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Research Article

Impact of Time Management on Academic Performance.

[1]Gilberto Oroz Galaviz, [2]Lizeth Armenta Zazueta, [3]Celia Yaneth Quiroz Campas, [4]Cruz García Lirios, [5]Gilberto Bermúdez Ruiz,

[1]Instituto Tecnológico de Sonora
gilberto.oroz@itson.edu.mx
[2]Instituto Tecnológico de Sonora larmenta@itson.edu.mx
[3]Instituto Tecnológico de Sonora cjquiroz@itson.edu.mx
[4]Universidad de la Salud cruz.garcial@unisa.cdmx.gob.mx
[5]Universidad Anahuac del Norte gibe_gil@hotmail.com

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ABSTRACT

In accordance with what was expressed by Rubio et al (2019), when they point out that particularly in Latin America, time management is an element of fundamental interest to positively address deficiencies related to school performance, associated with inequity and limitations in the educational quality of its different systems.

The objective of this research was to determine the level of contribution of time management, as a self-regulation strategy, to increase the academic achievement of students, of the manufacturing block of the educational program of industrial and systems engineering; in the Náinari unit, of the 2016 plan. Therefore, the population studied was the 44 students enrolled in the January - May 2024 semester

For the proper development of the research, the following procedure was addressed: Authorization was requested from the head of the academic department of industrial engineering, the target population was selected and the sample size was defined. Participants were asked for their informed consent; informing them of the processing and confidentiality of the data collected. For data collection, they were provided with the University Time Management (GTU) instrument, which consists of 34 items with five dimensions, in digital format using Google forms. The collected data were processed using the SPSS IBM Statistics software, determining: Descriptive statistics, normality, reliability and validity.

It was found that time management is an element that affects the academic performance of students, so it is concluded that it is necessary to inhabit students with this competence.

Keywords: use, administration, time, self-regulation and organization

CHAPTER I: INTRODUCTION

The Technological Institute of Sonora is an institution that was born in Ciudad Obregón, Son., as a result of the initiative of visionary members of the society of Cajema, members of the Lions Club, headed at the time by Mr. Moisés Vázquez Gudiño, who promoted the creation of a preparatory school for the benefit of young people who, for various reasons, mainly economic, they had to remain in the region and renounce the possibility of receiving a higher education. In 1955, the "Instituto Justo Sierra" preparatory school began operations with 55 students and eight teachers; in 1956 it changed its name to "Instituto Tecnológico del Noroeste" and in 1962 it acquired the name of "Instituto Tecnológico de Sonora". By 1964, as a result of the efforts made by Mr. Alberto Delgado Pastor, studies were offered for the first time at the university level, with the opening of the Industrial Engineering career.

It currently has six different campuses divided between the entities of Guaymas, Empalme, Navojoa and Ciudad Obregón. The Náinari campus is located northwest of Ciudad Obregón, along Antonio Caso and Eusebio Kino streets, next to the Náinari lagoon. (Technological Institute of Sonora [ITSON], 2024)

Currently the institution has an enrollment of 17,547 students composed of the total number of students enrolled in

the different educational programs offered through the different academic directorates such as: Economic and Administrative Sciences, Social Sciences and Humanities, Natural Resources and Engineering and Technology, the latter being made up of more than 4,000 students to which the educational program of Industrial and Systems Engineering (Development Plan) belongs. [PDI], 2024)

According to the PDI (2024) in the Industrial and Systems Engineering program, of the total number of students enrolled in the educational program, the largest number of students is concentrated on the Nainari campus, with 42% of its total, followed by the Guaymas campus with 27%, while the rest is distributed between the Navojoa and Empalme units.

The Industrial Engineering department is responsible for administering educational programs in Industrial and Systems Engineering (IIS), Logistics Engineering (IL), and the Master of Engineering in Logistics and Quality (MILC). In the 2016 Industrial and Systems Engineering program, 57 subjects are taught aimed at the blocks of quality, manufacturing, logistics, work study, organizational management and integrative project, including basic training subjects such as: basic sciences, university English and general training. (ITSON, 2024)

1.1. Background

The academic program of industrial and systems engineering is currently fully accredited by the Council for the Accreditation of Engineering Education A.C. (CACEI) and as an accrediting body of engineering programs, it establishes that the maximum allowable failure rate should not exceed 30% (Vargas, 2015)

Grasso (2020) in relation to school performance states "it is understood as an indicator to measure the productivity of a system, which in turn involves students and teachers and triggers evaluation processes aimed at achieving quality education". (p. 1). Rubio et al (2019) in their literature review, refer that particularly in Latin America, time management is an element of fundamental interest to positively address the deficiencies related to school performance, generated by inequity and limitations in educational quality presented by its different systems.

Reyes et al (2022) report in their study entitled "Planning and management of academic time of university students", carried out in Colombia, that the subjects in whom attitudinal and habilitation aspects related to planning strategies and time management tools were identified, showed superior academic performance, concluding that academic time management is an element that allows the disposition to learn and is associated with elements of the regulation of cognition.

Ramírez and Hernández (2019) in the study entitled "Academic Self-Regulation and Learning Goals in students of the Pedagogical University of Durango" point out that a large part of the difficulties observed in relation to academic achievement are directly related to motivational and emotional aspects, manifested in disinterest in studying, lack of enthusiasm and lack of active participation in the classroom. It is also associated with the cognitive plane and management strategies.

Franco (2018) in his master's project "Self-regulation and academic performance in university students who study subjects in mixed modality" developed in the state of Sonora, seeks to identify the existing relationships between self-regulation variables and academic performance, according to Zimmerman's model, found sufficient elements to establish an important correlation between them.

In the same vein, Molina (2022) in his thesis project entitled "Self-regulation, orientation to the future, learning strategies and academic performance in students University. An explanatory study". Project carried out in the state of Sonora; It analyzes the relationship between academic performance, self-regulation variables, and learning strategies. Concluding that, although there are many variables involved in academic performance, there is sufficient evidence to recommend that school authorities promote the use of strategies that favor learning among university students.

