













Comparison of ideal vocational profiles against real vocational profiles and their relationship with academic performance at the Technological University of Leon





Comparación de perfiles vocacionales idóneos contra los perfiles vocacionales reales y su relación con el desempeño académico en la Universidad Tecnológica de León

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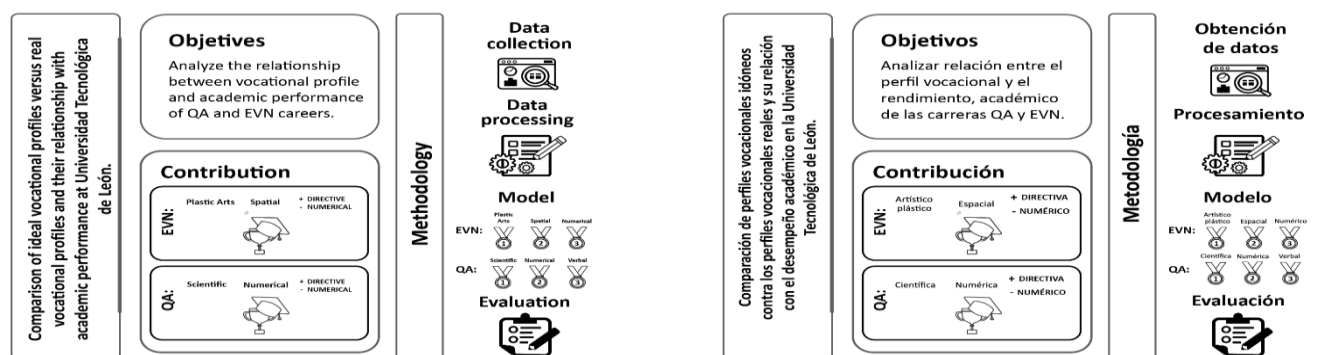


Abstract

In this research, the relationship between the ideal vocational profile and the real vocational profiles of students in the Virtual Environments and Digital Business (EVN) and Environmental Chemistry (QA) courses, generation 2020-2022, at the Technological University of León, was explored. The results of the vocational preferences of the Single Registration System for Higher Education Applicants (SUREDSU) were used and compared with the qualification of the stay process. The sample consisted of 88 students, 38 from the EVN course and 50 from the QA course. The results allow us to identify that the ideal vocational profile coincides with excellent performance, but there are also combinations with other complementary areas that enable good academic performance. This work invites us to expand the research to identify the additional factors that influenced these results, in order to recognize and enhance them.

Resumen

En la presente investigación se exploró la relación entre el perfil vocacional idóneo y los perfiles vocacionales reales de los estudiantes de las carreras de Entornos Virtuales y Negocios Digitales (EVN) y Química Ambiental (QA), generación 2020-2022, de la Universidad Tecnológica de León. Se utilizaron los resultados de las preferencias vocacionales del Sistema Único de Registro de Aspirantes a la Educación Superior (SUREDSU) y se compararon con la calificación del proceso de estadía. La muestra fue de 88 estudiantes, 38 de la carrera de EVN y 50 de la carrera de QA. Los resultados permiten identificar que el perfil vocacional idóneo coincide con un desempeño de excelencia, pero también existen combinaciones con otras áreas complementarias que posibilitan un buen desempeño académico. Este trabajo invita a ampliar la investigación para identificar los factores adicionales que influyeron en estos resultados, con la finalidad de reconocerlos y potenciarlos.



Vocational profile, Terminal efficiency, Academic performance

Perfil vocacional, Eficiencia terminal, Desempeño académico

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Introduction

The Technological University of León (UTL), since its beginnings in 1996, recognises the socio-economic and labour changes, seeks to adapt to current demands and integrates into its house of studies the new generations of young people, whose crossroads range from strengthening their knowledge and professional skills, defining a life project in accordance with their values and aspirations, to recognising themselves as part of a social group that allows them to mature in socio-emotional processes important for this stage of life (UTL, 2024). (UTL, 2024).

Currently UTL is one of the largest Technological Universities in the country with a reported enrolment of **7,870 students***, distributed in two Academic Units, Acámbaro and León, which include the Higher Technical University (TSU) and undergraduate levels. This brings with it great benefits, but also great challenges.

An example of these challenges is that despite the increase in enrolment and the efforts undertaken by the different educational actors, the terminal efficiency of the **TSU generation 2020-2022 is only 43.4%****.

