2018-2019 school year, the total school population in the entity of Campeche at the higher level was 32,167 students; of which, our University is considered the institution with the highest enrollment, with a total of 7,375 young people enrolled, that is, this represents 22.9 percent of the state total. Particularly, at the bachelor's level, a quarter of the students at this level throughout the state are students enrolled at the University (Autonomous University of Campeche, 2019).

We relate this last data to the year 2022 because it is the culmination of the 2018-2022 generation in which the UAC had 1,271 students who graduated; of which 590 were men and 681 women. The faculties with the most graduates were the following Health Sciences (507), Social Sciences and Law (267) and Administration and Business (228) (economía.gob.mx, s.f). Below are some images that reflect the situation.

Box 1



Figure 1

Graduates according to campus 2022

Source: *economía.gob.mx*. (s.f). Universidad Autónoma de Campeche.

<https://www.economia.gob.mx/datamexico/es/profile/institution/universidad-autonoma-de-campeche>

Box 2

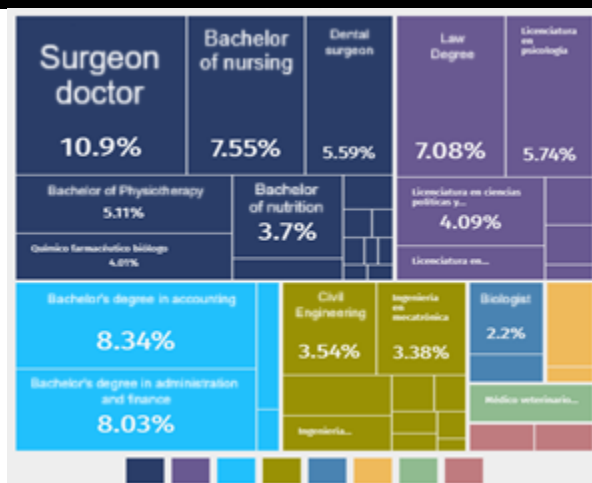


Figure 2

Graduates according to career 2022

Source: *economía.gob.mx*. (s.f). Universidad Autónoma de Campeche.

<https://www.economia.gob.mx/datamexico/es/profile/institution/universidad-autonoma-de-campeche>

In the same year (2022) the UAC obtained 64 graduates, of which 27 were men and 37 women. The areas with the most graduated students were Administration and business (23), Health sciences (23) and Natural sciences, mathematics, and statistics (9); Likewise, 971 students graduated from their studies. Figure 3 shows the total number of men and women graduates, graduates, and graduates.

Box 3

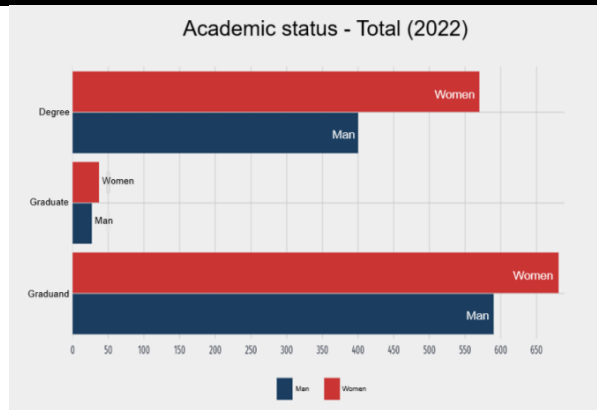


Figure 3

Graduates according to career 2022
 Source: *economía.gob.mx. (s.f). Universidad Autónoma de Campeche.*
<https://www.economia.gob.mx/datamexico/es/profile/institution/universidad-autonoma-de-campeche>

The main question to answer is: Where are the other enrolled students? Why does the UAC not achieve the terminal efficiency goal?

Next, questions were asked to the students. These questions were applied to a representative sample of 200 students from this 2018-2022 generation, who were acquiring online classes during the COVID-19 pandemic.

The questions refer to the ages at which the students of the Engineering degrees in: Computer Systems, Electrical Mechanics, Energy, Civil and Administration, Mechatronics and Software Technology were during the COVID-19 pandemic; the gender of the students; degree; place of residence; years of study at the UAC; failed subjects; tutor support; titration factors; online study efficiency; technology and software used online; online learning efficiency; place where classes were taken; technological resources of the Faculty of Engineering; internet at home; post-pandemic support; electronic devices at home; as well as the reasons why he did not complete the degree.