In the Results Report analysis of indicators of school trajectory of the industrial and systems engineering educational program, the academic development coordination [CDA], (2022) in indicator 7: Courses with the highest frequency of failure by cohort, it can be seen that the manufacturing block is the one with the highest cumulative failure rate among the blocks of the educational program of the department of industrial and systems engineering.

By lowering the failure indicator by cohort, the observations of the accrediting bodies will be complied with. It will benefit not only the Industrial and Systems Engineering program, but also students and professors; therefore, there

is a need to reduce the failure rate in the manufacturing block of the IIS program.

1.2. Problem statement

According to the approach proposed by the United Nations [UN], (2023); For the expectations of Sustainable Development Goal 4.4, it is established that by 2030, the number of young people and adults, graduates of the different education systems, who have the necessary skills, in particular technical and professional, to access employment, decent work and entrepreneurship, is to be considerably increased.

In this sense, according to the Organization for Economic Cooperation and Development [OECD], (2019), which recognizes that Mexico has made great progress by increasing the achievement in higher education from 16% in 2008 to 23% until 2018, however, it also points out that there is a significant inequality gap in relation to the rest of the affiliated countries. where the general average is 44%.

At the Technological Institute of Sonora, during the work of reviewing the school trajectory indicators of the industrial and systems engineering program, carried out in 2022, for the 2016 plan; ITSON, (2022); It was found that the program was presenting terminal efficiency percentages of 39%, accompanied by annual dropout percentages of up to 26%. Being found in the comprehensive system of school trajectories (SITE), that 86.79% of the total withdrawals from the program are concentrated in 6 reasons, for the cohorts 2016 to 2019:

- Low academic achievement (40%)
- Difficulty of schedule (13%)
- Difficulty with the teacher (10%)
- Problems with work (8%)
- Possible change of Program (8%)
- Personal and family problems (7%)

The manufacturing block was the one that presented failure rates of up to 48%.

Therefore, considering what Yate, et al (2023) pointed out; by stating that aspects such as: motivation, pedagogical strategies and the mastery of self-regulation tools, are factors that can positively affect significantly on the academic performance of university students.

Complementing the results presented by Wilson, et al (2021); where they point out the importance of providing students, from the first year of university, with solid training in time management, as a tool for self-regulation; since this can have a positive impact on the academic performance of students.

Hence, it is proposed for the industrial and systems engineering program; In order to increase academic performance and reduce dropout, the following research questions:

What is the contribution of mastery of time management tools to students' academic achievement?

1.3. Objective

To determine the level of contribution of time management, as a self-regulation strategy, to increase the academic achievement of students, of the manufacturing block of the educational program of industrial and systems engineering, plan 2016.

1.4. Justification

The results obtained will enrich the referential and methodological framework for subsequent studies, in the different areas of technological education, related to the theme of time management and self-management; being particularly relevant for curricular design. As suggested by Miertschin, et al (2015) in relation to the fact that the findings of

These types of studies suggest that course design features may play an important role in supporting students' time management skills and academic performance.

This research will provide useful information, so that decision-makers can generate timely and relevant strategies,

aimed at favoring the school performance of students; contributing, as Grasso (2020) mentions, as school performance is a useful indicator in the performance metric of the educational program; since it involves students and teachers and triggers evaluation processes aimed at achieving quality education.

The actions derived from this study will also allow the observations of the accrediting bodies to be resolved; benefiting not only the educational program of Industrial and Systems Engineering, but also students and teachers. (Vargas & Jiménez, 2015)

Although students of industrial and systems engineering are offered two mandatory tutorial courses in semesters I and II, where the topic of self-management is addressed; there is currently no formal monitoring of the evolution of competencies related to time management, nor is their reinforcement considered beyond the initial tutorial courses; therefore, if this study is not carried out, it will not be possible to identify the elements of time management that are present among students in subsequent semesters, much less will it be possible to identify areas of opportunity, to generate strategies to solve the deficiencies.

CHAPTER II: THEORETICAL FRAMEWORK

This chapter addresses the concepts and principles necessary for the development of research; It includes a detailed review of the recent literature, theories and models relevant to the research topic. Publications of research papers are explored, where related theories and methodological approaches have been applied.

2.1. Weather

When reflecting on the problems that entail the knowledge of time, its metrics and eventually its management, in order to direct its inexorable passage over individuals and human societies in a controlled manner; it is interesting what Elias (2021) expressed in his book "On Time", when he points out how elusive and abstract its study is for philosophers and scientists; also establishing that the perception of time is a cognitive problem, since it is related to the human capacity for synthesis; Its management, however, is the product of the collective need to solve in an organized way the commitments demanded by society. In this sense, in the field of educational psychology, over time there have been many studies that have been carried out regarding time management and its relationship with academic performance; both internationally and nationally.

As Martínez (2015) states, time is a limited resource, there is no way to store it, there is no device in which it can be accumulated. Its manipulation is impossible. Outside of the theoretical postulates of the theory of relativity, it cannot be stretched nor can it be compressed; once consumed it is impossible to recover it. It is one of the most important non-renewable resources of humanity, as it constitutes the basis on which the productivity metric is established, since a wrong management of time will prevent the efficient use of available resources.

From a philosophical perspective, the Roman emperor Marcus Aurelius (121-180 AD) in his book Meditations, expressed that time is similar to the flow of a river that cannot be stopped, nor made to recede. Hence, it is important to learn to navigate it.

Marco A (2019). From this it can be deduced that the proper management of time is relevant because it represents for the individual the most sublime way of exercising freedom, stewardship and manifesting the dominion of the human being. Time is a limited resource, so its use must be efficient and productive, it is a precious good that we must assess wisely; Its administration allows us to decide how we want to use it to achieve our personal goals; as García (2008) puts it. "Time is a precious commodity, and we must use it wisely. Time management allows us to choose how we want to spend our time and achieve our goals." (p. 80).

