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Journal Educational Theory

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The works must be unpublished and refer to topics of Education economics, school demography, education history, education sociology, education philosophy and other topics related to Humanities and Behavioral Sciences.

Presentation of Content

As first article we present, *Interdisciplinary collaboration in the training of entrepreneurs: learning outcomes of biology and food science students working together in the classroom*, by HERNÁNDEZ-TINOCO, Araceli & CARBAJAL-MARISCAL, Oscar, with adscription Universidad de Guadalajara, with second article we present, *The impact of stress on the education of high school students*, by GARCÍA-CONTRERAS, Laura Patricia, RAMIREZ-CERECERO, José Ricardo and RODRÍGUEZ-AGUILAR, Jessica Sabrina, with secondment at the Universidad Autónoma de Coahuila, as third article we present, *Perception of the level of food security in university students of an educational program*, by PACHECO-JIMÉNEZ, Cuauhtémoc & CAMPOS-BRAVO, Carlos Alberto, with adscription in the Universidad de Guadalajara, as last article we present, *Professional identity of the engineers at the Tecnológico Nacional de Mexico, Oaxaca campus*, by SILVA-MARTÍNEZ, Dalia, MOZOY-VENTRE, Elsie Fernanda, VALVERDE-JARQUÍN, Reyna and ORTÍZ-MÉNDEZ, Virginia, with adscription in the Tecnológico Nacional de México - Instituto Tecnológico de Oaxaca.

Content

Article **Journal Educational Theory**
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Interdisciplinary collaboration in the training of entrepreneurs: learning outcomes of biology and food science students working together in the classroom

Colaboración interdisciplinaria en la formación de emprendedores: resultados de los aprendizajes de estudiantes de biología y de ciencia de los alimentos trabajando juntos en el aula

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Abstract

Before the new world scenarios, graduates of public universities require new skills and competencies in the management of information and technologies capable of solving real contemporary problems. Entrepreneurship gains value and sets trends for its incorporation into educational programs, including basic education, aimed at solving real problems in the field, outside the classroom. The validated methodologies Design Thinking and Lean Canvas were used for the detection of problems and development of solutions with a business vision with sustainable impact. Two groups, from different careers, created a multidisciplinary course with an emphasis on meaningful learning per session, with products from each stage of the process, from the final portfolio. A satisfaction survey was applied to the students at the end of the course. The results of educational practices developed entirely in an immediate geographical environment, in a multidisciplinary way, with the focus on the solution of contingent socioeconomic problems are presented; The data obtained in the evaluation of the learning signified by the students are analyzed to know their perceptions of the immersion experience in a target locality and the creation of their projects with individual business potential and elaborated in a collaborative way.

Entrepreneur, Classroom, Collaboration

Resumen

Ante los nuevos escenarios laborales, los egresados de las universidades públicas requieren nuevas habilidades y competencias en el manejo de información y tecnologías capaces de resolver problemas reales contemporáneos. El emprendimiento cobra valor y marca tendencia para su incorporación en los programas educativos, incluyendo la educación básica, dirigidos hacia la solución de problemas reales en campo, fuera del aula. Se usaron las metodologías validadas Design Thinking y Lean Canvas para la detección de problemas y desarrollo de soluciones con visión de negocio con impacto sustentable. Dos grupos, de diferentes carreras crearon un curso multidisciplinario y con énfasis de aprendizaje significativo por sesión, con productos de cada etapa del proceso, del portafolio final. Se aplicó una encuesta de satisfacción a los alumnos al final del curso. Se presentan los resultados de prácticas educativas desarrolladas completamente en un entorno geográfico inmediato, de forma multidisciplinaria, con el enfoque en la solución de problemas socioeconómicos contingentes; se analizan los datos obtenidos en la evaluación de los aprendizajes significados por los alumnos para conocer sus percepciones de la experiencia de inmersión en una localidad objetivo y la creación de sus proyectos con potencial de negocio individuales y elaborados de forma colaborativa.

Emprendimiento, Aula, Colaboración

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Introduction

Technological advances such as artificial intelligence represent a huge challenge for the new generations of students graduating from public universities: international companies could consider the substitution of key job positions by these large language models (LLM), consequently, the job outlook would be uncertain for people who conclude their higher education with certain professional profiles.

The culture of entrepreneurship has a very significant value, with a strong growth trend in Jalisco and in the world. In 2021, the government of Jalisco enacted the "Law for the Promotion of Entrepreneurship in Jalisco" to increase competitiveness among companies, which includes: training, incentives, support and awards, among other aspects. This law provides for curricula to incorporate entrepreneurship subjects from basic education onwards (Government of Jalisco, 2023).

On the other hand, the University of Guadalajara, a public institution of higher education with more than 80 years of tradition and the largest in terms of coverage, infrastructure and projects in the west of the country, sustains in its vision the commitment to "promote innovative approaches to teaching and learning and to the generation of knowledge for the benefit of society" (University of Guadalajara, 2023). Consequently, it is a challenge for the teaching staff of this educational institution to achieve a comprehensive training of students; this requires constant updating with alternative learning models that are adjusted to the immediate work scenarios, through flexible organic actions that allow students to establish relationships with actors in the business and productive environment and to carry out training practices of real value.

The University of Guadalajara establishes in its mission statement that it is "a decentralised public body [...] whose aims are to train and update [...] human resources [...]; organise, carry out, promote and disseminate scientific, technological and humanistic research; rescue, conserve, increase and disseminate culture, science and technology" (University of Guadalajara, 2023).

Thus, in 2018, an academic, business and social networking event called "ExpoImagina" was created, which has been held uninterruptedly up to the date of publication of this article. In the 2019 edition of "ExpoImagina", a workshop was held at the University Centre for Biological and Agricultural Sciences, with the participation of more than 60 students from five thematic University Centres of the University of Guadalajara and higher secondary education, together with authorities from the Municipality of Tlaquepaque, Jalisco and the target community, setting a precedent on the need to support entrepreneurial development strategies that link university students with the entrepreneurial ecosystem and society, mainly in the communities where the students come from, to address the solution of local contingent problems.

In this sense, for the Entrepreneurship Development and Entrepreneurship courses - which will be used interchangeably throughout this paper - taught respectively in the Biology and Food Science degrees at the Centro Universitario de Ciencias Biológicas y Agropecuarias, a collaboration was carried out between two teachers of both courses to reorganise the contents of the courses with the vision outlined above. Table 1 shows the adaptation of the contents of the descriptive chart for the inclusion of an immersion activity in a community, based on the unification in the teaching of the courses "Development of Entrepreneurs" and "Entrepreneurship".

Content of the units of competence of the course "Development of Entrepreneurs".	Content of the blended course in the January-June cycle 2023
Learn about the basic concepts of entrepreneurship, the entrepreneurial ecosystem in Mexico and current needs.	Module I - Integration, presentation of personal and professional objectives. Activities: - The life plan. - The Wallet Project
Develops and builds sketches of business models using different tools with novel methodologies.	Module II - Participation in a business activity (exhibition and sale on the occasion of Valentine's Day) Activities: - Design of the proposal (type of product/service, production cost, unit cost, design of the presentation)

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	- Development of the product/service design - Exhibition and sale - Recovery of classroom experiences
Develops and generates appropriate strategies for launching a product, business or service to the market and achieves a minimum viable product..	Module III - Problem to be solved and market segment. Activities: - My venture idea - Problem tree - 360° strategy to find the solution (value proposition) - Re-engineering and final solution - Identity of the solution - Market segment - Networking
Construct a financial run to understand the key concepts that will allow you to obtain financial viability in the market and develop strategies that will allow you to finance the project.	Module IV - Business Model, Prototyping, Validation and Sales Activities: - Lean Canvas Model - Prototype development - Marketing strategy
Identifies the regulations, bodies and procedures for the registration of copyright and intellectual property rights.	Module V - Financial Tools / Product or Service Presentation Activities: - Cash flow - Strategy for the search for financing (crowfounding) - Creation of the Pitch - Delivery of the executive project.
Develop a document with technical feasibility. Financial and market feasibility that describes the generalities of the new product, business or service, its value proposition and profitability.	Module VI - Immersion in the community for the creation of proposals for solutions to problems Activities: - Visit to the community and interview with the villagers and agricultural producers. - Elaboration of the diagnosis - Identification of the problem - Proposed solution - Delivery of the proposed solution to the community

Table 1 Comparison of the contents of the descriptive letter and the activities carried out in the courses "Development of Entrepreneurs" and "Entrepreneurship". Source: Collegiate descriptive charter (document for internal use, unpublished)
Source: Own elaboration

During the 15 weeks of the workshop course, collaborative dynamics were carried out so that the students could apply each of the terms, concepts and learning from the programme in context, as they were being developed, all from validated methodologies such as Design Thinking and Lean Canvas, used in the course.

Two groups from different degrees worked together: the Entrepreneurship Development group from the Biology degree and the Entrepreneurship group from the Food Science degree. Each class session provided them with a topic with a complementary activity that was incorporated into the individual portfolio; at the end they obtained a proposal for a personal business project.

