



## **Model for obtaining data aimed at the academic failure of IT students in the face of a pandemic**

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**Abstract.** Academic failure is a situation that influences the terminal efficiency of students at a higher level. This is a consequence of various factors that affect the student. The objective is to identify factors that influence school failure in the face of the pandemic. A data collection model was applied for the analysis of factors that influence school failure based on the student's perception during the second year of the pandemic. The model considers technological, academic, and personal factors; The figure of the manager and the academic tutor are incorporated as elements that can influence school failure. The instrument was applied online, and data analysis and reliability were performed with free software tools. The age range of the participants is 18 to 25 years old. 53.1% of the participants consider that the absence of a tutor in the face of failure problems influences failure. The factors that influence failure are the academic tutor, academic manager, internet access, the delivery of projects, the teacher's way of explaining, and health. The tutor and the academic manager have an important role as a guide in a situation of failure or academic performance.

**Keywords:** Academic failure, pandemic, data model, health, student perception

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### **1. Introduction**

The arrival of the pandemic caused the authorities to establish policies to change the way of working or carrying out their activities physically to a remote modality. The students, teachers and educational authorities were not prepared to face the challenges and situations that the pandemic caused for face-to-face distance teaching-learning.

Communication problems with the teacher when assigning excessive activities and not providing follow-up to them during the pandemic affect the academic performance of the students, this by trying to preserve their grades, causing low academic performance [1]. Failure is the fact of not accrediting or failing to pass one or

several subjects at a certain level or grade or period by the guidelines established by an institution [2]. The decision of a collegiate teacher or group about an academic work presented by a student who does not meet the specifications of the same and that entails repeating the subject or course or evaluation process is called reprobation [3].

Academic failure leads to school dropout, and thus the terminal efficiency of educational programs is affected [4]. One of the main reasons for school dropout is failure [5]. Each institution has defined procedures, methods, instruments or evaluation criteria to test or measure that students cover what is specified in the subjects, courses and study programs [6]. The result is translated into approval or reprobative qualifications.

Two figures are important for students of educational programs in higher education institutions in Mexico: the manager of the educational program and the academic tutor. The educational program manager or career director is the professor responsible for the management and operation of a study plan, within his activities the following stand out: management and proposal of subjects, responsible for monitoring the academic trajectories of the students, accreditation and quality of the study plan, address problems related to enrollment and graduation, propose alternative solutions presented by students that hinder learning; The academic tutor is the professional who guides a student or students in a subject, course, practice or research work [7]. It is the teacher who guides the human and scientific formation of a student and accompanies him in his learning processes [8]. The accompaniment and follow-up must be systematic and continuous throughout the student's stay in the institution. In most cases, it is not limited to academic situations.

Socio-demographic-economic, academic and personal factors affect the failure of students, while tutoring significantly supports students with failed subjects [9]. Socio-demographic, educational, student satisfaction and social service development factors were analyzed in students who performed their social services with and without failed subjects [10]. On the other hand, the perception of the students is considered in the analysis of pedagogical factors that influence academic failure, with apathy towards the courses being the main cause. The proposal considers factors such as pedagogical-academic, socioeconomic, physiological and psychological [11].

The strategies and habits of study, teaching and evaluation are factors that cause failure from the perspective of the students. The study focuses on the exogenous pedagogical factor, and whose developed instrument considers aspects: economic, labour, personal relations, absenteeism, habits and strategies of study and responsibility, the subject, teacher and teaching, and evaluation [12].

With [13], he states that when the family self-concept is greater, the failed subjects are fewer. Teachers and family are of great importance as a guide in the school environment in the face of academic failure. Factors associated with the student, the academic and socioeconomic are considered in the identification of the causes of failure in nursing students. The organization of time, the student-teacher relationship and economic problems are the identified causes of failure [14]. Addiction to social networks has a non-positive influence on academic performance (obsession and excessive use of social networks), which impacts academic failure at a higher level [15].