2.1.1. International contributions

In the case of the study entitled: "Path Relationship of Time Management and Academic Achievement of Students in Distance Learning Institutions"; Ahmad and Choudhry (2019) stated that evidence was found of a positive relationship between time management and academic performance. This means that students who are better at managing their time to attend to their school commitments tend to have higher academic performance. The study also found that time management is particularly important for distance education students, as they often have to deal with multiple responsibilities and commitments. The study also recommends that, in the first instance, it should be educational institutions that provide students with training and support in time management skills, in accordance with their need to solve the areas of opportunity derived from the monitoring of their own indicators. Parents and

guardians can also play an important role in helping their children develop good time management habits.

Another interesting international reference is the case of the study entitled "Improving students' performance with time management skills"; where Wilson and Abbasi (2021) state that the findings of their study suggest that adequate training in the use of time management tools has a positive impact on the academic performance of first-year university students and add that future research should explore the impact of time management training on students from different backgrounds and cultural contexts in universities around the world.

On the other hand, in relation to self-perception, for the study "Examining Students' Confidence to Learn Online, Self-Regulation Skills and Perceptions of Satisfaction and Usefulness of Online Classes" by Landrum, (2020), where the factors that affect students' perception of their online classes are examined, including their confidence in the use of learning platforms, self-regulation skills and past learning experience. It was found that: students' confidence to study online, self-regulation skills, and previous experience with online classes were positively related.

Specifically, the study found that students who had previously taken more online classes had greater satisfaction with their learning compared to those who had taken fewer classes. The study also found that students who had higher levels of self-regulation skills reported higher class satisfaction. Overall, the study highlights the importance of students' confidence in learning online and self-regulation skills.

2.1.2. National contributions

In the study prepared by Molina (2022), entitled "Self-regulation, orientation to the future, learning strategies and academic performance in university students. An explanatory study", carried out with 367 university students from different universities in Mexico, in the distance modality and focused on pandemic conditions; It is noted that in the scales of strategic planning and time management, both belonging to self-regulation, statistically significant relationships were found with respect to academic performance. However, although the correlation exists and it is the high-performing students who report the best scores; they do not explain academic performance in direct terms on their own; since, due to the nature of the study, other variables were additionally considered, so it concludes that it is necessary to delve deeper into this type of study, through the use of specific designs.

On the other hand, Rubio et al., (2019), in the study entitled "School time. A theoretical review of empirical studies carried out in Latin American educational centers", detailed that the management of school time turns out to be a key factor in educational quality, particularly in Latin American countries; this is due to the problems of quality and lack of educational equity that affect them. Although the work was carried out in Mexico, experts from other Latin American countries collaborated. The research establishes that the management of school time presents a significant correlation with respect to educational improvement, but in the same way it was specified that the evaluation of time should be contrasted with respect to the participation of other educational agents. In this sense, it is also important to consider extracurricular contexts; such as: time in the family environment, time in the neighborhood, activities related to transfers to schools and extracurricular activities in general. It is then stated that school time can also be considered as an important pedagogical resource in relation to academic performance.

Another interesting case was that of Molina et al., (2021), where their research had the particular objective of evaluating the relationship between future orientation, learning strategies, self-regulation, and academic performance and comparing the results according to the sex of the participants. An instrument was administered that included three scales: orientation to the future, self-regulation and learning strategies; academic performance was assessed with grade point average; the following findings were found in relation to the female sex:

- They show a greater orientation to set future goals
- They use more learning strategies
- They have better academic performance than boys
- Self-regulation and future-orientation predispose to better academic performance
- Self-regulation is influenced by contextual factors, teacher feedback, and general aspects of the program and the university

2.2. Time management

According to Reverón (2015), time management from a general perspective is related to activities such as the establishment of goals and the actions necessary for their fulfillment; defining priorities, organizing and managing the necessary resources for the fulfillment of tasks effectively, making effective use of the time available.

2.2.1. Academic Time Management

On the other hand, for Umerenkova and Flores, (2018), who establish that time management has been defined for academic research purposes in very varied ways, however, they specify that all of them converge in a single central idea: That the fulfillment of the tasks assigned for the execution of any productive activity must be related to the time expected for its completion, obtaining as a final product results that meet the expected expectation. For this, procedures such as planning, organization, assignment of priorities, as well as partial revision of goals must be considered.

In the same sense, Reyes and García (2022), but based on the different results that educational research has yielded, establish that time management is justified based on the ability to carry out an adequate and effective organization of activities. They must understand the ability to organize and manage in the best possible way the establishment of priorities, the planning for the execution of activities and the fulfillment of tasks in the given time.

Umerenkova and Flores (2018) also point out that time management is a desirable skill for students, as it allows them to be more organized, efficient, and productive; significantly contributing to improving their academic performance. Students who have time management skills tend to feel less stressed about the execution of school tasks, in addition their performance in evaluations is outstanding, which is reflected in their grades, increasing their self-esteem. Finally, students can improve their time management skills by learning specific techniques and strategies, such as: Prioritization, planning, avoiding procrastination, and periodic review

2.2.2. Dimensions

According to the perspective of researchers Durán and Pujol, (2013) cited in the work of Pilares (2017); There are four minimum dimensions that should be considered as a basis for conducting a scientific, quantitative study of time management:

- Setting goals and priorities. It consists of taking into consideration the predisposition both to specify the objectives, as well as to define and assign priorities to the tasks that are required to be carried out so that an individual can meet his goals.

- Use of tools for time management. It refers to the associated behaviors that the individual usually manifests regarding the use and management of formats, electronic devices, social networks and any accessory that contributes to effective time management, such as planning techniques, schedule management, lists to review tasks to be performed.

- Organizational preferences. It consists of the characterization of the different ways in which the subject approaches each of his tasks, as well as the way in which he provides the necessary maintenance to maintain a planned study environment and inclined to carry out the activities for which he was designed.

- Perception of control over time. It refers to the way in which it affects the subject, the perception they may have about the different levels of time control, as well as the way in which this perception can affect them directly or indirectly.

2.3. Academic performance and performance

2.3.1. Academic performance

From a pedagogical perspective, Sánchez and Fernández (2022) point out that academic performance is defined as the degree to which students achieve the learning goals set out in the educational program, permeating the level of the course program and lesson plan. This concept can be measured in a variety of ways, including test scores, participation in classroom and extracurricular activities; it must be reflected in a grade.