This is a worrying figure, as it means that less than half of the students who enrol at the University complete their professional training. The main causes of desertion are the following reasons for leaving**:

1. **Academic:** failing grades that do not allow them to continue progressing.
2. **Personal:** family problems, interpersonal conflicts and others.
3. **Vocational:** vocational confusion, dislike of the career or lack of interest in studying.

In the first reason for leaving, several factors converge, on the one hand, the lack of knowledge and skills specific to the chosen career, but also speaks of an educational process that needs to strengthen their academic strategies to develop these skills. The personal motive refers to emotional and social changes or imbalances, which influence the change of perspective on the student's priorities. Family problems are generally the most prevalent.

The third reason is directly related to the phenomenon of 'not feeling called' or interested in the chosen career, losing the purpose of continuing to make an effort.

According to the monitoring of the reasons for dropping out carried out in the psycho-pedagogical department, it has been identified that a large number of students enter UTL without having carried out a process of self-knowledge and reflection on their interests and abilities, having opted for a university degree based on the choices of their group of friends, suggestions from their relatives or occupations that promise greater economic success, but which are not related to tasks or activities that they enjoy doing and learning.

This leads to great frustration when they realise that their lack of vocation and skills makes it difficult for them to achieve the desired academic integration, adding to the list of students at risk of dropping out.

This is why the Technological University of León incorporated a self-diagnostic questionnaire on vocational preferences into its admission process: the Unique System for the Registration of Applicants to Higher Education (SUREDSU).

This tool was created by the now defunct Secretariat of Innovation, Science and Higher Education (SICES) in conjunction with the Guanajuato State's Higher and Higher Education Institutions, to identify and monitor high school students' expectations about university careers (Martínez-López, Vega-Flores and Vega-Chávez, 2018). SUREDSU, being a publicly funded initiative, allows easy and free access for all students interested in knowing their vocational preferences.

The SUREDSU (SEG, 2023) consists of 72 questions with Likert-type answers where the respondent must assign a value of 0-4 according to his or her perception of how much the actions described in the instrument are facilitated.

This survey can be completed virtually through the portal: <https://suredsu.guanajuato.gob.mx/> where your answers will profile you to identify your skills and interests across the nine areas of knowledge covered by the instrument.

These areas are: directive, musical, artistic, plastic, scientific, verbal, numerical, mechanical, spatial and social.

Specific combinations of these knowledge areas can help to outline a vocational profile for a career. The student gets a voucher with their results which can be printed out and in case they need to review or reprint them, their results are saved in their user account on the SUREDSU website.

Since 2020, the Universidad Tecnológica de León has sought to take advantage of this information by proposing a combination that is even more in line with the technical careers offered at UTL.

This selection of knowledge areas was carried out with the collaboration of the career managers who, by examining what each knowledge area consisted of and, based on their experience of the skills demanded by their careers, would choose the three main knowledge areas that form the basis for developing the desired technical and professional competences. This combination was called the ideal vocational profile.

Thus, as part of the enrolment process, students complete the SUREDSU survey upon enrolment at UTL. The information obtained from this questionnaire is integrated into a database that is shared with the academic authorities for better analysis and use.

As explained in their study Sánchez et al. (2017), which explains the relationship between dropout and vocational profile in university applicants, academic performance can be classified into two: internal performance, whose indicators are based on the grades that the student obtains throughout their school career, and external performance, which is the result of the implementation of knowledge and skills in a real scenario, where their professional competences are put to the test.

This is why this study considers the evaluation of the internship, which is the period in which students put their skills into practice and put them to use in the solution of a problem or by contributing to the development of a project with benefits for a local company.

In order to make a diagnosis of the current situation related to student drop-out, the case of the Environmental Chemistry and Virtual Environments and Digital Business degree courses is taken, as they are some of the degree courses with the lowest terminal efficiency rates.

The terminal efficiency of QA for the 2020-2022 generation was only 31.5% *** and for the EVN course in the same generation it was 35.1%***.

In the absence of an analysis showing that these results are in themselves predictors of better academic performance, the relationship between the answers provided by the student and their actual vocational preferences is unknown.

For, there is a margin that lends itself to manipulation by seeking to fit into the career for which he or she has bought a token. Therefore, it is imperative to carry out this research and implement proposals based on a more systematised analysis of this information.

Theoretical framework

Vincent Tinto (1987) mentions that during the first year of university there is a greater risk of dropping out, since students are usually not very involved in university life. For the tasks that the student must undertake in order to integrate into the institution include: detaching from the relationship with the old school (baccalaureate) and adapting to the new intellectual and social requirements.