Results

We found that there are 148 19-year-old students, which represent 74% of the total university students surveyed, also 29 of them are 20 years old, which is equivalent to 14%, 14 students are 21 years old correspondingly. 7% and 9 mention having other ages, which represents 5% (Figure 4).

Box 4

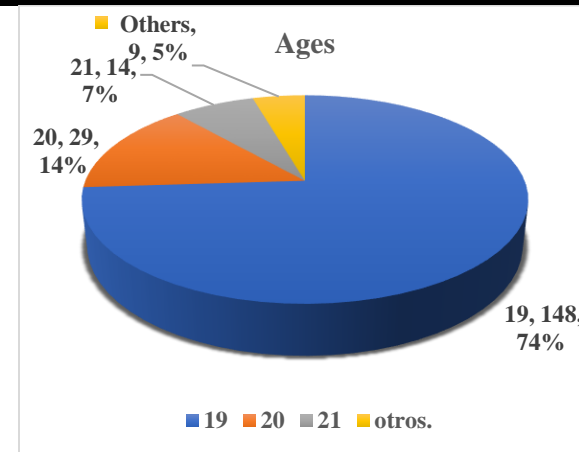


Figure 4

Age of the students of the 2018-2022 generation.
 Source: *Own elaboration*

Figure 5 shows that there are 154 young people with the male gender representing 77%, 44 students with the female gender which corresponds to 22% and 2 non-binary students representing 1%.

Box 5

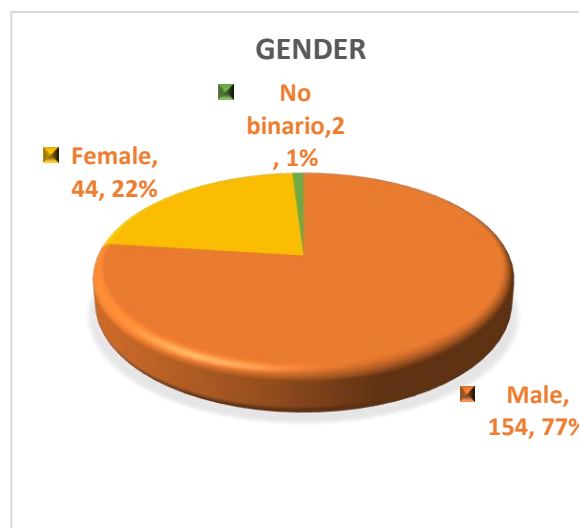


Figure 5

Gender of students of the 2018-2022 generation.
 Source: *Own elaboration*

The number and percentage of students for each degree in Engineering were obtained, which are as follows: Computer Systems, 34 students, which represents 17%, Electrical Mechanics, 21 university students with a percentage of 10%, Energy corresponding to 7%. , Civil and Administration, 70 young people corresponding to a percentage of 35%, Mechatronics, 39 students with a percentage of 20% and Software Technology with 21 students and a percentage of 11% (Figure 6).

Box 6

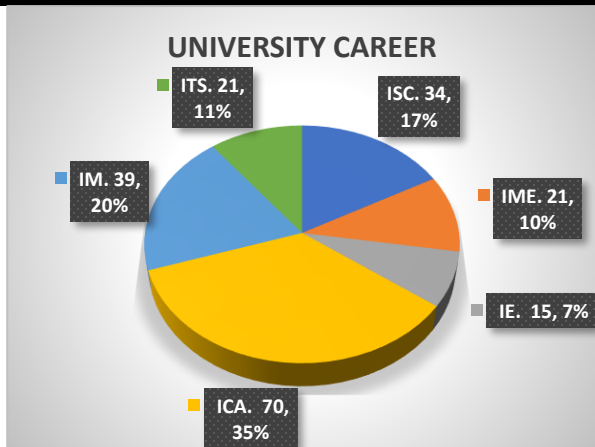


Figure 6

University career of students of the 2018-2022 generation.

Source: Own elaboration

Figure 7 shows that 94 students live in the municipality of Campeche, 10 live in the municipality of Calkiní, 15 live in the municipality of Hecelchakán and in the concept of others with several 81, they answered that they live in other municipalities of the same state, as well as in other states of Tabasco, Mérida and Veracruz.