According to Pérez et al., (2010), academic performance is the sum of diverse and complex factors that act on the individual who is subject to the teaching-learning process and has been conceptualized with a value attributed to the

student's achievement in academic tasks. It is measured by the grades achieved, with a quantitative assessment, the results of which can express both the courses passed, the dropout rate or the degree of academic success. (Pérez, Sánchez, et al. 2000 cited by Pilares, 2017). On the other hand, from the perspective of Tonconi (2010), academic performance is defined as the level of knowledge achieved in an area or subject, evidenced through quantitative indicators, manifested through some evaluation system, where at the end a weighted grade will be obtained, expressed on a collegiate scale. (Tonconi, 2010 cited by Pilares, 2017)

2.3.2. Academic performance

For Moreno and Cortez (2020), academic performance is not only related to obtaining a grade, but the term also describes the way in which the student develops within the educational context, as it also includes aspects such as class participation, attendance, attitude towards learning, and social skills. Hence, the student's performance is significantly influenced by the student's socio-affective context.

For Bedregal et al (2020), education is a fundamental component to promote the development and well-being of societies; hence, the student body will always be the most important asset of any educational institution. Therefore, the social and economic development of a country is directly related to the academic performance of its students. Your metric should then include aspects such as academic performance, dropout, and lag. Where academic achievement (AR) is expressed in terms of success or efficiency of the result of the educational process. Student dropout is expressed by the fact that the student, after having been enrolled in a defined period of time, decides not to complete his or her educational project. Student lag occurs when the student fails to meet the previously established criteria to pass one or more courses, in such a way that, if the situation is repetitive, it can lead to school dropout.

CHAPTER III: METHOD

In this section, a detailed outline of the proposed methodology for the development of the research is shown. A detailed description of the experimental design, the description of the variables involved and the action plan that will allow the proposed objectives to be achieved are included.

3.1. Type of research

This is a quantitative research, since it is necessary to collect numerical data to identify the time management and administration strategies, which students use systematically or not, in order to meet the requirements posed by each of the courses in which they are enrolled. The design is non-experimental, since there is no manipulation of any of the variables, only the study phenomenon is observed in its natural environment, with the purpose of being analyzed later. The study can also be considered to be of the relational cross-sectional type, since the data are collected at a single time, with the purpose of examining the relationship between the dependent and independent variables and analyzing their incidence. Cauas (2015).

3.1.1. Definition of study variables

Since the research aims to determine the level of contribution of time management, as a self-regulation strategy, to increase the academic achievement of students, of the manufacturing block of the educational program of industrial and systems engineering, plan 2016. The variables it studies are the following:

The dependent variable in this case will be the academic performance of the students, which in this case will be the global average that each student has at the time of the study.

The independent variable is the use of strategies for time management. With four dimensions:

- Objectives and priorities
- Management tools
- Preference for disorganization
- Perception of control

The addition of elements of the sociodemographic dimension, such as: sex, age, nationality, employment status and educational level, is also considered as a contextualizing complement.

3.2. Participants

The population that will be analyzed are the students enrolled in the optional courses of the manufacturing block. The population of students enrolled in the January - May 2024 semester is 46 students; so in this case, it is considered to study the entire population of the block.

3.3. Instrument

The instrument applied in this research, known as university time management (GTU) (See Appendix B). This instrument was originally applied in Spain by García-Ros and Pérez-González (2012) and later in Venezuela by Durán-Aponte and Pujol (2013) and eventually in Mexico, showing very good reliability and validity. Both studies cited by Roblero (2020).

The instrument consists of 34 items, where the dimensions considered are related to the items as follows:

Table 1 *Ratio of items to variable dimensions*

Dimensions	Items
Objectives and priorities	5, 8, 9, 11, 19, 22, 25, 29, 30, 31, 32
Management tools	3, 12, 13, 16, 20, 23
Preference for disorganization	2, 7, 10, 14, 17, 18, 21, 24, 27, 28
Perception of control	1, 4, 6, 15, 26

Note: Source: Roblero (2020).

The items of the study will be applied, on a Likert-type scale, where the weighting used is as follows: 0: Never, 1: Almost never, 2: Sometimes, 3: Frequently, 4: Almost always, 5: Always

3.4. Procedure

For the proper development of this research, it is necessary to follow the procedure detailed below.

Request authorisation from the competent authority. The purpose of the application for authorization is that during the development of the research fieldwork:

- The necessary facilities are provided.
- The applicable regulations in the institution's facilities are observed
- Participants' rights are protected

To carry out the study, in this case authorization was requested from the head of the industrial engineering department, in the Náinari unit (see appendix 1).

Select the target population. For the purposes of this study, the target population was that of students of the industrial engineering program, enrolled in the optional courses of the manufacturing block see annex A.

Define the sample size. Because on average three groups are opened among the five elective courses of the block, for the purposes of this research, the entire population of students enrolled in the semester will be studied.

Informed consent. The students were asked to participate voluntarily, informing them about the confidentiality of personal data, the objective of the research, the ethical and moral implications, both on the veracity of the data collected and the publishable information (see appendix 2).

Data collection. The data collection instrument was provided to the students, both printed (see annex B), and in digital format using the Google forms tool.

Data analysis. The SPSS IBM Statistics software was used for data analysis in projects within the field of social sciences and education, determining parameters of descriptive statistics such as: means, modes, averages, deviations, among others, which provide an overview of the statistical behavior of the sample. For inferential statistics, population normality, reliability, validity and correlation between variables and their dimensions were addressed.

CHAPTER IV: RESULTS

This chapter details the findings of the application of the University Time Management (GTU) instrument to the students of the manufacturing block of the IIS program; as well as the results of its subsequent analysis. The instrument included 34 items where the four dimensions were considered: objectives and priorities, management tools, preferences for disorganization and the perception of control.

4.1. Characteristics of the participants

In relation to the profile of the participants, all of them declared to be of Mexican nationality, all full-time students. 80% stated that they were male and 20% female; In addition, it was noted that the average scores of both clusters are very similar, being 8.57 for the female group and 8.71 for the male group, see Table 2.