From this, two problems can be reviewed which may jeopardise their permanence: a) that the student falls into isolation and b) that there is an *incongruence* between his or her ideals and the values offered by the institution.

In this sense, the process of vocational and professional guidance is of great relevance, as it would help to reduce the risk of dropout in early stages, helping the young person to adapt to the new requirements with a greater understanding of himself and the educational model to which he is enrolled, maintaining the greatest possible congruence between his ideals and reality.

The concept of **self-efficacy** studied by Bandura (1986) helps to understand the aforementioned phenomenon, as he explains that a student who knows he is capable of facing an academic problem is a student who is more easily committed to trying to overcome it and, therefore, is more likely to complete his degree.

The key lies in dedicating time to reflection, self-analysis and observation, especially of the positive experiences of achievement that have been had, and in social interaction that recognises the efforts and successes obtained.

Among the factors recognised as a cause of university drop-out, the following is identified among the first places: the wrong choice of career. According to Zambrano, Rodríguez and Guevara (2018) 'The deficient vocational orientation received before entering to select a university career causes students to enrol in professional careers without basing their decision on solid information about them.' (Zambrano, Rodríguez and Guevara, 2018, p.5)

In Mexico, there have been several investigations that have been conducted regarding the importance of Vocational Guidance. In their research work reported in the article 'El efecto de la Orientación Vocacional en la elección de carrera' De León y Rodríguez (2008), emphasise the importance of the vocational guidance process to strengthen the decision-making process in young people at the high school stage, mentioning that: '...the correct selection of the career to study becomes an important tool to preserve or increase the student's motivation and school performance' (De León & Rodríguez, 2008).

According to Bonilla, López, and Juárez (2015), the importance of vocational guidance for upper secondary students lies in providing a space for reflection and self-knowledge, which favours a '*correct professional choice adjusted to their reality...*' (Bonilla, López, and Juárez, 2015).

Key concepts

Vocation: According to the Royal Spanish Academy (2023) the term comes from the Latin *vocatio-onis* 'action of calling'. Vocation is the inclination to a state, a profession or a career.

Vocational Guidance: is a process of vocational and professional guidance to reach the right choice of profession at a higher level; therefore, it must be planned, programmed, executed and evaluated (Barreno, 2016).

Terminal efficiency: indicator that expresses the capacity to ensure that those who start a given level of education graduate satisfactorily from it (Muñoz Izquierdo, 1973).

Dropout: at the Technological University of Leon, dropout is considered to be the interruption of the academic course, whether voluntary or involuntary; temporary (more than 3 years have elapsed since its preparation) or definitive.

Graduation: for the purposes of this study, a graduate is considered to be any student who has satisfactorily completed their studies, fulfilling 100% of the curricular load corresponding to the current study plan in the chosen degree course.

Permanence: a term coined in studies on students who persevere in education, with emphasis on overcoming adversities (González, 2011). This term seems to derive from the translation of the English term used by Tinto and other authors as *persistence*.

Factor: an element or circumstance that contributes, together with other things, to produce a result.

Suitable vocational profile: combination of areas of knowledge based on the SUREDSU survey, previously selected and defined for each career, according to the nature of the essential activities and the graduate profile.

Actual vocational profile: combination of knowledge areas that each student obtains through the SUREDSU survey. The following is a description of each area of the survey in relation to the present study:

Artistic-plastic: Artistic-plastic interest is manifested when we enjoy doing creative work with our hands; drawing, painting, decorating, modelling or sculpting; that is, creating products or expressing ideas and emotions.

It is important for artists and the careers that are related to this type of aptitude are: visual arts, digital arts, performing arts, among others.

Spatial: It is the passion for the use and transformation of materials into drawings, models, posters and other graphic works.

It is thinking in images visualising a future result. It manifests itself as a great imaginative capacity, spatial orientation and skill in representing reality graphically or by means of drawings. It is very noticeable in architects, graphic designers, photographers and others.

Numerical: It is the interest in solving numerical problems, in reasoning and calculating, in thinking logically and systematically. It is very important for economists, actuaries, accountants, aeronautical engineers, computer systems engineers, among others.

Scientific: It is the taste for knowing the cause of natural phenomena, as well as to think logically and systematically. This interest is manifested in the degree to which efforts are made to investigate the reason for the existence of things and events, to discover the causes that produce them and the principles and rules that explain them.