Considering a series of trained data and using data mining algorithms, it is possible to predict the students with the highest probability of passing or failing [16]. Training before university studies, lack of dedication and interest have a significant influence on dropout and failure in the mathematics course [17].

The national medical exam is studied considering the opinion of medical students, about the knowledge they have of the test and the perception of passing it or not with the knowledge obtained in their institution [18]. The test is considered a requirement to be able to carry out their social service.

Repetition is one of the signs of failure that affects the graduation of undergraduate students. From the students' perception, the aspects that most influence repetition and desertion are absence due to work activity, course approval associated with the teacher's explanation and the excess of individual and extra-class activities [19].

Some of the instruments or models used to analyze academic failure are presented in this work.

Model	Dimensions or Factors	Sources
Social media addiction	<ul style="list-style-type: none"> <li>– Obsession</li> <li>– Lack of control in the use</li> <li>– Excessive use</li> </ul>	[15]
Causes of university failure	<ul style="list-style-type: none"> <li>– Inherent to the student</li> <li>– inherent to the academic</li> <li>– Factors inherent to the socio-economic level</li> </ul>	[14]
García and Musitu AF5 Self-Concept-Scale	<ul style="list-style-type: none"> <li>– Academic</li> <li>– Emotional</li> <li>– Family</li> <li>– Social</li> <li>– Physical</li> </ul>	[13]
Pedagogical factors	<ul style="list-style-type: none"> <li>– Teacher training</li> <li>– Mastery of content</li> <li>– Teaching strategies</li> <li>– Attitude</li> <li>– Evaluation criteria</li> </ul>	[11]
Failure factors.	<ul style="list-style-type: none"> <li>– sociodemographic-economic</li> <li>– Academic</li> <li>– Staff</li> </ul>	[9]
Pedagogical factors	<ul style="list-style-type: none"> <li>– Economic</li> <li>– Employment</li> <li>– Personal relationships,</li> <li>– Absenteeism</li> <li>– Habits and strategies of study and responsibility</li> <li>– Matter</li> <li>– Teacher and teaching</li> <li>– The evaluation</li> </ul>	[12]

Table 1. Instruments and models identified in the studies.

## 2. Materials and methods

**Participants.** We worked with a purposeful sample composed of 32 students belonging to a public university at a higher level; men and women over 18 years of age, regular students enrolled in an educational program related to information and communication technologies. The population size is 47 people with a sample of 32 people, a confidence level of 90% and a sample size of 32 people and a margin of error of 8%.

**Instrument.** On the one hand, demographic data such as age, sex, marital status, semester, place where they live, with whom they live, a career in which the student is enrolled and that corresponds to the population to be analyzed are considered. As for the model for obtaining data, it is mainly composed of three components with their corresponding elements and subelements, respectively (Table 2):

- Technological. The access and availability of technological devices, and access to internet services as essential tools for learning.
- Academic. They are the elements associated with the subject or course, teacher, academic tutor, and educational manager of the program.
- Personal. They are affective elements directly associated with the student. Family, economic, health and sentimental problems are considered.

Dimension	Subdimension	Element	Id
Technological	Technology	– Lack of computer equipment	TE1
		– Lack of Internet access	TE2

Académica	Grade	- Enroll in a face-to-face course (distance due to the pandemic)	A1
		- Class schedule	A2
		- Do not enter classes	A3
		- Do not deliver projects-tasks	A4
	Professor	- Does not explain	P1
		- Not understanding the teacher	P2
		- Not going to counselling	P3
	Tutor	- Does not generate Confidence in academic situations	T1
		- Do not offer Information provides is useful	T2
		- Not available for Care	T3
	Manager	- Do not go to the manager due to failure or performance problems	G1
		- Manager does not offer alternative solutions to failure or performance problems	G2
Personal	Student	- Present economic problems	PA1
		- Present sentimental problems	PA2
		- Have health problems	PA3
		- Present family problems	PA4

Table 2. Dimensions, Subdimensions, and elements of the proposed model.