Table 2

Profile of the participants

Number ofparticipants	Percentage	Gender	Grade Point Average
9	20%	Female	8.58
37	80%	Male	8.71

Note: Comparison by gender

4.2. Academic performance

Figure 1 shows in the frequency distribution of students' academic performance, contrasted against the Gauss curve, that the mean grade was 8.68, with a standard deviation of 0.571 and a median of 8.8. The maximum and minimum grades were 10 and 7 respectively. In addition, in table 3, due to the asymmetry value of -0.23, due to its negative value, a slight bias to the right with respect to the mean is identified. The kurtosis of 0.51 denotes a leptocurtic distribution, that is, with a predominance of values with central clustering.

Figure 1 ***Grade Distribution***

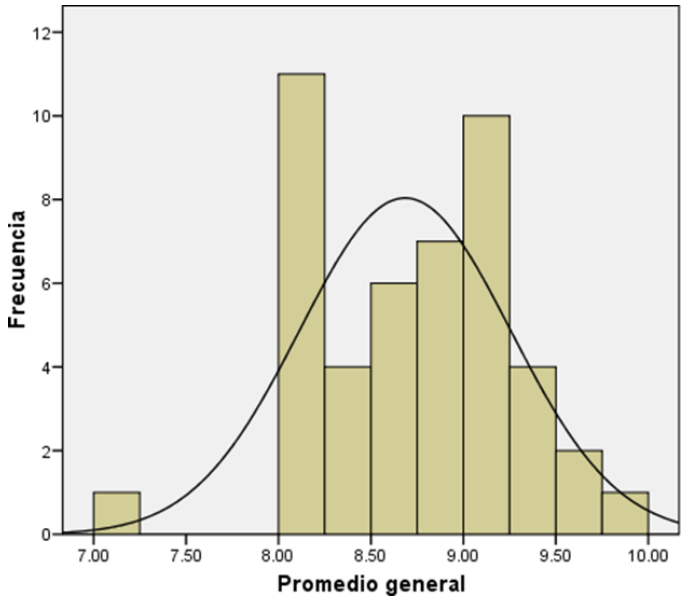


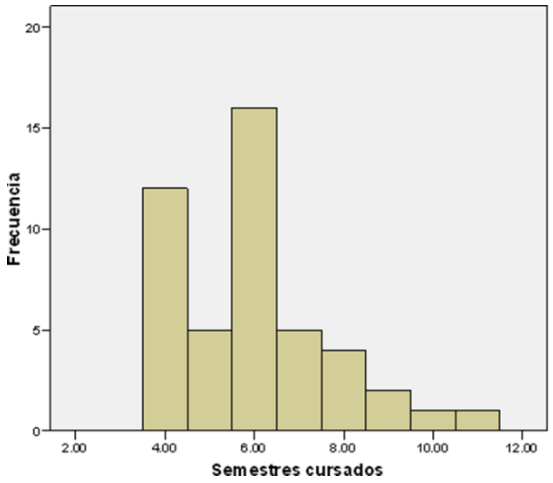
Table 3 ***Ratings statistics***

Concept	Value
N	46
Stocking	8.68
Median	8.80
Fashion	8.00
Desv. Typ.	0.57
Variance	0.33
Asymmetry	-0.23
Typo error. of asymmetry	0.35
Kurtosis	0.51
Typo error. of kurtosis	0.69
Minimal	7.00
Maximum	10.00

Note: Descriptive Performance Statistic

Regarding the semesters taken by the participants, it can be seen in Figure 2 and Table 4 that, predominantly, 34.78% of them were academically in the sixth semester, followed by students in the fourth semester with 26.09%. The mean number of semesters completed in the study was 5.98 semesters, with a standard deviation of 1.719

Figure 2 ***Semesters attended***



Note: The mean was 5.98 semesters, with a standard deviation of 1.719

Table 4 ***Statistics of semesters taken***

Semesters attended	Frequency	Percentage	Cumulative percentage
4	12	26.09	26.09
5	5	10.87	36.96
6	16	34.78	71.74
7	5	10.87	82.61
8	4	8.70	91.30
9	2	4.35	95.65
10	1	2.17	97.83
11	1	2.17	100
Total	46	100	

4.3. Statistical analysis by dimension

4.3.1. Dimension: Objectives and priorities.

The first dimension corresponds to "Objectives and priorities", and includes eleven items: 5, 8, 9, 11, 19, 22, 25, 29, 30, 31, 32; where it seeks to identify the predisposition of the participants both to specify objectives, as well as to define and assign priorities, see Table 5.

The results show that the means of the responses located at the lowest levels of the Likert scale (0: Never, 1: Almost never, 2: Sometimes), corresponded to the items: 5, 22, 25 and 31: where the lowest was 2.07, corresponding to the R22 item: "I review my daily activities to see where I waste time", followed by R25: "During a working day I evaluate if I am complying with the schedule I have pre-established", with 2.61. At the same time, it should be noted that the kurtosis of these items presents negative values, which is typical of platicurrtic distributions, in which the deviations are usually large and the frequency of central values is low. However, it is striking that the item in this dimension, located at the highest response level: R29: "I establish priorities to determine in what order I will do the tasks each day", with a mean of 3.65, denotes that the subjects recognize the importance of setting priorities, but on the other hand, they do not usually evaluate compliance with the schedules established to meet those priorities (R25).

4.3.2. Dimension: Management Tools

This dimension includes the following items: 3, 12, 13, 16, 20, 23; with which it seeks to identify associated behaviors regarding the use and management of formats, devices, social networks and any accessory that contributes to effective time management.

Table 6 shows that in general in this dimension, the subjects have means with relatively low values, but particularly the R20 items: "I carry an agenda with me". and R23: "I keep a diary of the activities carried out". they obtained 1.91 and 1.57 respectively; which places them between: 1 Almost never and 2 Sometimes, with a positive asymmetry that locates the distribution of the answers, mostly with values below the average.