It is important for biologists, physicists, chemists, environmentalists, agricultural engineers, renewable energy engineers, veterinarians, nurses, nutritionists, doctors in general, among others.

Verbal: This is the taste for transmitting ideas, feelings, experiences and emotions orally or in writing in one or more languages. It is important for teachers, lawyers, communicologists, etc. and the careers included in this type of aptitude are philosophy, education, communication sciences, language teaching, among others.

Leadership: It is the satisfaction of leading or guiding the activities of other people, it is the ability to take the initiative, manage, convene, promote, encourage, motivate and evaluate a group or team. This aptitude is related to careers in business administration, business management, business development, among others.

Methodology

The present work is a correlational study analysing both qualitative and quantitative information.

- **Hypothesis 1:** The greater the match with the ideal career profile, the greater the academic performance during the stay process.
- **Hypothesis 2:** The lower the match with the ideal career profile, the lower the academic performance during the internship process.

Suitable vocational profiles determined by the UTL Career Management Offices:

- A) TSU in Virtual Environments and Digital Business (EVND): **Artistic Plastic, Spatial and Numerical.**
- B) TSU in Chemistry Environmental Technology Area (QA): **Scientific, Numerical and Verbal.**

Sample:

The academic trajectory of 88 students corresponding to the 2020-2022 generation, 38 students from the EVN career and 50 students from the QA career, were compared with the results of the SUREDSU survey.

For the purposes of this study, the population is divided into 3 categories according to the grade they obtained in the last semester of TSU, which corresponds to the stay:

- a) STUDENTS OF ACADEMIC EXCELLENCE, who obtained an average of 10.
- b) Students of GOOD PERFORMANCE, who obtained an average of 9.
- c) SUFFICIENT students, who obtained an average of 8.

Results

Analysis of results of the Virtual Environments and Digital Business (EVN) degree course

1. It should be noted that the students who were part of the study, whose condition was to have graduated favourably from TSU in the Virtual Environments and Digital Business degree, none of them have the expected profile: Artistic Plastic, Spatial and Numerical. They have at most 2 areas that coincide with this profile.

2. Among the **students who obtained a score of 10** in the process of stay, the areas of vocational interest that predominate are the DIRECTIVE area and the SOCIAL area, being present in 13 of the 18 students of this group equally, that is to say, 72%.

None of these areas is considered to be a preferred area of vocational interest in order to develop successfully in this career. Of the areas that do make up the profile, this group of students obtain the following: the area ARTISTIC PLASTIC, with 8 appearances out of 18 students (44%). The SPACE area appears in 7 out of 18 students (39%). The NUMERICAL area appears in 5 out of 18 students (28%).

Box 1

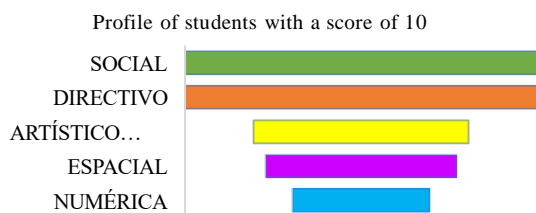


Figure 1

Results of predominant area of interest in the group of students with a grade of 10 in stay

3. Among the **students who obtained a score of 9 in the process of the stay**, the areas of vocational interest that predominates is the SOCIAL area, since it is present in 13 of the 15 students who confirm this group (87%), followed by the DIRECTIVE area, with 10 appearances in 15 students (66%). The NUMERICAL area appears in 5 out of 15 students (33%), the ARTISTIC-PLASTIC area appears in 4 out of 15 students (26%) and the SPACE area appears in 4 out of 15 students (26%).

Box 2

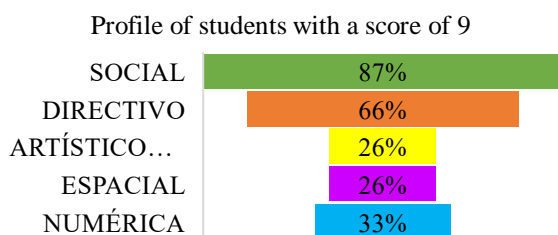


Figure 2

Results of predominant area of interest in the group of students with a grade of 9 in stay

4. Among the students who obtained a score of 8 in the process of stay, the areas of vocational interest that predominates is the SOCIAL area, present in 5 of the 5 students that make up this group (100%).