Box 7

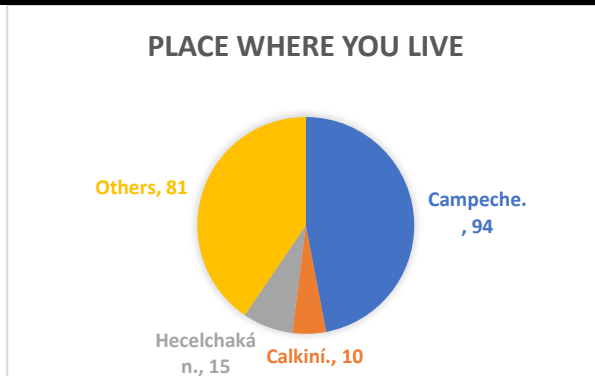


Figure 7

Place where the students of the 2018-2022 generation live.

Source: Own elaboration

In Figure 8 it is observed that there are 13 students who have been studying for a year at the Faculty of Engineering, which represents 7%, likewise 162 university students have a period of 2 years which corresponds to 81%, in the same way there are 13 students who are in the Faculty for 3 years representing 6% and in the case of others there are 12 students which corresponds to 6%.

Box 8

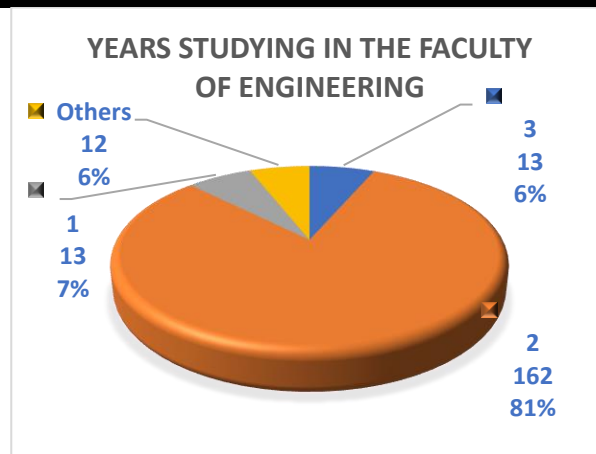


Figure 8

How many years have you been studying at the Faculty of Engineering of the Autonomous University of Campeche?

Source: Own elaboration

It was detected that 24 students have failed 3 subjects, 53 students have failed two subjects, 34 university students have failed one subject and 89 students have not failed any subject (Figure 9).

Box 9

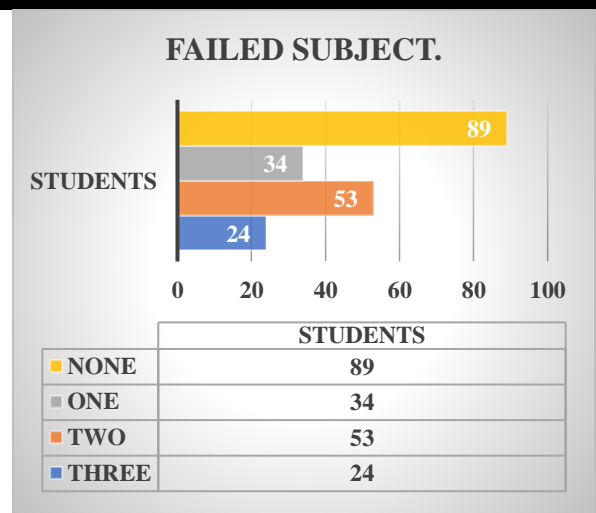


Figure 9

Do you have any failed subjects? If so, how many?

Source: Own elaboration

Through Figure 10 it is observed that, with respect to the question about support received from the tutors, 27 students of those surveyed responded with a yes, 117 students answered no and in the response of others, 56 students answered that They did not know and had no knowledge who their guardian was.

Box 10

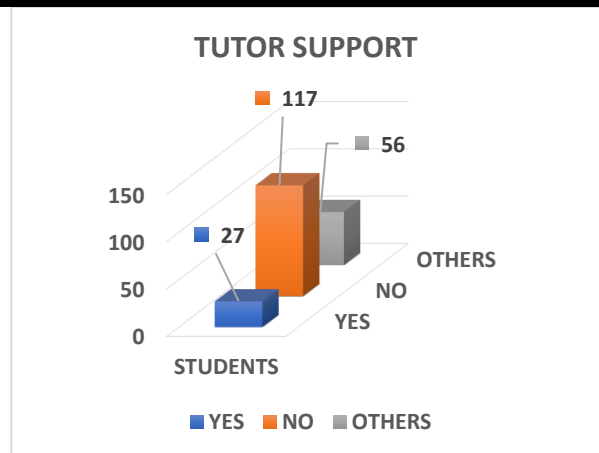


Figure 10

Have you received support from tutors or academic advisors during your academic career?