Table 5 ***Statistical of the dimension objectives and priorities***

Dimension: Objectives and priorities	My.	Max.	M	D.	V.	A.	C.
5) I organize my activities at least a week in advance.	0	5	2.85	1.30	1.69	-0.02	-0.81
8) I set short-term goals for the that I want to achieve in a few days or weeks.	0	5	3.39	1.20	1.44	-0.66	0.49
9) I have the feeling of controlling my time.	0	5	3.46	1.28	1.63	-0.60	-0.20
11) I set deadlines when I set out to complete a task.	0	5	3.37	1.44	2.06	-0.60	-0.40
19) I finish high-priority tasks before doing the less important ones.	0	5	3.59	1.27	1.63	-0.71	0.10
22) I go over my daily activities to see where I waste time.	0	5	2.07	1.51	2.28	0.09	-0.81
25) During a working day I evaluate if I am complying with the schedule that I have pre-established.	0	5	2.61	1.57	2.47	-0.03	-1.18
29) I set priorities to determine in what order I will do the tasks each day.	0	5	3.65	1.34	1.79	-1.07	0.94
30) If I'm working on something and I know I'm going to have to wait a while, I prepare some homework to do in the meantime.	0	5	3.15	1.23	1.51	-0.38	0.46
31) I set blocks of time in my schedules for activities that I usually do (shopping, leisure, surfing, on the web...)	0	5	2.85	1.40	1.95	-0.38	-0.57

32) I find places to work where I can avoid interruptions and Distractions.	0	5	3.61	1.20	1.44	-0.79	0.48

Note: M=Mean, D=Standard Deviation, V=Variance, A=Asymmetry, C=Kurtosis

Table 6 ***Statistical dimension management tools***

Dimension: Management Tools	My.	Max.	M	D.	V.	A.	C.
3) I keep a notebook to jot down notes and ideas.	0	5	2.37	1.84	3.39	0.03	-1.39
12) I write notes to remind myself of what I need to do.	0	5	2.74	1.61	2.60	-0.15	-0.88
13) I have to spend a lot of time on unimportant tasks.	0	5	2.30	1.31	1.73	-0.04	-0.70
16) I make a list of things to do each day and put a sign next to each task when I have completed it.	0	5	2.52	1.64	2.70	-0.02	-1.07
20) I carry a planner with me.	0	5	1.91	1.70	2.88	0.46	-1.15
23) I keep a diary of the activities carried out.	0	5	1.57	1.64	2.70	0.68	-0.78

Note: M=Mean, D=Standard Deviation, V=Variance, A=Asymmetry, C=Kurtosis

4.3.3. Dimension Preference for disorganization

This dimension includes the following items: 2, 7, 10, 14, 17, 18, 21, 24, 27, 28; where it seeks to identify the different ways in which the subject approaches each of his tasks, as well as the way in which the necessary maintenance is provided to maintain a planned and inclined study environment to develop the activities for which it was designed.

In table 7, you can see that the items with the lowest means were R10: "I can find the things I need more easily when my workplace is upside down and messy than when it is tidy and organized", with a value of 1.98 and R14: "The time I invest in managing time and organizing my workday is wasted time", with 1.57. Both of a rhetorical type, since they are assertions of opposite sign, In contrast, the item with the highest average was R7: "At the end of each day I leave my workplace tidy and well organized", with 3.39.

Table 7 ***Statistic of the dimension preference for disorganization***

Dimension: Preference for disorganization	My.	Max.	M	D.	V.	A.	C.
2) When I make a list of things to do, at the end of the day I have forgotten it or I have put it aside.	0	5	2.37	1.14	1.30	-0.04	-0.41
7) At the end of each day I leave my workplace tidy and well organized.	0	5	3.39	1.29	1.67	-0.72	-0.06
10) I can find the things I need more easily when my workplace is "upside down" and cluttered than when it is tidy and organized.	0	5	1.98	1.58	2.51	0.39	-0.90
14) The time I invest in managing time and organizing my workday is wasted time.	0	5	1.67	1.32	1.74	0.64	-0.02
17) I find it difficult to keep a schedule because others keep me away from my job.	0	5	2.13	1.42	2.03	0.24	-0.72
18) My daily days are too unpredictable to plan and manage my time.	0	5	2.41	1.50	2.25	-0.22	-0.94
21) When I am disorganized, I am better able to adapt to unexpected events.	0	5	2.70	1.44	2.08	-0.22	-0.69
24) I have some of my most creative ideas when I'm disorganized.	0	5	2.37	1.53	2.33	0.08	-0.76

27) I realize that I am postponing tasks that I don't like, but that are necessary.	0	5	3.33	1.32	1.74	-0.70	0.35
28) I find that I can do a better job if I put off tasks I don't like instead of trying to do them in order of importance.	0	5	2.67	1.55	2.40	-0.17	-0.96

Note: M=Mean, D=Standard Deviation, V=Variance, A=Asymmetry, C=Kurtosis

4.3.4. Dimension Perception of control

This dimension refers to the way in which it affects the subject, the perception they may have about the different levels of time control, as well as the way in which this perception can affect them directly or indirectly. It is made up of items 1, 4, 6, 15, 26.

Table 8 shows that in all the items the means range: 3: Frequently and 4: Almost always; In addition, all the items exhibit negative statistical asymmetry, with a bias to the right, which places the responses mostly in values above the average to this dimension as the one with the fewest areas of opportunity.

Table 8 ***Statistics of the perception dimension of control***

Dimension: Perception of Control	My.	Max.	M	D.	V.	A.	C.
1) When I decide what I am going to try to achieve in the short term, I also take into account my objectives through the short term. long term.	1	5	3.91	1.05	1.10	-1.02	0.92
4) I go over my goals to determine if I need to make changes.	0	5	3.13	1.13	1.27	-0.17	0.14
6) I split complex and difficult projects into smaller, more manageable tasks.	0	5	3.07	1.27	1.62	-0.53	-0.07
15) I look for ways to increase the efficiency with which I carry out the activities in my studies.	1	5	3.37	1.10	1.22	-0.48	-0.38
26) I use a tray system (files or folders) to organize information.	0	5	3.09	1.76	3.10	-0.49	-1.04

Note: M=Mean, D=Standard Deviation, V=Variance, A=Asymmetry, C=Kurtosis

4.4. Normality test

In relation to the normality tests for the different dimensions, the values obtained can be seen in table 9. In this case, for a sample size of less than 50, the Shapiro-Wilk criterion was chosen, where in all cases values greater than 0.05 were obtained for the value of significance, so it is assumed that there is a normalized parametric distribution; therefore, correlation tests are deduced with Pearson's R.