From the literature review, we can first highlight the social retribution options that the Mexican government has established for people who have benefited from some type of support through CONAHCyT, among which the following stand out: "Systematise and present social and innovation initiatives", "Participate in education and communication processes for sustainability" and "Provide free advice to young entrepreneurs with ideas that address current problems in the country. (CONACyT, 2023).

The development of entrepreneurial skills requires new didactics, new training pedagogies towards educational and business innovation with the consequent link between business and academia to create successful ventures. "Entrepreneurship in universities is an effort to contribute to the economic development of society" (Macías, 2023).

Universities already include entrepreneurship as a trend and by government regulation, to support the creation and promotion of new businesses. Thus, work is being done to train entrepreneurial graduates for the creation of these companies. "In order to comply with the policy, business models have been taken, but no models or methodologies have been built for teaching entrepreneurship" (Saldarriaga et. al, 2023).

It is important to review whether what universities are doing to promote and teach entrepreneurship is really resulting in the new entrepreneurial culture that is intended for graduates or whether it is just another subject to pass (Saldarriaga et. al, 2023).

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In the current university context, more importance is given to the generation of the business than to the training of the entrepreneur, with the intention of generating indicators and obtaining resources to obtain recognition in the environment, "which makes the sustainability of businesses very difficult" (Saldarriaga et al., 2023). (Saldarriaga et. al, 2023).

It is important, in the role of the educator-entrepreneurship trainer, to have education and experience in entrepreneurship so that he/she can be the model, motivator and transmitter of the knowledge of the subject, so that he/she can transmit it to the students in the classroom by promoting the culture, carrying out external extracurricular work of application in the field. Through these actions "entrepreneurial education is being strengthened with teachers and fostering entrepreneurial culture in the medium term and within the university classroom". (Mamani et. al, 2023).

The recent pandemic situation and the latent threat that anything can happen that puts working conditions at risk or creates an atmosphere of uncertainty leads to the development of skills in students that help them to face a social and working reality, so the teacher must also stimulate the student to undertake, "to do", with strategy and vision (Mamani et. al, 2023).

"The research developed contributes to the education and entrepreneurial culture that is generated in the university community, highlighting the role of the teacher as a trainer and that is key to impact on students through their knowledge and experience" (Mamani et. al, 2023). (Mamani et. al, 2023)

According to Quejada-Pérez et al. (2016), the theory of entrepreneurship has been studied from very varied perspectives, finding out on the one hand the entrepreneurial spirit and on the other hand the entrepreneurial profile taking into account many particularities and traits thus establishing the "Entrepreneurial Intention Model" which is constituted by aspects such as the psychological, sociological and economic vision, which is developed according to the entrepreneurial impact on personality traits, growth and cultural conditions that exist in the environment.

Leyva-Carreras et. al., (2019) emphasise that the entrepreneurial profile is constituted by the set of attitudes, aptitudes and skills that an individual acquires through family, social and educational experiences, for the generation of new ideas or innovations to existing ones.

With all of the above, the objective of this document is to present the results of the practices in the Entrepreneurship and Innovation training classroom directed and applied in the development of a product with the aim of ensuring the learning of the methodologies used while developing a personal business project with added value, validated and the experience seen from the student for the case.

Methodology

The course was developed according to the proposed programme which included: Exposure of personal and professional motives through a personal SWOT matrix (in which the student identified the physical biological, mental, socio-emotional, spiritual, economic, professional dimensions through a short, medium and long term scheme, including strengths, weaknesses, threats and opportunities, creating their personal strategies), Design thinking methodology (empathy, problem, solution, prototyping, validation) and Lean Canvas (business model conversion template for the solution), the latter for the search of the problem to be solved, the solution idea and its transformation into a monetised idea or business proposed individually by each course attendee.

A. The individual business project that each student developed during the semester was through the free choice of the problem of their particular interest; for those who did not have a business to develop in mind and for those students who already had a business idea or a family business underway, a strategy of value analysis was developed, in which their existing service or product was analysed and, through a focus group and a directed dynamic, their idea was examined and added value was given to generate a fresh proposal with new value.

B. The steps followed to create the value proposition of the business idea are presented below:

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1. Introduction to the subject. We worked on the development of definitions in a collaborative manner based on the concepts of entrepreneurship, business and innovation. The concepts and definitions were translated into familiar and clear language so that the students could transmit and communicate what they had learnt to other people.

2. Understanding and defining the problem. The "problem definition" was the core of the work, therefore, it was a requirement that each student understood that defining, knowing and describing the problem was of utmost importance for the optimal development of the solution, which leads to a business venture with real potential, if it solves a demand for someone. Emphasis was placed on the rigorous search of bibliographic sources to study and understand it, using practical examples of problems so that they had the clarity to differentiate between the problem, the cause and the solution, and at the end of the exercise each one obtained a well understood and appropriate definition. The didactic strategy of the "Problem Tree" was used as a contextual support.

3. Solution to the problem. Having defined and described the problem, the students worked on the proposed solution. They started by brainstorming ideas derived from their personal and professional experience and from previous knowledge and information provided by the research developed by the student. The following didactic tools were then applied:

C. Brainstorming (individual work). Each student proposed five different solutions to the problem. All of them were based on experience, on sources of information consulted or on similar success stories in Mexico or in the world. After elaborating the five proposals, they were reduced to three, selecting the most viable ones or making a combination and finally a single solution proposal was presented, which could be one of the initially proposed ones or a combination of all the previous ones. The template in table 2 was used for this purpose.

Description of the problem:				
Idea 1	Idea 2	Idea 3	Idea 4	Idea 5
Idea 1		Idea 2	Idea 3	
Idea for a solution				

Table 2 Template for brainstorming
Source: Own elaboration

D. Strategy 360 (collaborative work). From the chosen brainstorming proposal, each student, using the template in table 3, wrote the problem and the solution to that problem in the central quadrants. Then they left the sheet on the work table and each student went on to read the problem and the solution proposed by their classmates and if they had any kind of contribution to the solution or modification of it, they wrote it on the sheet.

Proposal 1	Proposal 2	Proposal 3
Proposal 4	PROBLEM _____ _____	Proposal 5
Proposal 6	SOLUTION _____ _____	Proposal 7
Proposal 8	Proposal 9	Proposal 10

Table 3 360 strategy template
Source: Own elaboration

At the end of the exercise, each student reviewed the contributions of their peers and rewrote the new proposed solution from the aggregated material.

4. Conversion of the proposed solution into a business model using the Lean Canvas. Based on the solution idea, it was necessary to transform it into a business, i.e. into a proposal with the capacity to be monetised, and for this purpose the Lean Canvas template was used, which is a nine-component methodology that gives a business sense to the solution. During the class time, each aspect of the methodology was reviewed for each of the students' proposals, with the aim of identifying the sequence of the components, supported by the advice of their classmates and teacher guides. It is worth noting that doing so during the class provided them with understanding and learning, as some students grasped it almost immediately, organically and helped to explain the doubts to the classmates in the group. By the end almost the entire group had understood the topics developed in each class.

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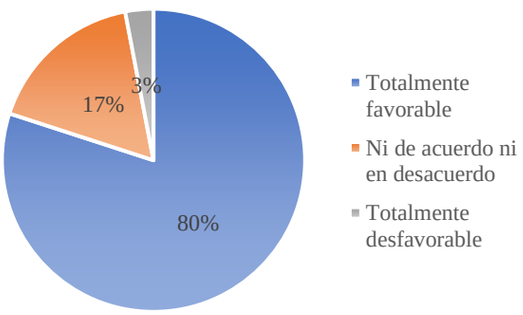
Documentation of the overall experience of the entrepreneurship course: satisfaction survey

In order to validate the achievement of the objective of the course and to know the experiences of the students during the semester, a satisfaction survey was applied at the end of the course through the Google Forms tool, with 17 questions, five of which were multiple choice and the rest open to receive proposals for improvement for the following school cycles.

Results

During the introductory talk to the course, a dynamic presentation was carried out to find out the perceptions of the Entrepreneurship Development course they were about to start. Graph 1 shows the results on the degree of acceptance of the course, according to the background they had of the subject through the opinions expressed by the students who had taken it previously.



Graphic 1 Level of acceptance of the Entrepreneurship Development course for the January-June 2023 cycle
Source: Own elaboration

One of the reasons that we consider key to the students' opinion of the course content is that the rest of the teachers of the subject have no experience in training entrepreneurs, so there is no rigour in the information or educational strategies that they share with their students, which results in a theoretical course, attached to a descriptive chart, but without support in real situations, or from the students' environment. According to the "totally unfavourable" opinion, the main comment was that the course "was boring and you didn't have to make a big effort to accredit it".

The creation of the SWOT matrix provoked various expressions of their feelings and perceptions. About 60% of the students had not asked themselves: "what do I want? what are my strengths?" and 15% of the population did not recognise their strengths or did not attach value to them. Regarding "Weaknesses", 20% did not identify them or confused their weaknesses with their strengths. For example, "being empathetic or emotional" was identified as a "weakness" by some of the students. 85% of the students had not asked themselves about the importance of setting their personal goals in the short and medium term. More than 50% did not have self-care as an immediate priority, therefore their nutrition was poor and they considered rest as an unimportant activity. Their skills and abilities, as they were easy for them to perform, were of little value to them.