Source: Own elaboration

Figure 11 graphs the responses to the question: What factors do you consider most relevant to achieving the degree?; It is observed that 74 students mention that one of the relevant factors that would allow them to obtain a degree is personal motivation, followed by 48 university students who point out that the quality of teaching is important to achieve the aforementioned objective; Similarly, 38 students comment that family support is essential to graduate and finally 23 students point out that among other factors they encountered the death of the family member who supported them to continue studying and complete their studies; Likewise, the father of the family lost his job or, if applicable, the student lost his job.

Box 11

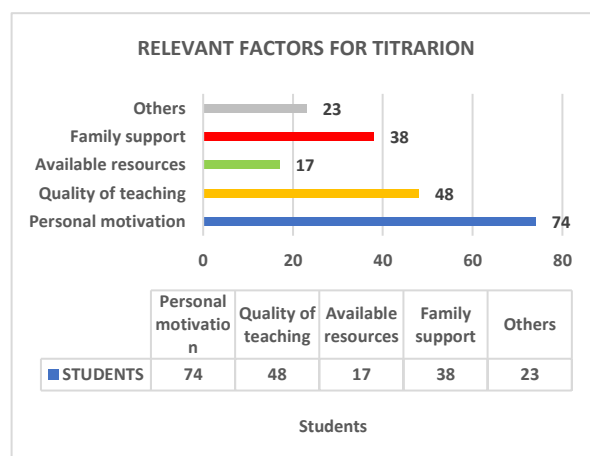


Figure 11

What factors do you consider most relevant to achieving the degree?

Source: Own elaboration

For the question How effective are your teachers when studying online? Figure 12 was prepared, which summarizes the responses obtained; It is observed that there are 7 students who consider that the teachers have not been useful at all when studying online, as well as 72 students think that the teachers have been slightly useful, in turn 80 university students mention that the teachers are moderately useful when studying online ; Likewise, 30 students consider that their teachers have been very useful and 11 students find their teachers extremely useful when studying online.

Box 12

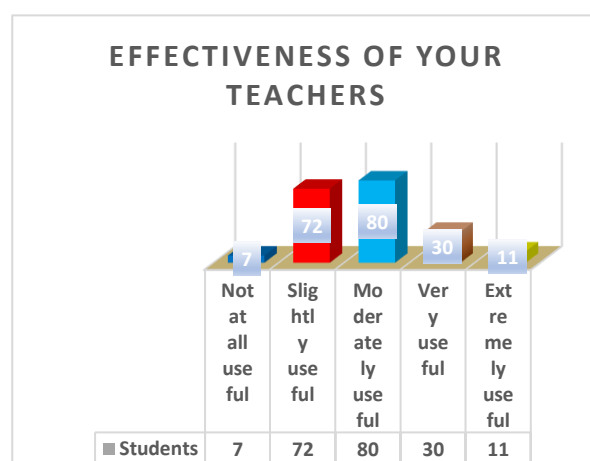


Figure 12

How effective are your teachers when studying online?

Source: Own elaboration

In relation to Are you satisfied with the technology and software you use for online learning?; It was obtained that 41 students surveyed responded that not at all, 53 students responded that they were slightly satisfied with technology and software such as online learning, another 58 university students responded that they were moderately satisfied, 44 responded that they were very satisfied and 4 that they were extremely satisfied (Figure 13).

Figure 14 presents the responses to the question: How effective do you think distance learning has been during the pandemic?; where it is observed that 74 students comment that distance learning has not been effective, representing 37% of 100%, 51 students indicate that said learning is slightly effective, this response represents 25%; Likewise, 40 university students responded that this way of learning has been moderately effective, which corresponds to 20%, 28 students responded with the answer that it is very effective, which response represents 14% and 7 students responded that it is extremely effective.

Box 13

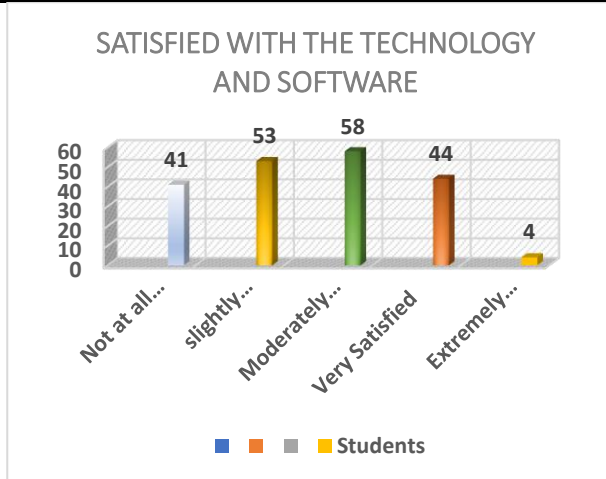


Figure 13

Are you satisfied with the technology and software you use for online learning?