Table 9 ***Normality tests***

Kolmogorov - Smirnov(a)				Shapiro -Wilk		
	Statistical	Gl	Mr.	Statistical	Gl	Mr.
Yield	0.102	46	0.200(*)	0.968	46	0.240
Objectives and priorities	0.090	46	0.200(*)	0.974	46	0.384
Management tools	0.101	46	0.200(*)	0.969	46	0.264
Preference for disorganization	0.132	46	0.045	0.969	46	0.264

Perception of control	0.116	46	0.139	0.962	46	0.141

Note: (*) Values at the lower limit of the true significance. (a) Correction of Lilliefors' meaning

4.4.1. Correlation inferential result

The first inferential test is the identification of the correlation between the dependent variable and the independent variable; where in table 10 it can be seen that the relationship is -0.028, that is, inversely proportional low mean. The significance for the independent variable in general is 0.853.

Table 10 ***Correlation between dependent and independent variables***

		Overall average	Independent variable
Overall average	Correlation	1	-0.028
	Sig. (bilateral)		0.853
Independent variable	Correlation	-0.028	1
	Sig. (bilateral)	0.853	

Note: Pearson Correlation Analysis

In the same way, it can be seen in tables 11 that each of the variables separately also presents a low correlation with respect to the average of grades, however, four significant correlations are distinguished between the dimensions: a) "Perception of control" and "Management tools" with 0.538, b) "Perception of control" and "objectives and priorities" with 0.847, c).- "Management tools" and "objectives and priorities" with 0.533, d).- "Preference for disorganization" and "Objectives and priorities" with 0.412

Table 11 *Correlations and significance between dimensions and academic performance*

		Perception of control	Herr. Management	Obj. and priorities	Preference for disorg.	Yield
Perception of control	Correlation	1	0.538(**)	0.847(**)	0.214	0.167
	Mr.		0.000	0.000	0.154	0.267
Management tools	Correlation	0.538(**)	1	0.533(**)	0.120	0.092
	Mr.	0.000		0.000	0.429	0.542
Objectives and	Correlation	0.847(**)	0.533(**)	1	0.412(**)	0.009
priorities	Mr.	0.000	0.000		0.004	0.953
Preference for disorg.	Correlation	0.214	0.120	0.412(**)	1	-0.273
	Mr.	0.154	0.429	0.004		0.067
Yield	Correlation	0.167	0.092	0.009	-0.273	1
	Mr.	0.267	0.542	0.953	0.067	

Note: Pearson correlation analysis; ** The correlation is significant at the 0.01 level (bilateral).

4.5. Reliability Testing

For the determination of reliability, Cronbach's alpha criterion is used as a reference, see table 12, where for the 34 elements that make up the instrument it is found that Cronbach's alpha obtained is 0.897.

Table 12 ***Global reliability***

Cronbach's alpha	N of elements

0.897	34

Note: Reliability Analysis

According to the reliability criteria, see table 13, places the instrument within the range of 0.8 to 0.9, positioning it in the category of instrument of good reliability, tending to excellent.

Table 13 ***Criteria for reliability analysis***

Interval to which Cronbach's coefficient belongs	Assessment of the reliability of the items analyzed
0 to 0.5	Unacceptable
0.5 to 0.6	Poor
0.6 to 07	Weak
0.7 to 0.8	Acceptable
0.8 to 0.9	Well
0.9 to 1	Excellent

Note: Table extracted from Chávez and Rodríguez (2018)

In turn, in Appendix 3, it can be seen in the general adjustment table that the suppression of any of the items will generate an overall change for the instrument's statistics both in the value:

- From Cronbach's alpha
- Mean of the scale
- Scale variance
- Corrected Element-Total Correlation

4.6. KMO and sphericity test

From the Kaiser-Meyer-Olkin analysis, in Table 14 it can be seen in the results of the test that:

- A score of 0.590 was obtained, which implies that the KMO indicator is low
- For the Bartlett sphericity test, a significance of 0.000≤0.05 was obtained, indicating that the test result is significant

Table 14 ***KMO and sphericity tests for the 46 people***

KMO and Bartlett Test		
Kaiser-Meyer-Olkin sample adequacy measure.		0.590
Sphericity test of	Approximate Chi-square	1000.018
Bartlett	Gl	561.000
	Gis.	0.000

Note: For a KMO>0.5 and KMO<0.6, the value is considered low.

4.7. Analysis of results

The data collected in this study, using the instrument already described in chapter three, were analyzed using the descriptive statistics tools, available in SPSS, obtaining the values corresponding to means, medians, deviations, among others, as detailed in each section. Subsequently, the analysis also included the use of inferential tools, such as the normality tests of Kolmogorov Smirnov and Shapiro Wilk. As well as the determination of Pearson's

correlations and Crombach's alpha for the determination of the reliability of the instrument, amply solving the findings of Roblero (2020), where he points out that the reliability reported in his analysis was 0.715, also indicating that it was slightly lower than that reported by García and Pérez (2012) in Spain of 0.765 and that reported by Duran and Pujol (2014) in Venezuela of 0.72.

CHAPTER V: DISCUSSION

In this section, the discussion of the findings derived from the results obtained in the research is presented, where the proposed objective is answered, in addition to the discussion, the conclusions and final recommendations are proposed.

5.1. Discussion

This research aimed to determine the level of contribution of time management, as a self-regulation strategy with the purpose of increasing the academic achievement of students in the manufacturing block of the Industrial and Systems Engineering Educational Program, 2016 Plan.

From the results derived from the research, it was found, first, that there was no significant difference by gender, in relation to the average grade declared by the participants; coinciding with the findings of Centeno et al (2019), where in their comparative study between academic performance and the gender of students, they expressed no significant differences, despite the differentiated cognitive aspects. In this sense, Roblero (2020), although he did not make a gender contrast with respect to the average rating; She noted in her study that women tend to be better organized than men.