In order to achieve the objective of proposing an entrepreneurship aimed at a business idea with potential, the students were sensitised to use the information from their skills to enrich such an idea beyond their disciplinary knowledge. An entrepreneur has one or more of the following characteristics: initiative, creativity, confidence, responsibility and passion (Fernandez, 2023). We consider that this was one of the most outstanding contributions to the proposal of individual business ideas and to the creation of a solution for a community problem, because academically the institution does not promote the development of talent or soft skills. Their identification, promotion and further application will make them competitive and with the potential to point out and solve internal problems of the companies in which they work in the future.

Understanding the problem

The identification of the problem represented a challenge for each of the students. In the first part we worked with the existing definitions of "problem" until we found the one that seemed most familiar and easy to handle: "A problem is the objective not solved by the client". Many exercises were done in the class with the examples of the students until most of them understood it sufficiently. Having understood what a "problem" is, each person chose a problem based on their interest in finding a solution; among other reasons, they also chose situations that triggered their indignation or annoyance.

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By influencing their emotions, they were provided with the direction towards the solution intention, which motivated their willingness and eagerness to solve in order to build their business proposal.

Problem solving results

41 individual business ideas were created and integrated into an executive document that was sent to the portfolio for scoring. The ideas presented in table 4 are those that are linked to social entrepreneurship, i.e. 15 proposals that encompass various aspects of economic and sustainable development, health, technical, disciplinary and attention to vulnerable groups.

Type of solution related to social entrepreneurship
Promotion of environmental education through art
Equipping first level mobile health care units with efficient, sensitive and accurate diagnostic equipment for rural communities in inaccessible areas.
Promotion of awareness and responsibility in the field of self-medication.
Summer course: Educating for life for children aged 4-9 years.
Consultancy for manufacturers and distributors of environmentally responsible and affordable products, as well as for organisations that encourage sustainable innovation.
Laboratories for analysis of soils with erosion problems in the agricultural community in Mexico.
Support network for transplant recipients
Support network for student work
Bioremediation of heavy metals in water.
Powdered drinking supplement made from natural extracts
Platform for accommodation of foreigners
Aquaculture farm with biofloc system
Workshops with a philosophical-scientific approach in contact with nature
Interdisciplinary research centre for scientific dissemination in the community
Psychological support network and job counselling for women over 50 years of age

Table 4 Executive projects that exhibit links to social entrepreneurship in communities
Source: Own elaboration

Satisfaction survey

The following results were obtained from the satisfaction survey:

Out of 48 students only 16 (33%) responded. Of these, 69% agreed that the course provided elements to develop their personal and professional life.

75% of the respondents agreed that the course provided them with the necessary tools to develop any future venture they may propose because they already know how to structure, sequence, prototype and validate the project. 94% of the respondents would recommend the course to their peers. 81% of the respondents stated that they finished the course with a potential product or service to do business with. 88% of the respondents have no interest in following up or continuing their project after finishing the course.

Among the things they stated "what they liked about the course" were the dynamics and participation, the attitudes of the teachers, the experience of the teachers, having made a life plan, the personal SWOT at the beginning and the experience in the rural community.

They highlighted the advantages of working with colleagues from another career that brought value to their proposals, as well as new ways of seeing their environment, and sharing other ideas and knowledge.

They reported having obtained new non-disciplinary learning such as the use of artificial intelligence language models and the action of having applied a SWOT to their own person. They highlighted having experienced the development that can be made to a proposal from the enunciation of the problem, through collaborative work and recognise significant learning from the theme of Entrepreneurship and Innovation.

Acknowledgements

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Conclusions

In light of the results obtained, it is recommended that the current descriptive charter of the Entrepreneurship and Entrepreneurship Development course at the University Centre for Biological and Agricultural Sciences be updated to include the topics and strategies for immersion in communities in vulnerable situations in order to create proposals for social entrepreneurship solutions.

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From the satisfaction survey the students stated:

- To have learned and fulfilled the intended objective of the course.
- That their relationship with their potential clients is fundamental for understanding their real needs without making assumptions that lead to solutions without value for the users, and that they collaborate with other professional profiles to generate better ideas for solutions.
- Emphasised that the knowledge will be useful in their professional and personal lives.
- They emphasised that they have gained confidence in their proposals, their knowledge and the way they conduct themselves.
- They emphasised that working with colleagues from another career brought value to their proposals, and new ways of seeing their environment, and of sharing other ideas and knowledge.

Although each member of the group developed an idea with business potential, only one of the 41 students was willing to have post-course mentoring to implement their project.

The number of projects with a vision of social entrepreneurship developed by the students of the Bachelor's Degree in Biology stands out.

Therefore, one of the challenges for subsequent courses will be to increase the percentage of projects advised in order to take them to the level of incubation before the corresponding bodies or to seek strategies for transferring them.

The inclusion of students in the activities of "ExpoImagina" and other triple helix activities of the University of Guadalajara should be considered, as another way of carrying out the social retribution of the public university to the community.

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The impact of stress on the education of high school students

El impacto del estrés en la educación de estudiantes de nivel medio superior

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Abstract

The environment and context in which young people develop play a crucial role in the manifestation of stress, since the social, economic, and cultural conditions of modern life expose them to various stressful situations (Barrera, 2020). Within the framework of this research, we analyze how stress affects the daily academic life of high school students, considering aspects such as communication between peers, trust in their teachers and the tools available to deal with stressful situations. The research question that guides this study is: "How does stress influence the education of high school students?" To carry out this research, we worked with a sample of 71 high school students. An instrument consisting of four signalitic variables and 38 variables related to the phenomenon of stress was used and evaluated using a nominal scale from 0 to 10, where 0 represents the total absence of the attribute and 10 is its maximum presence. Among the most relevant results, the importance of promoting resilience as a fundamental capacity to create an enabling environment that allows students to achieve the desired educational levels is highlighted. This is achieved by promoting self-analysis in terms of mental and emotional health. As an intervention proposal, is suggested the elaboration of a quantitative study that educational institutions can use to identify stress in their students in a timely manner, thus contributing to improving their well-being and academic performance.

Stress, Resilience, Mental health

Resumen

El entorno y el contexto en los que los jóvenes se desenvuelven desempeñan un papel crucial en la manifestación del estrés, ya que las condiciones sociales, económicas y culturales de la vida moderna los exponen a diversas situaciones estresantes (Barrera, 2020). En el marco de esta investigación, se analiza cómo el estrés afecta la vida académica diaria de los estudiantes de bachillerato, considerando aspectos como la comunicación entre compañeros, la confianza en sus docentes y las herramientas disponibles para afrontar situaciones estresantes. La pregunta de investigación que guía este estudio es: "¿Cómo influye el estrés en la educación de los alumnos de educación media superior?"
Para llevar a cabo esta investigación, se trabajó con una muestra de 71 estudiantes de bachillerato. Se empleó un instrumento que consta de cuatro variables signaliticas y 38 variables relacionadas con el fenómeno del estrés, evaluadas mediante una escala nominal de 0 a 10, donde 0 representa la ausencia total del atributo y 10 su máxima presencia. Entre los resultados más relevantes, se destaca la importancia de promover la resiliencia como una capacidad fundamental para crear un entorno propicio que permita a los alumnos alcanzar los niveles educativos deseados. Esto se logra mediante la promoción del autoanálisis en términos de salud mental y emocional.
Como propuesta de intervención, se sugiere la elaboración de un estudio cuantitativo que las instituciones educativas puedan utilizar para identificar el estrés en sus estudiantes de manera oportuna, contribuyendo así a mejorar su bienestar y rendimiento académico.

Estrés, Resiliencia, Salud mental

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Introduction

Stress is currently one of the most recognised phenomena in society due to its significance in the post-pandemic context. Stress is the physical response that the body experiences when an individual is exposed to an overload of tasks in any of the areas in which he or she develops. As a risk factor, not only for physical health but also for emotional well-being, it is necessary to identify coping strategies where those affected can find a new balance in their lives.

There are authors who mention different aspects of stress. It can be seen as a disease that the subject provokes by not finding balance, others approach it as a silent affectation that takes the aspects that surround the person as the main incentive and finally, others say that it is a combination of both situations.

In this research, it will be approached from different axes, to finally culminate with what academic stress is, focused on high school students.

Justification

The main beneficiaries of this research will be the students of Secondary Education. Through this study, knowledge will be gained of the factors that contribute to stress among students, which in turn negatively impacts their academic performance. By identifying and understanding these factors, it will be possible to implement specific strategies to address stress and improve the performance of students at this educational level.

In addition, it is important that the academic bodies will have concrete and well-founded proposals to optimise the teaching-learning process and, in this way, improve students' performance during their classes. These proposals can then be applied more broadly, benefiting the entire student community.

Finally, the findings of this research will provide a deeper understanding of stress as a risk factor in student performance.

This will enable institutions to implement preventative and supportive measures that help students cope with stress more effectively and ultimately achieve better academic performance across all faculties and campuses of the university. In summary, this research has the potential to significantly improve the academic experience and success of students across the Autonomous University of Coahuila.