Source: Own elaboration

Box 14

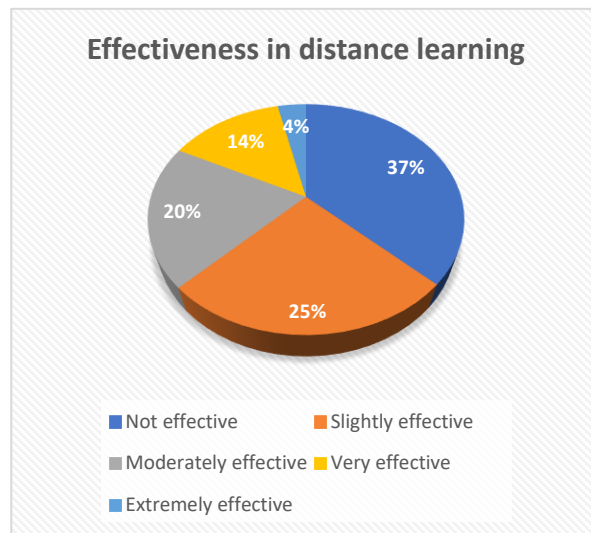


Figure 14

How effective do you think distance learning has been during the pandemic?

Source: Own elaboration

Figure 15 shows the number and percentages of the students surveyed: 31 of them answered that they had their own room during classes during the pandemic, this figure represents 15%; 66 students indicate that they had a shared room during said classes and this figure represents 33%, 65 university students took the classes online in their living room, which also represents 33% and 38 students respond that they took the classes online. external places of the home, such as parks, fields, etc. This data represents 19% of the representative sample.

Box 15

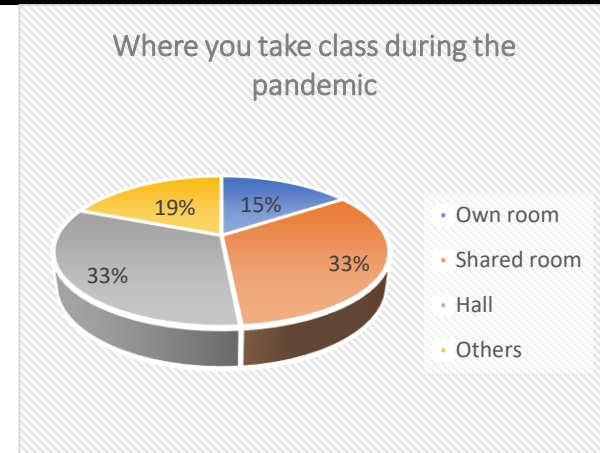


Figure 15

Where were you taking classes during the pandemic?

Source: Own elaboration

Box 16

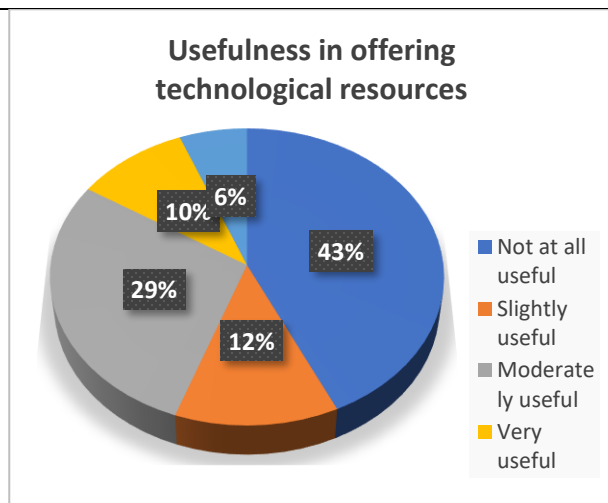


Figure 16

How helpful has the Faculty of Engineering been in offering technological resources for learning at home?