Todaro (2001) cited by Roblero (2020), in a similar study, found that women excelled in order, discipline, and responsibility. For Gozalo et al (2022), in a similar study, there was a significant difference between academic performance between men and women, but their study also showed that this difference is mainly related to the level of interaction with teachers, particularly when the interaction encourages the student to assume active roles in the learning process. On the other hand, Doumet et al (2011), cited by Gozalo (2022), observed in their study that the gender difference in school performance is associated with the greater time that women spend on academic activities.

The research identified a low level of correlation between grade point average and academic time management, which coincides with the observations of García and Pérez (2012), as well as those of Duran and Pujol (2014), cited by Roblero (2020), who also report low correlations between the dimensions of academic time management and student grading. arguing that it is a correlation that must be analyzed in detail. On the other hand, although Mondragón et al (2017)

They reported that there is no statistically significant correlation between study habits and academic performance, they also pointed out that other factors are involved with academic performance, such as: social, family, economic and other complex factors such as cognitive structures.

A relatively high correlation of 0.847 was found between the perception of control in students and the ability to specify objectives, as well as define and assign priorities to the tasks that need to be carried out for the effective fulfillment of goals. The perception of control is also correlated at 0.538 with the use of time management tools, which contribute to increasing efficiency in the use of available resources.

In his analysis, Hernández (2016) found a correlation factor of 0.632 between student motivation and the perception of the performance obtained, emphasizing the importance of the teacher's role in aspects of the soft curriculum, such as student motivation. In relation to the use of management tools, Hernández (2016) stated that, although there is no significant correlation between their use and academic performance; He also pointed out that students with better academic performance said they used a greater variety of tools than the rest of the students. For their part, Gozalo et al (2022) reported correlations of 0.626 for the dimension of optimizing the time spent on homework and 0.527 for interaction with teachers. Eduardo (2021) reported positive correlations of 0.423 with respect to time management, with respect to the establishment of objectives and priorities, as well as 0.376 for the use of time management tools.

In relation to the areas of opportunity identified, it can be seen that the aspects that require greater attention are:

- For the dimension "Objectives and priorities", a) The monitoring of daily activities and b) The periodic evaluation of the fulfillment of the established goals.

- For the dimension "Management tools", the use of the agenda as a means of support for the recording and control of planned activities.
- For the "Preference for Disorganization" dimension, students recognized that they were putting off tasks that they didn't like, but that are necessary.
- In relation to the dimension "perception of control", it is positively appreciated that the subjects manifest recognition of the importance of the implementation of some type of control over the execution of academic activities.

In contrast, Umerenkova and Flores (2018) reported that the most significant limitations among low-achieving students were:

- Ineffective task planning
- Failure to comply with the established planning, due to lack of follow-up
- Failure to adapt to unexpected events
- Lack of clarity in the use of regulation tools for low-achieving students.

For Reyes et al (2021), the aspects where the greatest correlation with academic performance was evidenced were:

- Goal Formulation
- Planning and monitoring
- Level of commitment and adherence to schedules
- Diverse and effective use of support tools

For the study carried out by Gozalo et al (2022), the factors that presented the highest correlation were:

- Optimization of time spent on tasks
- Interaction with teachers
- Managing the environment and its challenges
- Maintain positive expectations

On the other hand, for Eduardo (2021), the dimensions that were positioned as the most influential in relation to time management are: The establishment of objectives and priorities and the use of management tools.

Derived from the elements raised in the discussion, it can be assumed that the research question has been answered, since the results obtained allow us to identify those competencies that should be strengthened. In addition, these same findings complement the results reported by the different researchers, who have addressed the issue of time management, regarding the theoretical dynamics of its dimensions; however, in relation to academic performance, the position of who propose as an element of interest for subsequent studies, to make a complementary approach to additional convergent variables, whose effect on academic performance has been proposed by other studies.

5.2. CONCLUSIONS

It can be seen that to a large extent the results obtained in this study are in agreement with the findings documented by other authors; therefore, they will strengthen decision-making, in relation to the qualification of university students of industrial engineering, regarding the impregnation skills associated with time management.

With the identification of the main areas of opportunity, as well as the most important correlations between the dimensions of academic time management; It is concluded that the objective of the study has been solved, since strategies can be derived to promote the use of tools for effective time management among students.

Because self-perception is a triggering element for the rest of the dimensions of time management; The role of the teaching staff in the promotion of inclusive environments that, through their particular interactions, actively involve

the student in their own learning, acquires relevance. In addition, for an effective implementation of strategies, for the efficient use of time, it will first be necessary to have trained and updated teaching staff in the use of self-regulation tools, from methodological to technological.

This type of study contributes to the strengthening of educational research, since in addition to generating new information, derived from the application of a diagnostic tool such as the GTU, in the field of engineering education, it sets a precedent to continue investigating in depth the interrelations between the different dimensions involved in time management; also including additional elements such as cognitive and sociodemographic aspects, typical of the context in which engineering students develop and their effect on academic performance.

5.3. Recommendations

Derived from the findings identified in this project, it is recommended to implement programs that promote self-regulation strategies among students, since, as Ramírez and Hernández (2019) point out, these have a positive effect on academic performance.

- First, it is proposed to promote the increase of the perception of control in students; since individuals with a better perception of this dimension tend to show a greater ability to specify objectives, as well as define and assign priorities to the tasks that need to be carried out, for the effective fulfillment of goals.

- Secondly, to enable students in relation to the use of tools for time management, which contribute to increasing efficiency in the use of available resources, being useful for the monitoring and evaluation of activities. Among which are: Planning techniques, schedule management, watchlists and agendas, from conventional paper to digital, such as electronic versions available on smartphones.

- As an additional element, it is recommended to incorporate the above points into the competencies of impregnation of the academic program; this with the purpose of providing them with follow-up through indicators in the curriculum, as well as a formal evaluation in relation to their level of proficiency.

The role of teachers will be fundamental for the promotion of self-regulation, because with adequate training, they will be able to create learning environments, where cognitive and motivational strategies are developed that contribute to favoring and encouraging the perception of achievement and the use of time management tools.

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