Research question

How does stress interfere with education in high school students at the Universidad Autónoma de Coahuila Saltillo unit?

General objective

To find out how stress intervenes in the education of high school students at the Autonomous University of Coahuila, Saltillo unit.

Specific objectives

- To explain the relationship between anger and learning.
- To explain the relationship between anxiety and interaction.
- To explain the relationship between emotions and attending classes.

Research questions

- What is the relationship between anger and learning in high school students at the UAdeC Saltillo unit?
- What is the relationship between distress and interaction in high school students at the UAdeC Saltillo unit?
- What is the relationship between emotions and attending classes in high school students at the UAdeC Saltillo unit?

Theoretical framework

According to Barceló (2018), the word "stress" has become an everyday term, which is generally recognised as a source of disorder in the behaviour of individuals who suffer from it, affecting their behaviour and quality of life.

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It is important to note that, although one of the ways in which stress resonates is through physical ailments such as headaches and muscle tension, the emotional side also plays a major role in the imbalance experienced by individuals. When emotional wellbeing begins to be affected, it is sometimes difficult to detect, as it is often kept hidden unlike physical signs.

However, there are authors such as Rodriguez (2020) whose definition is that stress is a phenomenon that is sometimes treated as a physical problem and not as a consequence of an alteration in mental health Arredondo (2022), explains that stress in young people is not only related to the academic load, the time available for activities and the available resources of information, skills and professional and peer support. Family factors also often arise due to age-related conflicts, given the quality of emotional relationships with their parents, especially mothers.

Both the environment and the context of young people play an important role in delimiting the phenomenon of stress. The social, economic and cultural characteristics of current life generate greater exposure to different conditions that can generate such situations Barrera (2020).

Valdez (2022) states that it is an important disorder present in a person's learning period, with increasingly high rates in 21st century societies. Research on stress and human illness is complicated by the fact that stress is only one condition that contributes to most disease states.

In other words, stress leads to multiple diseases that contribute to the decline of the subject. These health problems have their own meaning and symptomatology, suffering from stress can lead to anxiety, discomfort, distress, uncertainty, anger, and depression (to name a few).

Pinilla (2020) mentions that anxiety is one of the disorders that causes the greatest disability and years of life lost, compromises academic performance, favours dropout and increases the risk of alcohol and psychoactive substance consumption.

On the other hand, Rodriguez (2020) explains that depression is defined as a serious affective or mood disorder considered as the fourth leading cause of social disability in the world, one of the main concerns related to the risk of suicide.

The combination of anxiety and depression within a stress framework is highly related to the physical factor, such as muscle tension and anger, in the emotional factor.

Muscle tension is defined as any psychosomatic situation that forces the body to become rigid, while anger is the emotional state of constant annoyance and disagreement with the different activities and people around the subject.

The need for early attention to stress is not only necessary, but also opportune, since, seeing the subject as a unit, it is understood that, within their possibilities, they must look after their physical and psychological wellbeing. When a subject begins to have complications with the basic aspects of their daily life, that is when they should stop to make an introspection of what is happening.

Psychological well-being, according to Dávila (2019), delineates a person who stops to observe their development, to appreciate both their positive and negative characteristics, who has a positive assessment of their individual history and who is capable of anticipating and committing to new goals for their growth.

In relation to stress, which is not seen as a symptom, but as a situation that derives from the constant overload of work that the subject has, is nutrition.

Due to the rhythm of life that a stressed person leads, in many cases he or she neglects to eat correctly. Eating is not only eating the food that is needed for energy. It is a process where the person takes the time to rest, relax and have a moment with him/herself.

Therefore, maintaining balance in all aspects of daily life is essential, although for a person with a fast-paced life it is not functional to meet their basic needs, making space for recreation can be an activity that, on some occasions, prevents stress.

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Guzmán (2019), mentions that every day conditions such as depression, anxiety, alcoholism, violence and suicide among other psychosocial problems increase in the world, especially in young people.

However, the author Rozo (2019), expresses that stress is a phenomenon that affects human beings regardless of age, race, sex or stratum; hence the concern arises to investigate it and to know about its impact on life.

Although stress makes no distinction, it is imperative to point out that young people are part of this vulnerable stratum of the population, in relation to their status with adultcentrism, where they are often the object of anger and scolding from people older than them.

Rojas (2020), mentions that stress is a process that involves different elements, such as: the precise characteristics of the event, the cognitive assessment and the tactics used by the individual to deal with it.

In other words, if the person who is under stress does not have the tools to cope with it, he or she will not find a way to return to a balanced life, running the risk of developing illnesses that will subsequently become increasingly difficult to cope with.

Speaking specifically about stress in the school or academic environment, it is recognised that, even before the beginning of the 21st century, education played a fundamental role in people's daily lives.

Nowadays, students dedicate a large part of their lives to academic training, so classrooms become a second space for growth and interaction. When a student is overwhelmed by the academic load to be fulfilled, the dynamics that begin to develop become complicated to the point of general stress.

The main stressors of academic stress that students present are: exams, homework overload, the personality and character of the teacher Villacrés (2022).

Due to this, stress has been investigated as a work, family, social and academic phenomenon, Acebo and Samada, (2019).

It is found that there are factors within the student's context that contribute to starting a lifestyle that leads to stress.

Young people between the ages of 17 and 25, commonly go through a stage of life where important issues converge such as the search for identity, changes in social and emotional relationships, risky behaviour, addictions, maladaptive patterns, eating and sleeping disorders, academic overload, socio-economic deprivation, violence, unemployment, all of which require resources that lead them to adapt in the best way for themselves, Barrera (2020).

Young people relate to each other according to the affinities they share with others, moving within their own reality as well as the context in which they live. Sometimes they share too much of their lives with other young people of the same age, who may come to accept the opinions of those they consider their friends.

Almeida (2022) explains that, for young people, school is presented as a space where these skills can be better developed, as its students are in the midst of cognitive, attitudinal and socioemotional training.

From the above literature review, the following variables are distilled in terms of the stress axis: Frustration, overwhelm, tiredness, anxiety, relaxation, holidays, somatization, muscle tension, anguish, stressors, vulnerability, confusion, performance, performance, daily activities, emotions, mental health, environment, lifestyle, food, physical disorders, pressure, physical responses, productivity, symptomatology, anger, depersonalization, self-esteem, rejection, resilience, work.

Regarding the education axis: Teaching, use of ICTs, academic activities, learning, online interaction, digital competences, distance classes, face-to-face classes, interpersonal relationship, internet, confinement, attendance, guided discussion, virtual classrooms, assessments, didactic resources, timetables, training, connectivity, videoconferencing, educational platforms, student autonomy, computer-mediated instruction, participation, communication, adoption of technologies, innovative technology, resource optimisation, planning, cost reduction, knowledge dissemination, dynamics.

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Methodology

The research design involved 71 high school students, an instrument consisting of four signalistic variables and 38 variables of the study phenomenon, using a scale of 0-10 where zero is the absence of an attribute and 10 its maximum presence.

The research participants are young people between the ages of 14 and 20. They all have different socio-economic levels, most of them are currently fashionable, most of them are male, most of them depend on their parents for their studies.

The pilot test was developed using Google Forms. The test was administered by means of a QR code that was scanned by the participants.

In order to explain the behaviour of the variables, we worked with the statistical levels of univariate, 14haracterization and correlation in order to carry out an objective investigation.

Results

Frequency and percentage:

It is observed that the smallest part of the participating population first semester, representing by 50.81% which shows that they are mostly represented.

As for the female gender it is presented with a frequency of 30, a percentage of 49.18% and the male group with a frequency of 31 and a percentage of 50.81%.

Characterisation

It is observed that with respect to the Z-statistic (Z), the variables food (Z=2.12), resilience (Z=1.96), anxiety (Z=2.07), interpersonal relations (Z=2.15), communication (Z=1.99), timetables (Z=2.59), performance (Z=2.08), participation (Z=2.03), autonomy of the students (Z=2.64), and examination (Z=2.72), have confidence levels greater than 95%. It is inferred that the data obtained in the variables are predictors in populations with equal characteristics.

With regard to the mean (it can be read that the variables that are found in the high values of the scale high values of the scale (7, 8, 9, 10) are; exams (=8.10), attendance (=7.93) and student autonomy (=7.38). It can be inferred that students who have the criteria to make decisions on their own because they are aware of the context in which they find themselves, are not stressed when they attend examinations in their subjects.

In the mean of means it is observed that, of all the variables that make up the study phenomenon stress and education contrast, only the variable videoconferences (=1.1), is below the parameters of the lower limit (Li=2.17 =5.42 Ls=8.67). It is inferred that the students who do not show stress are in function of not taking classes via videoconferencing.

Correlation

It is observed that the subjects of investigation that generally have time to eat while they carry out their daily activities, potentiate their mental health (r=0.46), in relation to that they take breaks to relax (r=0.53), in this way, they generate tools to overcome adverse situations (r=0.52), learning the contents of the classes with minimum inconveniences (r=0.55), achieving a direct impact in their productivity (r=0.51). It is inferred that nutrition potentiates emotional and academic balance in students, reducing the possibility of generating stress.