Source: Own elaboration

Figure 16 shows that 86 students surveyed answered that the technological resources have not been useful at all, this represents 43%, as well as another 25 students responded that the offering of technological resources by the Faculty of Engineering has been slightly useful, representing 12% of the total students surveyed; Likewise, 57 university students have answered that the offer of technological resources for learning at home has been moderately useful, representing 29% as a percentage. Likewise, 20 students responded that the offer of technological resources by the institution has been very useful. These responses represent 10% of the representative sample and finally 12 students responded that the offer of technological resources by the faculty has been extremely useful, representing 6%.

Figure 17 summarizes the responses to the question: Why don't you have fixed internet in your home? It is observed that 130 students surveyed answered that due to lack of economic resources, this figure represents 65% of the representative sample, as well as 37 students have insufficient equipment or no capacity corresponding to 18% of 100%, 29 university students answered that There is no internet in the town where they live, representing 15% and 4 students answered that others, this response represents 2% of the total percentages.

Box 17

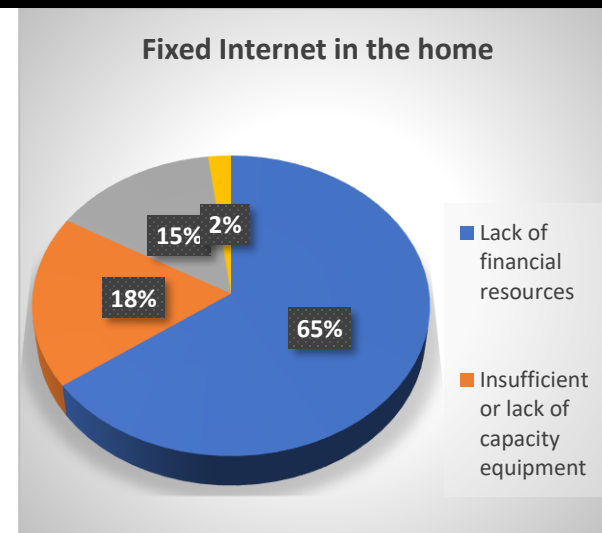


Figure 17

Why don't you have fixed internet in your home?

Source: Own elaboration

To the question: Have you received support from the engineering faculty after the COVID pandemic with topics like? It was found that 50 students have needed support related to the area of psychology, no student has received support in relation to financial resources, 97 university students have received support in the concept of scholarships and 53 university students have received support related to technological equipment (Figure 18).

Box 18

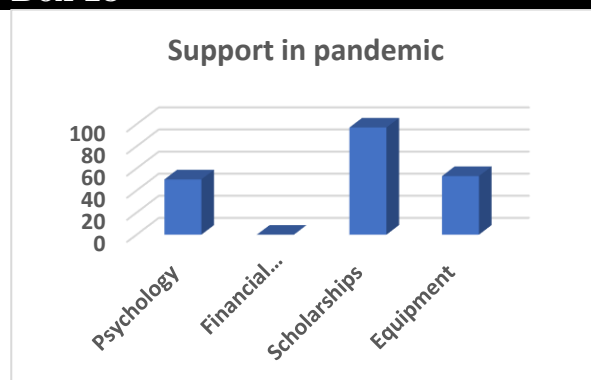


Figure 18

After the COVID pandemic, have you received support from the Faculty of Engineering with topics such as

Source: Own elaboration

When asking how many devices do you have in your home to take your classes in times of the COVID-19 pandemic?; It was found that zero students comment that they do not have too many devices in the pandemic, 27 students respond that they have more than one device.

Likewise, 124 university students have only one device, 18 students answer that they do not have any device and 31 students answer with the response of others, which involve responses such as having borrowed devices (Figure 19).

Box 19

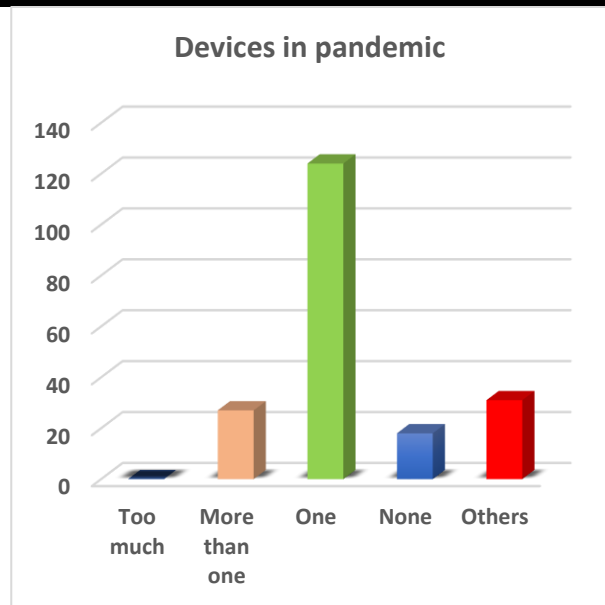


Figure 19

How many devices do you have at home to take your classes in times of the COVID-19 pandemic?