Procedure. The designed instrument was implemented in an online system of institutional surveys with a time of no more than 10 minutes to be answered. The resulting data was coded for analysis and interpretation using a free software statistical tool. The reliability analysis was applied Cronbach's Alpha coefficient, obtaining 0.766 with a total of eighteen elements (Table 3) and a reliability analysis for each element (Table 4).

Mean	Standard deviation	Cronbach's Alpha	N of elements
3.09	0.565	.766	18

Table 1. Scale reliability statistics.

Item	mean	Standard deviation
TE1	3.06	1.413
TE2	3.38	1.476
A1	2.53	1.367
A2	2.84	1.221
A3	2.78	1.539
A4	3.41	1.434
P1	3.00	1.391
P2	3.03	1.177
P3	2.25	1.218
T1	4.31	1.091
T2	4.50	0.718
T3	4.34	0.827
G1	2.69	1.256
G2	3.13	1.212
PA1	2.91	1.400
PA2	2.09	1.118
PA3	2.94	1.343
PA4	2.38	1.212

Table 2. Reliability statistics per item.

### 3. Results

The age range is between 18 and 25 years, being the population of 19 and 20 years with the highest percentage of participation. That is, 19 years old with 25%, and 20 years old with 34.5%; the ages of 22, 23 and 25 with 3.1% each. Younger students have a higher participation in the survey.

The 25 percent of the participants are women, while the remaining 75 percent are men. Unfortunately there is no gender equity in the sample, they could tilt the results towards a certain gender.

Within the socioeconomic data related to who they live in, 56.3% were obtained with their parents, 28.1% with their mother, 9.4 with grandparents, and 6.3% with their father. An interesting fact is that 28.1% live with their mother and although a smaller percentage with 6.3% live with their father. This may indicate problems within the family nucleus due to the absence of some figures from the family nucleus.

High school or preparatory education represented by 87.5% who come from public institutions and 12.5% from private institutions. This implies a good recognition of the institution, in addition to considering that many of the participants enrolled before the confinement due to the pandemic.

The 75% of the people responded that the career they are currently studying is what they wanted to study, and 25% thought otherwise. This is an interesting and favourable fact since the participants are identified and convinced of what they study.

Regarding the decision to study in the faculty that enrolled, 59.4% is what they wanted, 21.9% I do not have the resources for another institution, 6.3% is only to study in another faculty of the institution, 6.3% Do not pass the exam at another school, 6.3% had to study or work. 40.6% show that there are no resources to study in other institutions than the student, who only enrolled to later change to another school that he wanted to be in, and if he did not study he had to work.

### 4. Conclusions

A large part of the students do not have the resources to study in other institutions, which must be continued through the support of internal scholarship programs as an internal strategy for students.

The technological part highlights not having or having access to the internet. This is considered one of the most important elements to be able to study from home, in the face of this pandemic. Complementary to this, students share information technologies with relatives at home, being able to limit the time dedicated to academic activities.

Academically, aspects such as not delivering projects, tasks or activities as established stand out; The teacher does not explain the topics; the tutor does not generate trust, does not offer important information and is not available in the solution of the failure problem; the manager does not offer alternatives to the problem of disapproval. The tutorial action is considered of great importance for the student, showing the highest scores of the instrument in the attention of the tutor and the academic manager. The guidance and support that these two figures represent for the student is vital, both in non-academic and academic aspects.

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In the personal part of the student, health is one of the factors considered as a cause of failure, either because of being sick, or because a family member or acquaintance suffers from an illness. This can somehow influence the person. Even the affectation of the emotional part by not being able to have physical contact with classmates, teachers, friends or family members. Or even suffering from bullying or discrimination for presenting personal or family contagion of covid.

The 46.9% of those surveyed failed subjects the semester before the one they are studying (during the pandemic), 53.1% did not fail. The percentage of failure should be considered, since it is a high percentage in the educational program analyzed. With this, establish strategies to reduce this percentage. However, school failure is caused by multiple factors that may or may not be caused by students [20].

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