The research subjects who have time to relax inside and outside the educational institution, have the ability to self-analyse (r=0.45) in relation to the fact that they also show balance in their mental health (r=0.45), thus, they optimise the tools they already have to face situations that arise and are outside their routine (r=0.58), this in relation to reflecting on their actions by making their own decisions (r=0.44). It can be inferred that the rest taken by the students to carry out extracurricular activities is a fundamental element in avoiding stressful situations.

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It is observed that the research subjects who say that they feel pain in their muscles relate it to one of the main elements that generate stress (r=0.48), which means that they feel anxious about situations of which they are unaware (r=0.47), of which they have no knowledge (r=0.47). 47), of which they have no control, it also leads them to feel fragile (r=0.59), due to this, they cannot clearly perceive (r=0.47) the teachings given by the teachers and this potentiates the restlessness (r=0.64) for all those academic activities that they have to carry out for which they feel pressured. It is inferred that feeling stiffness in the muscles is one of the physical discomforts that cause stress, as the students do not have the emotional tools to face the academic load, they do not reach the expected educational levels, since the overload of tasks leads them to disorganisation at an academic and mental level.

The research subjects who tend to be overwhelmed, show attitudes of rejection towards the company of their classmates (r=0.49), as well as feeling distanced from everyone (r=0.60), they get angry easily (r=0.46) in relation to feeling pressured (r=0.71), leading to intrusive thoughts (r=0.60) that accompany them throughout their day. It is inferred that stress is one of the potentiators of stress, as it prevents students from having clarity about the contents that can be seen in class, due to the academic load that they have at that moment.

The research subjects who perceive themselves to be mentally healthy, take holidays (r=0.52) when school terms are over, show openness to communicate with their peers within the academic environment (r=0.50), as well as having the time to make their own decisions (r=0.48), thus, their performance in exams during the school cycle (r=0.44) enhances their academic productivity. It is inferred that students who have mental health, maintain educational quality, communicate effectively with their peers, from the time they give themselves to rest, this, makes students show a minimal relationship with stress.

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Conclusions

After analysing the factors that influence student stress and its impact on academic performance, we can draw some important conclusions:

Food and Rest: Adequate food and rest are fundamental aspects to maintain an emotional and academic balance in students. Good nutrition can reduce the likelihood of experiencing stress, and adequate rest, especially after extracurricular activities, is essential to prevent stressful situations.

Physical and Mental Effects of Stress: Stress can manifest itself through physical symptoms, such as muscle stiffness. When students lack the emotional skills to handle the academic load, they may experience disorganisation in both their academic and mental lives. In addition, overwhelm can make it difficult to understand academic content.

Mental Health and Communication: Maintaining good mental health is crucial to maintaining educational quality and promoting effective communication among students. Taking time to rest can reduce stress and improve peer interaction.

Resilience and self-analysis: Fostering resilience through self-analysis is an effective strategy to help students cope with stressful situations. This allows them not only to cope with academic challenges, but also to develop skills that will be valuable in their life outside of school.

Variety of Materials and Participation: The use of diverse materials in the classroom can enrich students' learning experience and enable them to apply what they learn in everyday life. In addition, the ease with which students exchange ideas and actively participate in the institution enhances their understanding of the subjects and strengthens their skills.

In summary, stress management in students is essential for improving their well-being and academic performance. Promoting resilience, self-analysis and effective communication, along with attention to nutrition, rest and the use of a variety of learning resources, can help students achieve desired educational levels and develop skills that will be useful in their personal and professional lives.

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Discussion

In the results of this research, it has been found that nutrition plays a crucial role in students' emotional and academic balance, which significantly reduces the possibility of experiencing stress. According to Yuri, R (2017), food is essential in providing the body with the necessary nutrients to maintain health and life. Furthermore, it is through food that the body obtains the materials necessary for its functioning, which supports the idea that proper nutrition contributes to both emotional and physical well-being.

Furthermore, according to Rojas, O (2020), stress is a process that involves various elements, such as the specific circumstances of the events, the cognitive evaluation made by the individual and the strategies used to cope with it. The results of this research support the idea that promoting resilience and self-analysis are key to creating an enabling environment in which students can achieve desired educational levels. When students are equipped with these emotional tools, they are better able to cope with challenging situations, which decreases the likelihood of experiencing stress.

In relation to the use of various materials in the classroom, it has been found that this practice enhances students' learning and allows them to apply the knowledge acquired in their daily lives. Although Alvarez, L (2018) mentions that knowledge and learning can be stressful and demanding, the results of this research suggest that access to a variety of learning resources, as well as curiosity and willingness to investigate topics of interest, can motivate students to study outside of school and actively resolve their doubts.

In terms of the relationship between mental health and stress, the findings of this research indicate that students who maintain adequate mental health have higher educational quality and effective communication with their peers. This is achieved through time spent resting and recharging, which contributes to maintaining a minimal relationship with stress. This differs from the opinion of Arredondo, N (2022), who suggests that stress in young people is mainly due to academic load and availability of resources, whereas this research emphasises mental wellbeing as a key factor in stress management.

Finally, in relation to participation in the institution, it has been found that this facilitates the development of both academic and personal skills, allowing students to extrapolate the knowledge acquired. Although Villacrés, M.J. (2022) mentions that exams, homework overload and other factors are the main triggers of academic stress, this research argues that the ease of participating in activities and the ability to be involved in institutional life can influence students' experience of stress significantly.

Intervention proposals

Carry out an intervention project that addresses the management of students' emotions.

- Development of a quantitative study that institutions can use to detect stress in time.
- Create a department within the institution to provide psychological support to students.
- Cycle of conferences on the importance of a balanced diet.
- Implement in classes that the teacher gives a speech on the importance of rest.

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Perception of the level of food security in university students of an educational program

Percepción del nivel de seguridad alimentaria en estudiantes universitarios de un programa educativo

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Abstract

Objective: to estimate the situation in the students of the degree in Food Science regarding the perception of their level of food security. Material and methods: A four-question questionnaire was applied to 132 students covering food safety and stress factors in their diet. Food security indices were constructed, weighted and unweighted, under the cut-off points: very bad=0%, bad=25%, average=50%, good=75% and very good=100%. Results: the total sample presented an unweighted security index of 67.73%, and 66.11% (good food security) in a weighted index giving more weight to concern about their eating habits. The stressor related to lack of resources presented the lowest food security index: 60.49%, It is confirmed with the weighted index showing greater concern about the means they have to feed themselves: 59.88% (regular food security). Conclusions: in the general population there are perceptions of food insecurity mainly due to a nutritional issue, still maintaining the category of good food security. 20.5% of the population perceive considerably greater experiences of food insecurity due to issues that have more to do with access.

Access to food, Nutrition, Eating habits

Resumen

Objetivo: estimar el nivel de seguridad alimentaria en el alumnado de la licenciatura en Ciencia de los Alimentos desde su percepción. Material y métodos: Se aplicó un cuestionario de cuatro preguntas a 132 estudiantes que abarcan seguridad alimentaria y factores estresantes en su alimentación. Se construyeron índices de seguridad alimentaria, ponderados y no ponderados, bajo los puntos de corte: muy malo=0%, malo=25%, regular=50%, bueno=75% y muy bueno=100%. Resultados: el total de la muestra presentó un índice de seguridad no ponderado de 67.73%, y un 66.11% (seguridad alimentaria buena) en un índice ponderado dando más peso a la preocupación por sus hábitos alimenticios. El factor estresante referente a la falta de recursos presentó el más bajo índice de seguridad alimentaria: 60.49%, se confirma con el índice ponderado mostrando mayor preocupación por los medios que disponen para alimentarse: 59.88% (seguridad alimentaria regular). Conclusiones: en la población general existen percepciones de inseguridad alimentaria dadas principalmente por una cuestión nutricional, conservando aún la categoría de seguridad alimentaria buena. El 20.5% de la población perciben experiencias de inseguridad alimentaria considerablemente mayores por cuestiones que tienen que ver más con el acceso.

Acceso a los alimentos, Nutrición, Hábitos alimenticios

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Introduction

The 1948 Universal Declaration of Human Rights proclaimed: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food" (Risk Sharing Trust, 2018). This was a very important step in the process of constructing the concept of food security. Currently, the most widely accepted definition is the one given at the 1996 World Food Summit: "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their daily energy needs and dietary preferences for an active and healthy life" (Food and Agriculture Organization of the United Nations (FAO), 2011).

Student nutrition is an often overlooked and particularly risky issue, as it is characterised by a lack of variety, low nutritional quality and often falls short of what they need for their daily activities (Fernandez and Lopez, 2020), This is compounded by the fact that it is a population that tends to experience high levels of stress, poor sleep hygiene and little physical activity, due to lifestyle changes brought about by the course of their own studies, which leads to the acquisition of unhealthy habits such as poor diet, sedentary lifestyles, alcohol consumption and smoking (Deforche et al. , 2015).