In second place there is a tie between the DIRECTIVE and MUSICAL areas, with 3 appearances out of the 5 students (60%). The ARTISTIC PLASTIC area appears in only 1 student (20%) as does the SPACE area. The NUMERICAL area does not appear in any student in this group.

Box 3

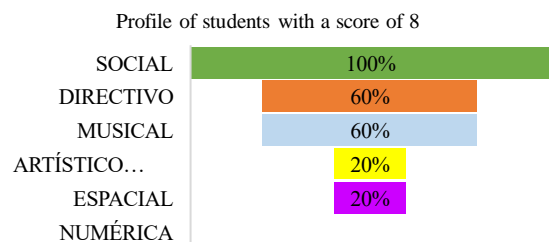


Figure 3

Results of predominant area of interest in the group of students with a grade of 8 in stay

1. The area of DIRECTIVE vocational intent is the common factor among students who successfully complete their stay. Making a difference between a performance of SUFFICIENT, GOOD PERFORMANCE or EXCELLENCE, the combination with the areas: NUMERICAL, ARTISTIC/PLASTIC and SPACE; that is, the ideal profile for the EVN career does have a weight in the good performance of the students in the process of stay together with the directive area that is not being contemplated for the profile.
2. There were four students who, despite not having any match with the suitable vocational profile, obtained 10 in their stay grade, i.e. 22% of the total number of excellent students.

These four students had a similar profile between them, where the DIRECTIVE and SOCIAL areas were combined with the VERBAL or MUSICAL. Therefore, these students can represent a good case study to identify which other variables, other than a suitable profile, can contribute to the adaptation to a career as EVN and favour an excellent performance in the stage of stay.

Analysis of the results of the Environmental Chemistry course (QA)

- It should be noted that the students who took part in the study, whose condition was to have graduated favourably from TSU in Environmental Chemistry, 4 students have the expected profile: Scientific-numerical-verbal, i.e. 7.7% of the total number of students who participated in this sample. Out of these 4 students, 3 young people have a score of 10 in the process of stay and the fourth one, with a score of 9.
- It is also important to mention that in this degree course there were 2 students who dropped out of the stay, although they had a general average of 9 during their five semesters, obtaining a temporary academic leave status. Both coincided in at least one area of vocational intention with the predetermined profile. The profiles of these students are: SCIENTIFIC-SOCIAL-DIRECTIVE and VERBAL-SPACIAL-DIRECTIVE.
- In the profile of the students with a stay grade of 10, the SCIENTIFIC area is the most repeated area, appearing in 20 students out of 26 (77%). The second most repeated attribute is the MANAGEMENT area, with 17 appearances out of 26 students (65%), this area is not included in the profile.

The third attribute is the SOCIAL area with 15 students (57%). The VERBAL area appeared in 10 of the 26 students (38%), occupying fourth place in preferences. The NUMERICAL area only appeared in 6 of the 26 students (23%), occupying 5th place in the preferences.

Box 4

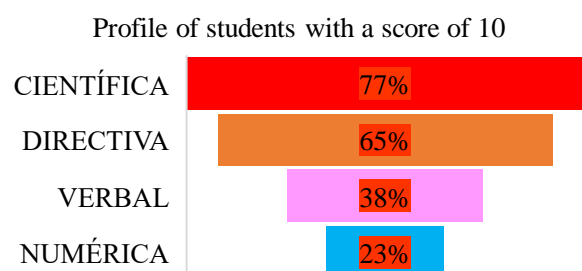


Figure 4

Results of predominant area of interest in the group of students with a score of 10 in stay

- In the profile of students with a stay grade of 9, the SCIENTIFIC area is the most repeated area, appearing in 12 students out of 16 (75%). The second most repeated attribute is the SOCIAL area, with 10 occurrences out of 16 students (62%). The VERBAL area appeared in 6 out of 16 students (37%) and the NUMERICAL area only appeared in 5 out of 16 students (31%).

Box 5

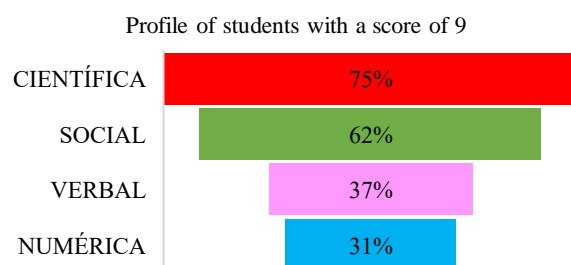


Figure 5

Results of predominant area of interest in the group of students with a grade of 9 in stay

- In the profile of students with exit grades of 8, the area MANAGEMENT is the most repeated area, appearing in 5 students out of 8 (62%).