Source: Own elaboration

Figure 20 shows that 162 students answered yes and 38 students answered no to the question: Was the main reason why the last school year did not end was related to the COVID-19 pandemic?

Box 20

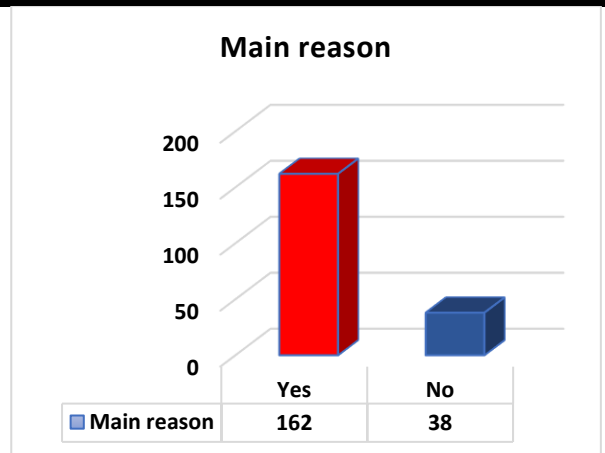


Figure 20

Was the main reason why the last school year did not conclude was related to the COVID-19 pandemic?

Source: Own elaboration

To find out some of the reasons why the students did not finish the school year, they were questioned about it and it was found that 36 students surveyed answered that they lacked any device to continue with school activities, 69 students mentioned that the reason for the why they did not finish the school year was because someone in the family lost their job, so the family income was reduced; Likewise, 46 university students indicate that they did not finish their studies because they became ill with COVID-19, 13 of the students comment that they could not complete their assignments and 36 students respond that their family became ill with COVID and some of the family members died as a result (Figure 21).

Box 21

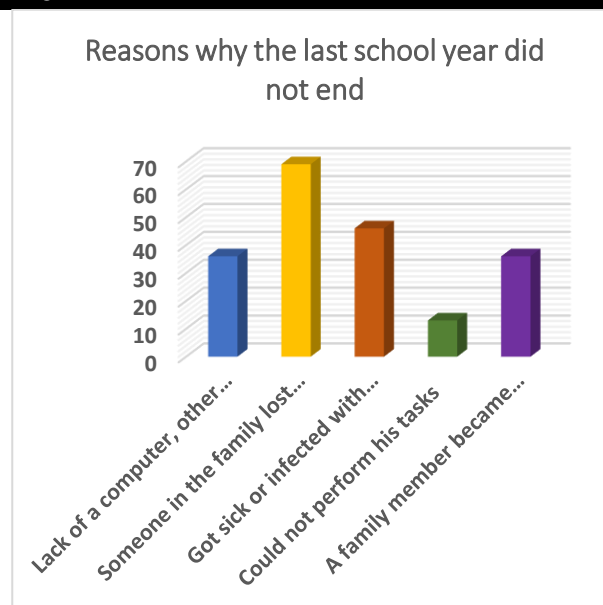


Figure 21

Some of the reasons why the last school year did not end was because:

Source: Own elaboration

When carrying out this research, several situations were found, the main one being communication with the students because the majority of the students of the engineering faculty of that generation are from some towns around the municipality of Campeche, others are no longer in the city left for other states and others did not accept interviews; It is also important to note that during this information inquiry, many findings were found that are reflected in the graphs prepared with the answers given by the students surveyed, such as:

Article

- The UAC, like many educational institutions, made its best efforts to implement strategies that helped psychological and physical academic well-being in the presence of the COVID-19 disease.
- Some of the students mentioned that taking online classes was more complex, since it involved greater effort and time in searching for information to complement what they saw in online classes.
- On many occasions they comment that the teacher's voice cannot be heard well and therefore the class cannot be understood, but this is due to the internet signal.
- Many of the students are in rural areas and towns far from the municipality of Campeche, which makes it difficult for them to have internet access, and some have limited resources and do not have this service.
- There were also students who indicated that it was difficult for them to concentrate in online classes because they did not have a personal room; most of the time they had to meet with other family members.
- The students shared a computer with the other siblings to listen to online classes; They did not have access to obtain another technological resource.
- Most of the students depend 100% financially on their parents or guardians and due to this disease, some of them died.
- Another situation that arose is that the parents or the student combined work and study and were left unemployed, thereby causing them to abandon their studies.
- Students have faced a lot of stress, depression, and sadness due to the situation they experienced.
- It is inevitable to deny that, although some teachers had knowledge of the use of technological tools, others did not have access or knowledge of said use. Although it must not be denied that the UAC offered courses for academic support in the face of this pandemic situation.