Historically, university students have been considered a nutritionally vulnerable group (Lopez et al. 2003; Lopez, 1998; Lopez, 1999) as they tend to skip meals frequently, snack between meals, opt for fast food and consume alcohol frequently (Bellisle et al., 1995; Gottschalk et al., 1977; Jakobovits et al., 1977; Miller and Coffman, 1980; Richmond, 1999; Truswell and Darnton, 1981; Webb et al., 1996). The intake of other unhealthy and high-calorie products such as soft drinks, energy drinks, fruit juices, snacks, sweets, baked goods, refined and ultra-processed products is also mentioned, situations that continue to be repeated today (Latasa et al., 2018; Singh et al., 2015).

The university stage contributes significantly to possibly detrimental changes in eating habits, as it is characterised by the need to change residence or move away from home, giving students independence in their diet, according to their new lifestyle and possibilities in the school context (Mancilla et al., 2020; Martínez et al., 2021).

These changes are generated according to various factors, such as class schedules, alcohol consumption, economic situation and even the influence of other students (Porto et al., 2018). In addition, the availability of food of low nutritional value, such as fast food, is predominant in educational institutions (Quintero, 2020).

Knowing the degree of food insecurity experienced by this population sector from their perspective takes on great relevance considering that these are professionals in training. This research aims to show what are the main concerns of students regarding their food situation and to generate a bibliographical background that contributes to the understanding of a general student vision that can be used to address this problem with specific strategies, safeguarding the health and well-being of the population.

Material and methods

A descriptive study was carried out at the Centro Universitario de Ciencias Biológicas y Agropecuarias (CUCBA) of the University of Guadalajara in Zapopan, Jalisco, Mexico, where a survey was administered to 132 students of the Bachelor's Degree in Food Science, who were informed of the research methodology, and who gave their consent to fill out the survey, guaranteeing anonymity and confidentiality of the information. The survey was carried out using the free software "Google Forms®", which consisted of three questions that collected information on the availability of food that the students have, the means they have to acquire it and how they use it. It was assumed that data such as their semester, age and gender would not affect the estimation results. (Mazón y Uset, 2019).

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A Likert-type scale was used as a measurement instrument on the basis of Hernández et al. (2010). The respondent gave a rating of one to five for each question, where 1) is never, 2) is almost never, 3) is neutral, 4) is almost always and 5) is always.

In order to give a more accurate context of the food situation at the university, a multiple choice question was added with several options about the stressors that make it difficult to eat properly.

With the results obtained from the surveys, the perception of the level of food security was estimated using two measurement indices, one unweighted and the other where the relevance of each question is weighted on a scale of 1 to 3 in the importance range. The final estimate was given as a percentage scaled as follows: Very bad=0%, Bad=25%, Fair=50%, Good=75% and Very good=100%.

For statistical analysis, Student's t-test (Statgraphics, 2023) was performed on the data grouped by response. Statistical significance was accepted with a confidence level of 95 %.

Results

Table 1 shows the results of the applied surveys, the value selected by the respondents according to the scale and the sum of the total response frequency of that value for each statement (score).

The statistic revealed that there is no significant difference ($p>0.05$) between the responses "always", "almost never" and "never". However, there is a significant difference ($p<0.05$) between these and the responses "almost always" and "neutral" (table 1).

Affirmations	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)	Total
The food I prefer is available in the quantity and quality required.	6	47	61	16	2	132
I have the means to purchase them to the extent of my needs	17	64	42	9	0	132
My food consumption habits are healthy	5	43	58	24	2	132
Total	28_a	154_b	161_b	49_{ac}	4_{ac}	
Different literals indicate significant differences at the p<0.05 level.						

Table 1 Survey results
Source: Own elaboration

The reading of this scale is that a value of 5 (always) represents the highest food security and a value of 1 (never) is the most severe case of food insecurity, while the others are intermediate values.

Given that there are three statements, the minimum score that a student respondent can obtain is 3, in the case that in all three statements he/she has answered with the correct answer.

While the maximum score is 15, if he/she answered only with the value of "always": 5+5+5=15. With 132 students surveyed, the minimum score for the whole sample would be 3*132=396, and the maximum score would be 15*132=1980. The maximum scores for each value on the scale can be seen in table 2.

The actual score obtained from the sample of 132 was: 4x1+49x2+161x3+154x4+28x5=4+98+483+616+140=1341 points. It is closer to the "neutral (3)" value. The food security index is calculated with the following expression: (1341/1980)100=67.73%. According to the scale of the final estimate, the estimated food security level is closer to the "good" category".

	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)
For one person:	15	12	9	6	3
For 132 persons:	1980	1584	1188	792	396

Table 2 Maximum possible scores to the sample size according to the scale values
Source: Own elaboration

A different estimate can be obtained by focusing on a particular statement and making it more relevant. The literature points more to the nutritional risk faced by university students than to issues of availability and access. Likewise, the first statement is of utmost importance for the object of study, since, if there is not enough quantity and quality of what students need and want, their food choices will be even worse.

Under this argument, a weighting of 3 is assigned to the third statement, 2 to the first and 1 to the second. Thus, the new results are shown in table 3. Table 4 shows the maximum score for this case for each value of the scale.

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Affirmations	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)	Total
The food I prefer is available in the quantity and quality required.	6*2=12	47*2=94	61*2=122	16*2=32	2*2=4	264
I have the means to purchase them to the extent of my needs	17*1=17	64*1=64	42*1=42	9*1=9	0*1=0	132
My food consumption habits are healthy	5*3=15	43*3=129	58*3=174	24*3=72	2*3=6	396
Total	44	287	338	113	10	

Table 3 Results with weighted statements
Source: Own elaboration

	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)
For one person:	30	24	18	12	6
For 132 persons:	3960	3168	2376	1584	792

Table 4 Maximum possible sample size scores with weighted statements
Source: Own elaboration

The score obtained from the sample of 132 with the weighted statements was: 10x1+113x2+338x3+287x4+44x5=10+226+1014+1148+220=2618 points. It is closer to the "neutral (3)" value.

Expressed in the food security index it would be as follows: (2618/3960)*100=66.11%, which turned out to be the lowest percentage of all the weighting combinations performed, 1.62 points lower than the unweighted index.

As with the results of the unweighted table, the final percentage is closer to the "good" category within the scale of the final estimate. This corresponds to an estimation with an emphasis on the students' eating habits.

Regarding the last question of the survey, concerning the students' perspective on the stressors that make it difficult for them to eat, the most repeated options are: B) Class timetable and A) Travel time to CUCBA, with 76 and 73 responses, representing 57.6% and 55.3% of the sample respectively. They are followed by factors C), G), D), E) and F) (see Figure 1). This is with respect to the 132 respondents, who were free to select more than one stressor.

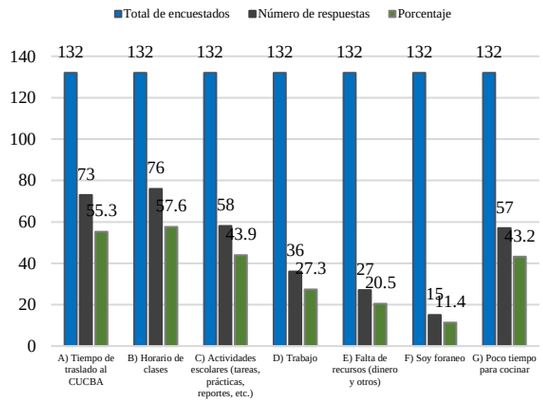

Figure 1 Eating stressors from the students' perspective
Source: Own elaboration

The data were analysed and the responses in the statements were filtered with the responses of the stressors in order to construct the food security index for each one and to find out which of them is more relevant. Following the same procedure for the construction of the general index, table 5 shows the results of the construction of the food security indexes by stressor, understood as the sum of the products of the multiplication of the scores by the value on the decision scale, divided by the maximum possible score and multiplied by 100.

Narrowing factor	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)	Total	Percentage	Food security
A)	70	376	243	54	3	746	68,13%	good
B)	75	356	282	56	2	771	67,63%	good
C)	60	280	210	42	1	593	68,16%	good
D)	35	164	135	30	0	364	67,41%	good
E)	10	88	105	40	2	245	60,49%	fair
F)	10	80	57	6	1	154	68,44%	good
G)	55	260	207	44	4	570	66,67%	good
A) Travel time to CUCBA B) Timetable of classes C) School activities			D) Work E) Lack of resources (money or other)			F) I am a foreigner G) Little time to cook		

Table 5 Food security index by stressor
Source: Own elaboration

The stressor "E) Lack of resources (money or other)" was found to have the lowest food security index, with a percentage of 60.49%, placing it in the "fair" category, while the rest had indexes with smaller differences, all placing them closer to the "good food security" category.

Another weighted index was constructed but taking only the 27 respondents who selected the stressor "Lack of resources". All possible weighting combinations were tested and it was found that assigning a value of 3 to the second statement, 2 to the first and 1 to the third (table 6) results in the lowest food security index with a percentage of 59.88% (fair food security) (table 7). The maximum possible score for this case is 810.