The second most repeated attribute is the SOCIAL area, with 4 occurrences out of 8 students (50%). NUMERICAL appeared in 3 out of 8 students (37%). The VERBAL area only appeared in 2 out of 8 students (25%).

Box 6

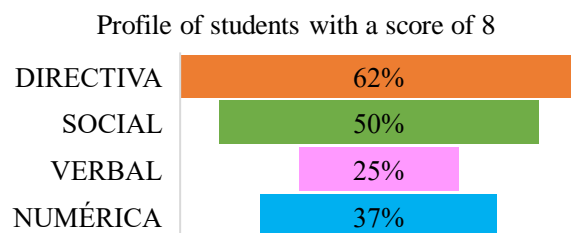


Figure 6

Results of predominant area of interest in the group of students with a grade of 8 in stay

- In this study it is observed that in the Environmental Chemistry degree the common factor among students who successfully complete their stay is to have a balance between the SCIENTIFIC-DIRECTIVE-NUMERICAL AND VERBAL areas.

Making a difference between a performance of SUFFICIENT, GOOD PERFORMANCE or EXCELLENCE, having or not more matches with the predetermined profile. The SCIENTIFIC area being the predominant one among students with excellence scores.

Conclusions

Although having a real vocational profile in line with the ideal vocational profile has a positive influence on achieving an excellent academic trajectory, it is also observed that it is not the only factor and is not a determining factor for the degree programmes analysed.

In the case of the EVN degree programme, it can be seen that despite the fact that the students do not have a vocational preference (it was the only degree programme with students with 'zero matches' with the ideal vocational profile), it can be observed that there were other internal and external factors that at the end of the day, promoted their academic integration. It is here that a close analysis of the four cases of academic excellence with zero matches in the areas of professional interest could shed light on these other more influential factors. In order to recognise and enhance them.

On the other hand, for the QA course, where the closer to the ideal vocational profile, the better academic results were observed, there is a space for research to analyse what actions can be implemented by the course for those young people with a different profile who choose to enrol in it.

Another case study would be to interview students who, despite having some area of coincidence with the ideal vocational profile and having obtained a good average in their academic career, in the end, decided to drop out during the stay process.

It is worth noting that, for the most part, the areas of *managerial and social* vocational interest were the most prevalent among the actual vocational profiles.

It can be seen that the students of the 2020-2022 generation were interested in leading or guiding the activities of other people, with the capacity for initiative and a taste for relating to and empathising with others.

Therefore, it can be thought that these skills allowed them to adapt to their chosen career in a successful way.

It is therefore essential that the Educational Institution looks at this phenomenon and motivates its future members to pay attention to the vocational profiles that harmonise best with each career, in this way working from early stages in the academic integration of students who enrol at UTL.

To this end, vocational orientation talks can be implemented, making reference to the results obtained in the SUREDSU survey and showing the wide variety of careers that match the results. Or, alternatively, virtual feedback mechanisms could be implemented so that students can compare their results with their chosen career in the first instance.

It is also proposed to identify the cases with the lowest matches with the ideal vocational profiles and to work closely with the tutoring programmes, academic counselling and the psycho-pedagogical department to generate a joint action plan and prevent desertion.

Declarations

Conflict of interest

The authors declare that we have no conflicts of interest. We have no known competing financial interests or personal relationships that could have influenced the article reported in this paper.

Authors' contributions

Aranda-López, Ariana: contributed to the project idea, interpretation and analysis of the data.

González-Arredondo, Liliana: Contributed to data collection, research method and data analysis.

Padilla-Gutiérrez, Luz Aurora: contributed to research development, reviewing and editing.

Arredondo-Muñozcano, Ana María del Carmen: contributed with reviewing and editing.

Availability of data and materials

The data used and analysed in this research are available from the lead author upon formal request.

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Abbreviations

- | | |
|------------|--|
| 1. DSM | Multi-platform Software Development |
| 2. EVN | Virtual Environments and Digital Business |
| 3. IRD | Digital Network Infrastructure |
| 4. QA | Environmental Chemistry |
| 5. SICES | Secretariat for Innovation, Science and Higher Education |
| 7. SUREDSU | Unique System for the Registration of Applicants to Higher Education |
| 8. UTL | Technological University of León |

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Background

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