- For the teacher it was an overload of work, since they had to restructure the planning of the educational contents.

It is important to mention that, although the UAC implemented and applied actions to not have such a strong impact in the face of this pandemic, such as the delivery of computers to those students who required them, it was not enough for the number of students who needed them. Likewise, as Castañeda, Martínez and López (2021) point out, in times of the COVID-19 pandemic, society experienced moments of anguish and great fear of possible contagion, but not only in that situation but also faced the conditions of poverty, unemployment and discrimination against those people who were infected, so the stressful life that university students faced in the face of this pandemic was also decisive in achieving terminal efficiency as a goal of the UAC (Castañeda, Martínez and López, 2021).

Conclusions

The purpose of this research was to know what were the causes that impact not achieving the terminal efficiency of the students of the 2018-2022 generation of the Faculty of Engineering of the Autonomous University of Campeche. Although it is known that every university educational society (directors, academic secretaries, coordinators, administrative staff, teachers, students, and the general public) has faced challenges in the face of this disease (COVID-19).

The adaptation of the Faculty of Engineering of the University to this situation was very complicated, but not impossible, so it can be concluded that terminal efficiency is not achieved in this 2018-2022 generation for the reasons already presented in the results and only the following solutions can be proposed, which are presented in Table 1:

Box 22**Table 1**

Causes and solutions for the lack of terminal efficiency of the students of the 2018-2022 generation of the Faculty of Engineering of the Autonomous University of Campeche

Causes	Solutions
Dropping out of school by students due to not having technological equipment to carry out their academic activities.	Creation of a financial fund for contingencies such as: the acquisition of technological equipment and other justified causes that affect the educational progress of students.
Students who were studying and working at the same time, and during the pandemic were left without jobs and without the possibility of continuing studying their degree.	Among its indicators of the Faculty of Engineering is to monitor the career path of graduates; However, there must be management to carry out a permanent campaign to improve the situation of those students who continue studying academically and have not graduated or completed their studies and in which their main source of economic resources no longer exists so that there is support and can continue their studies towards completion.
Lack of knowledge and apathy on the part of the teacher in relation to the use of different technological tools.	The Autonomous University of Campeche has always been interested in ensuring that its teachers are constantly trained. Although there is training for teachers at the end of each semester in the topics where it is necessary to strengthen the academic part; It is also necessary for teachers to commit to training, updating, and applying disciplinary, technological and psychological areas whose impact falls on university students.
The processes are very slow, causing the procedures to not be resolved in a timely manner according to the needs of the applicant.	It is proposed to analyze the processes by the responsible people and establish improvements in them to speed up the procedures, not only academic, but also administrative.
The job bank is coordinated from the central department of the UAC, so the Faculty of Engineering does not have knowledge of the labor needs required by the state.	The innovation of a department that is in charge of the job pool from the Faculty of Engineering is proposed to be able to cover the labor needs required by the state, in this way school dropouts are reduced by those students who require a job to continue with his studies.
Although it is not the UAC's task to ensure that the Internet exists in the places where the students live or reside, it is the responsibility of supporting the students so that they do not remain stagnant in their studies and can continue with them.	Manage with the competent authorities technological tools that allow the student to have the Internet in places with zero connectivity.
They do not have mobile devices.	Support of mobile phones so that students have this tool.
Anxiety, anguish, fear, etc. by teachers and students.	The solution is missing: Create workshops, increase psychological care, strengthen the tutoring program, others.

Declarations**Conflict of interest**

The authors declare no interest conflict. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Author contribution

TMRL: Conceptualization, data curation, methodology, supervision, validation, writing – original draft

CTRA: data curation, methodology, software, visualization, writing – review & editing

CCBM: investigation, validation, visualization, writing – review & editing

QCHM: visualization, writing – review & editing

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Abbreviations

UAC: Universidad Autónoma de Campeche.

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