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Affirmations	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)	Total
The food I prefer is available in the quantity and quality required.	0*2=0	8*2=16	13*2=26	5*2=10	1*2=2	54
I have the means to purchase them to the extent of my needs	0*3=0	5*3=15	15*3=45	7*3=21	0*3=0	81
My food consumption habits are healthy	2*1=2	9*1=9	7*1=7	8*1=8	1*1=1	27
Total	2	40	78	39	3	162

Table 6 Survey results for the stressor "Lack of resources", with weighted statements
Source: Own elaboration

Stressor	Always (5)	Almost always (4)	Neutral (3)	Almost never (2)	Never (1)	Total	Percentage	Food security
E)	10	160	234	78	3	485	59.88%	regular

Table 7 Food security index to stressor "Lack of resources", with weighted statements
Source: Own elaboration

This result confirms the concern that exists among this group of students about the means available to them to access their food and shows that they suffer from food insecurity attributed mainly to the lack of necessary resources, and secondarily due to the little or poor availability of sufficient and quality food based on their preferences, discarding the concern about their consumption habits as a relevant perception.

Discussion

Mazón and Uzet (2019), mention that the food security index in university students is closer to the "almost always" category. And in the weighted index, it is closer to the good category, a situation similar to the findings of the present study.

In a previous study carried out on students from three degree courses at the same university as in the present study (they applied the Latin American and Caribbean Food Security Scale (ELCSA)), it was found that 33.77% of the students' households were slightly insecure, 13.33% were moderately insecure and 4.88% were severely insecure. And when analysing the Bachelor's Degree in Food Science, 31.67% were found to be slightly insecure, 15.52% moderately insecure and 4.96% severely insecure (González, et al., 2021). This shows that different methodologies can lead to different accuracies in the results.

The method replicated for this study presents several irregularities in terms of accurately diagnosing the level of food security of a population. Inaccuracy in the wording of the questions predisposes to generalisation and confusion on the part of the respondent: question 1 does not emphasise whether it refers to the availability of food near the university environment, the home or both, unlike the ELCSA, whose questionnaire collects concrete information on experiences at home (FAO, 2012). Moreover, "quantity" and "quality" are entirely different attributes - there may be ample supply of poor food, or quality food that is in short supply, and assuming the respondent understands what quality refers to.

Complementary studies are needed that accurately reflect the resources students have to acquire their food, in terms of physical access and economic access, with the characteristics encompassed by the National Council for the Evaluation of Social Development Policy (CONEVAL) (2010), and provide information on students' eating practices, both in terms of schedules and number of meals per day, as well as diet quality, in order to identify whether their perception of unhealthy eating habits is reflected in the reality of their eating practices and whether it is influencing their academic performance and health.

Studies point out that an unbalanced and inadequate diet can have negative repercussions on students' attention span and academic performance, as well as presenting various ailments such as gastritis, headaches and colitis, since a high energy intake is necessary to carry out school activities (Bonvecchio et al., 2015; IMSS, 2016; Martínez et al., 2021).

It is worth arguing the importance of applying it to the entire population, without disregarding the stressor group "Lack of resources", since, although their eating habits seem to be of less concern to them, the fact that they do not have the appropriate means and their food availability is limited, may lead them to opt for foods of low nutritional value.

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This is supported by the study conducted by Martínez et al. (2021), who found that students' eating habits are related to access, with a tendency towards foods that are not recommended or have low nutritional value because they are inexpensive. The authors suggest that this phenomenon is also due to issues of practicality due to their busy schedules and prioritising school activities, stressors that were highly selected by the participants in this study.

This has been reported in several studies. The results of the research by Espeche and Rojo (2021), reflect that there are students who consider that healthy eating also involves the money available to buy and prepare food, as well as the lack of time, their own tastes and few options to choose healthy food at university. And when choosing they prefer the cheapest even though they recognise them as unhealthy. And Flores (2019), in his study on perceptions of food security, mentions that 86% of households suffer from food insecurity (mild 35%, moderate 30% and severe 21%), associated with limitations in access to food both in quality and quantity due to lack of money.

Eche and Hernández-Herrera (2018) conclude that both private and public university students suffer from food insecurity, despite the fact that the former have better access to and availability of food than the latter.

In a study conducted by Sánchez et al. (2019) at the Centro Universitario del Sur (CUSur) of the University of Guadalajara, it was found that unhealthy eating behaviours of university students are based on the beliefs they have about it. The authors recognise the importance of investigating these beliefs related to the student's perspective on their eating, arguing for the generation of timely and contextualised data that pave the way for targeted interventions in universities, the same justification given to the present research.

For its part, question 2 does not specify exactly what means it refers to, and how it is defined in the literature, there is physical and economic access, with all the variables that these confer; the answer to this question is not sufficient to determine food security from the dimension of access.

And finally, question 3 is based directly on what the respondent believes, without going into the foods they eat, meal times, dietary variety, among other issues related to their food practices, so it is not possible to demonstrate experiences from the dimension of utilisation in its entirety.

For these reasons, for the purpose of this study, this method is understood as the measurement of the level of food security, but starting from the paradigm that it is only about the superficial perception that individuals have of it, and not a real and accurate diagnosis. It is valid to compare the results obtained with those of another methodology that has been endorsed and proven to work, in order to try to understand how far away or how close what the population perceives is to what happens in reality, in order to give the method more validity.

It is inevitably ironic that students on a course of study that deals with food issues present levels of food insecurity from their perspective. It is contradictory that the main promoters of food, academically speaking, perceive food vulnerabilities. It raises the question of whether it is an act of incongruence on the part of the student body, negligence and indifference on the part of the authorities, the social inequality that has reached even the food system that cannot meet the needs of all, or whether it is simply a matter of misinformation on the subject.

In the study by Fuentes et al. (2021), it is mentioned that the diet of university students is inadequate and that new knowledge about food, nutrition and physical exercise should be encouraged for good health.

Castillo et al. (2017) emphasise that providing information on healthy eating habits is not enough in the case of eating disorders and obesity in Mexican university students, as it is essential to involve the family and school environments in order to have a successful prevention programme. In any case, it is important to insist on the dissemination of this type of content through various media, with the aim of providing students with the necessary basis and knowledge on how to improve their eating practices and the impact these have on their time at school and their daily lives.

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In this sense, educational authorities and students in this field have an ethical obligation to participate in the collection and communication of this research, in order to identify opportunities for action that can offer innovative solutions to these problems.

Conclusions

In the sampled population there are perceptions of food insecurity mainly due to a nutritional issue, although with a minimal difference and still retaining the category of good food security, however, 20.5% of the sampled population perceive considerably greater experiences of food insecurity due to issues more related to access.

Although the stressor "Lack of resources" is not the most common among the students, it is the one that causes the worst experiences of food insecurity in combination with other factors, which highlights the importance of paying special attention to it when focusing studies that provide more information and formulate strategies for solutions.

The responses reflect that the majority of the population perceives itself as undecided (neutral) with respect to the questions asked, which suggests that an educational intervention strategy can define their level of perception.

Due to the application of the method, the food security indices constructed for the sampled population fall into the category of "good food security", as they are closer to the cut-off point that corresponds to this condition, but it is still a regular level of security on the way to being good, it could be said that it is barely acceptable, but not optimal.

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Professional identity of the engineers at the Tecnológico Nacional de Mexico, Oaxaca campus

Identidad profesional de los ingenieros del Tecnológico Nacional de México, campus Oaxaca

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Abstract

This article presents the analysis of the professional identity of the engineering graduates from the Tecnológico Nacional de México (TecNM) Oaxaca campus, to achieve this a qualitative methodology was used, the data collection method was carried out through in-depth interviews with the graduates from the years 2014 to 2022 from the different engineering degrees offered at the institution. It was found that the professional identity of the engineers is shaped by the people who have influence on the choice of the career, the process they live at the moment of taking the degree, upon finishing it, subsequently upon performancing it. This process is complex and occurs in different aspects from how they see themselves as students and later as professionals, and how their social environment perceives them, where it must be recognized that it is also marked by the subjectivity of the perception they have of themselves.

Identity, Women, Engineering

Resumen

El presente artículo plantea el análisis de la identidad profesional de las egresadas de ingeniería del Tecnológico Nacional de México (TecNM) Instituto Tecnológico de Oaxaca (ITO), para lograrlo se utilizó una metodología cualitativa, el método de recolección de datos se realizó a través de entrevistas a profundidad a las egresadas de los años 2014 al 2022 de las diferentes ingenierías que se ofertan en la institución. Se encontró que la identidad profesional de las ingenieras se va conformando desde las personas que tienen influencia en la elección de la carrera, el proceso que viven al momento de cursar la carrera, al terminarla, posteriormente al ejercerla. Este proceso es complejo y se da en diferentes aspectos desde cómo se ven como estudiantes y posteriormente como profesionales, y cómo las percibe su entorno social, donde se debe reconocer que también está marcado por la subjetividad de la percepción que tienen de sí mismas.

Identidad, Mujeres, Ingeniería

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Introduction

The participation of women in engineering areas occurs in a lower proportion than of men. In recent years, it has been incorporated into the public agenda that more women are integrated into these areas, even though women have accessed University education, this does not occur in all branches of knowledge.

Engineering training not only has to do with the acquisition of knowledge and skills but also with how they are identified, in such a way that the study of professional identity is important to understand how the process occurs from the moment it is decided to study engineering, education in higher level institutions, as well as professional practice.

This article includes the professional identity of female engineers who graduated from the Chemical, Mechanical, Industrial, Computer Systems, Electronic, Electrical, and Civil engineering careers, It is important to mention that the institution also teaches Business Management Engineering, but it was discarded because ANUIES classifies it within Administration and not part of engineering.

This is where professional identity becomes relevant, because it implies about itself in reference to an area of job performance (Valero 2021), at the same time about its process of being part of a society (Luna 2021) and its context (Fuentes 2020).

Thus, "identity implies a way of feeling, understanding and acting in the world where social and personal factors are integrated" (González 2019), coupled with the fact that "it is interrelated with traditional gender characteristics, giving way to new forms of practice the profession" (Marquinez 2021)

In such a way that "it is not an objective reality nor is it the same as a role, but rather a discursive and mental construction that individuals use to express a certain mode of looking and feeling in relation to their environment" (Bolívar 2016).

Professional identity gives value and meaning to the profession because it implies "a set of knowledge that guides professional decisions and, above all, the moral ethical framework that guides the professional to coexist in a social and environmental way" (Cuadra 2021), the same as the Professionals internalize it by associating it with their performance (Blanco-Acheverry 2022), in the case of engineering they have a scientific and technical orientation (Walter et. Al. 2019).

According to Ferreira, "professional identity is self-perception over time, in terms of a planned sequence of learned actions, executed by a person in an interaction situation that requires specific theoretical and technical knowledge" (as quoted by García Dottor, et al. al.2022).

"Professional identity is found in this framework, where the social and the personal come together to give rise to a construction composed of professional models, relational processes and continuous biographical processes" (Blanco 2022).

This performance of female engineers is "conjugated, therefore, in a dynamic framework where discourses of power are presented with practices of exclusion and impact on participation in certain sectors of work, in ways of connection, in the existence of tense relationships between work and family (Rosero 2019), which has to do with paradigms established by families or society.

The study of professional identity is important because it allows us to understand how female engineers perceive themselves personally and professionally and how their environment contributes to their training and professional performance, in such a way that it allows us to identify elements to face the situations that make it difficult for them to access to these higher level study areas.

Background

A study in Mexico carried out by Razo (2008) found that the majority of those interviewed in his study had conditions that encouraged entry into engineering in addition to taking the mathematical physics area in high school.

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Studies have been carried out on women's participation in higher education, but there are fewer in engineering fields.

In the state of Oaxaca, the project "Professional identity of engineering graduates from the Tecnológico Nacional de México/Instituto Tecnológico de Oaxaca from 2014 to 2022" that was carried out at the TecNM Oaxaca campus is the first in the state that includes the issue of identity of female engineers in which a statistical analysis of the participation of women in this area was carried out and it was found that there is a difference between each of the careers offered in the institution, being chemical engineering where the number of women is greater than men, while in electronic engineering and mechanical engineering the percentage is less than 8%.

Methodology to be developed

For this project, a qualitative methodology was used, for this an analysis of the literature was carried out, making a theoretical review, as well as the different approaches from which professional identity has been addressed in order to determine the categories to be used in the research, it is important to mention that it was found that professional identity is formed along with personal identity, for this reason personal aspects and their environment were integrated without losing the central focus of the research. To achieve this, the following were proposed:

Before choosing to study engineering	- Schools where they studied. - People who influenced the election. - People who supported them in their choice. - Institution where to study.
During his engineering studies	- Interaction with the classmates. - Interaction with teachers. - People who supported them. - Knowledge and skills they developed. - Family perception.
Professional residency	- Job performance (knowledge and skills). - Attitudes. - Difficulties that they faced. - How it was perceived as a professional.
Work life	- Job performance. - Attitude. - Perception of society, family and herself. - Relationship with co-workers. - Relationship with superiors.

Table 1 Study categories

The interview guide was developed considering the categories to be used in the research, 15 detailed interviews were applied, recorded and transcribed, the answers were classified by categories in a graphic organizer for analysis.

An analysis of the results obtained from the interviews was carried out with respect to the literature about the topic and the results were discussed.

Results

A great varied of results were found, since that not all of them have the same high school education or come from the same social environment, due to young people who come from the city of communities belonging to the state where they come to study at the TecNM Oaxaca campus.

Before choosing to study engineering

Most of the engineers interviewed began their career in engineering, due to the motivation of a loved person (father, uncle) to figure out that engineering is interesting, creating and applying mathematics. Another says that she was motivated because one of her teachers taught Information Technology classes at the high school where she studied, she talked to them about the career and how they could work.

Some of them have received contradictory comments, for example referring to why they want to study engineering as women, if engineering is not for women. Such comments, instead of lowering their spirits and diverting them from their goals, have served as an engine to improve and go against the current, following their purposes. Others report that in high school they took a technology or electricity workshop, which allowed them to realize that they had opportunities to study.

One of them says that a high school classmate had the intention of studying engineering but she was from a rural town and that it involved an expense that her parents could not afford, so she chose to study a short career.

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During their engineering studies

During their training, female engineers had to work harder than men, since some of their teachers have expressed preferential actions towards men over women. Although according to school control statistics in the institution, the failure rate is lower in women than in men.

Such is the case of the anecdote of one of them, who was the original author of a program and obtained a lower rating than her colleagues who cheated the program. Having to study more than their classmates and work harder became a habit for the students.

Unfortunately, one of the graduates told the story of one of her classmates, who, when she became pregnant, could no longer continue with her training as an engineer because she could not afford to support her son and continue with her studies.

Other ones report that they have not had any impediment to study and participate in activities with their male classmates; this also depends on the engineering that they study.

Regarding the knowledge and skills developed by the students, they refer to the fact that during the course they were obtained, however, there were subjects that represented difficulties for them (such as inferential statistics, mathematics) but that was not due to gender.

Professional residence

In the Professional Residency stage, engineers put into practice their knowledge learned during their professional training. At this stage they face professional and personal challenges. In the professional part, they have to deal with the stigma that society expects to see a male engineer and not to a woman (like climbing a high transmission tower), however they successfully achieve the curricular part and the reinforcement of their skills, to such a degree that they are sometimes hired to enter the labor market.

In working life

Female Engineering is increasingly gaining ground in society and professionally since their job performance and attitude are key elements to strengthen coexistence with superiors and co-workers**.** The perception of society and the family improves every day since they are supported and given confidence to strengthen their development and job unemployment.

The female engineers are satisfied with their professional development, since they would generally recommend that high school graduates study engineering. Their perception as engineering graduates and certificated of Tecnologico has given them and their families satisfaction.

Unfortunately, sometimes the economic remuneration received by women is less than that of men.

Gratitude

With great gratitude to the engineers who agreed to be interviewed for this research project.

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Conclusions

The professional identity of female engineers is related to the high school they attend, the people who encouraged them to choose the career, who in most cases were male people, also to the career they took, especially the obstacles they overcame to complete the professional career and resilience that they developed in the different semesters as they progressed in their studies.

Women have more access to university education, but in the areas of engineering the gender gap still needs to be reached, however there is progress, that is why the governments of all countries are promoting programs so that more women join the STEM areas, this will be achieved by promoting an interest for engineering areas from an early age.

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It is important to mention that higher education institutions are changing and currently young women are encouraged to study an engineering career, although there are also professors, especially older ones, who discourage them.

Once they finish studying engineering, they perceive themselves as successful women, although later finding a better-paid job also makes it difficult for them. One of them says that she would like to go to work to another state but she finds limitations on the part of her family when they hinder the change of residence.

Another important aspect that they mention is that their professional performance is not always connected according what they studied, coupled with the fact that in the professional field they do not always have the same activities, responsibilities and economic remuneration as their male colleagues, but despite everything they say that they consider that studying an engineering gave them the opportunity to develop professionally in a better way than if they had not studied.

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Introduction

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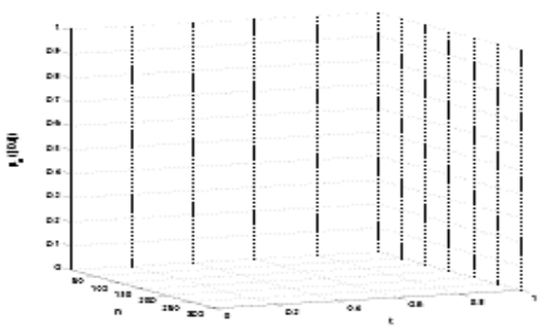

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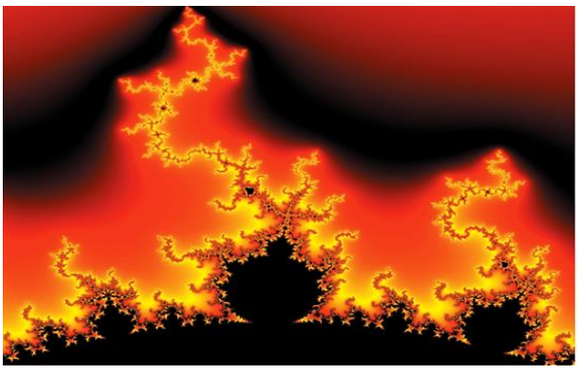

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