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# **Journal of Social Researches**

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In the first article we present, *A procedure for the degree project in the bachelor of music degree* by Juan-Carvajal, Mara Lioba, Juan-Carvajal, Dargen Tania and Vdovina, María, with adscription in Universidad Autónoma de Zacatecas and Universidad de las Artes, Cuba, as the next article we present, *The impact of the jurisprudential interpretation emanating from the Supreme Court of Justice of the Nation and its application in local courts in Mexico* by Flores-Corvera, Saúl Oswaldo, Mercado-Castellanos, Juan Carlos, Muñoz-García, Martha María de los Ángeles and Pinedo-Muñoz, Ma. Concepción, with adscription in Universidad de Guadalajara, as the next article we present, *Analyzing the effectiveness of graduate competencies at the Polytechnic University of Zacatecas* by Lara-Torres, Claudia Guadalupe, Velázquez-Macias, Jesús, González-Hernández, José Roberto and Guirette-Barbosa, Omar Alejandro, with adscription in Universidad Politécnica de Zacatecas, as the last article we present, *Anxiety and depression in students of third semester of “Facultad de Medicina y Nutrición de la UJED, Campus Durango”* by Salas-González, Cecilia, Ríos-Valles, José Alejandro and Pérez-González, Ivonne, with adscription in Universidad Juárez del Estado de Durango.

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## A procedure for the degree project in the bachelor of music degree

### Un procedimiento para el proyecto de titulación en la carrera de licenciatura en música

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#### Abstract

The program for the training of an instrumental musician at the UAZ (Autonomous University of Zacatecas) currently has an emphasis on the beginning of the research processes through the UDI Degree Project; however, the predominance of actions for training as a performer makes the pedagogical process in this subject difficult and sometimes delays the completion of studies. The objective of this article constitutes a solution to this problem: to present a procedure for the orientation of music students that systematizes work experiences during the research process. For this, systematization was combined with experiential methods, pedagogical observation, systemic-structural/analytical-synthetic and document analysis, which led to the development of a procedure for the orientation of the music student based on the curriculum and the theoretical framework in research.

Objectives	Methodology	Contribution
To present a procedure for the orientation of music students that systematizes work experiences during the research process.	Systematization was combined with experiential methods, pedagogical observation, systemic-structural/analytical-synthetic and document analysis	The development of a procedure for the orientation of the music student based on the curriculum and the theoretical framework in research.

#### Musician's Training, Curriculum, Procedure

#### Resumen

El programa para la formación del músico instrumentista en la UAZ, cuenta actualmente con un énfasis hacia el inicio de los procesos investigativos a través de la UDI Proyecto de Titulación; sin embargo, el predominio de acciones para la formación como intérprete, dificulta el proceso pedagógico en esta asignatura y en ocasiones retrasa el término de los estudios. Una solución a esta problemática constituye el objetivo de este artículo: exponer un procedimiento para la orientación del estudiante de música que sistematiza experiencias del trabajo durante el proceso investigativo. Para ello se combinó la sistematización con los métodos vivencial, observación pedagógica, sistémico-estructural, analítico-sintético y análisis de documentos, lo cual propició la elaboración de un procedimiento para la orientación del estudiante de música con base en el currículo y en el marco teórico en una investigación.

Objetivos	Metodología	Contribución
Exponer un procedimiento para la orientación del estudiante de música que sistematiza experiencias del trabajo durante el proceso investigativo.	Se combinó la sistematización con los métodos vivencial, observación pedagógica, sistémico-estructural, analítico-sintético y análisis de documentos.	La elaboración de un procedimiento para la orientación del estudiante de música con base en el currículo y en el marco teórico en una investigación.

#### Formación Del Músico, Currículo, Procedimiento

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## Introduction

The training of musicians is one of the careers that requires lifelong study and practice. In order to graduate, the musician must pass through different levels according to the pedagogical model determined by the context in which he or she is professionally trained. In many cases, this process begins in childhood, which offers many advantages for the formation of habits and skills that avoid deformations and favour the gradual development of competencies in correspondence with the graduate's profile and modes of performance. With children, physical-motor development and primary skills such as tuning, rhythm, sound, music reading, singing, posture, arm, finger and body positions, among others, are worked on. With the development and transit through the different levels, their complexity increases and competences are formed in order to adjust or perfect their performance as an instrumentalist. Consequently, we can find students who have faced at least three stages of graduation (infant, intermediate and higher levels), in which, traditionally, a recital is held in which works from the repertoire of the instrument are performed, favouring the appreciation of the student's development in accordance with the requirements of the level being studied.

A review of the graduate profile at the higher level led to an analysis of the performance of music students once they have graduated; in addition to the performer, their output considers other variants with new qualities; for example, for the instrumentalist-teacher or instrumentalist-researcher, other competences are needed which, based on the knowledge of the musician, include new skills such as directing processes, communicating or writing texts, to name but a few.

The diversity of opportunities for graduates - in relation to the labour market or the continuity towards postgraduate studies - together with other conditioning factors based fundamentally on Psychology, Curricular Theory, Didactics and Scientific Research Methodology, led some educational institutions such as the UAZ to modify the culmination of studies, offering new alternatives for the student, one of them being the elaboration of a thesis as the culmination of the Degree Project subject, which allows the student to develop in the research sphere.

This variant has two aspects: one from the point of view of the preparation of the teachers responsible for tutoring the student in this process, and the other from the point of view of the student's prior knowledge on arrival at the course.

When studying the competences of the teachers for their performance as tutors during the process of preparation and elaboration of a thesis or research work as a graduation exercise (which may or may not be accompanied by a concert according to the plan for the professional training of the musician at the UAZ), It was observed that not all teachers (since some were only trained up to the degree level as instrumentalists) have the necessary preparation for this and, in some cases, empirical knowledge dominates this procedure due to a lack of knowledge, fundamentally of a theoretical-methodological nature, which is based on the Methodology of Scientific Research. "For curricular reasons, undergraduate students are required to carry out small projects and/or research studies with the help of their tutors (who sometimes have limited or no research experience)" (Bautista & Fernández-Morante, 2018, p. 5).

On the other hand, during their trajectory at the higher level, students receive subjects or topics related to Scientific Research Methodology, usually from the fifth semester onwards according to the curriculum (Instituto de Arquitectura, Diseño y Arte, 2016; Unidad Académica de Artes [UAA], 2021; Universidad de Sonora, 2021; Universidad Veracruzana, 2021); but they do not acquire skills for the development of research, nor do they understand how much this knowledge contributes to their professional performance. Many postgraduate students in music have more or less training gaps, which seem to depend on the speciality or terminal exit they have chosen during their undergraduate studies. In this sense, experience and a few academic works indicate that graduates of music performance programmes, due to the emphasis that these programmes place on the technical mastery of musical instruments, exhibit areas of opportunity in terms of non-musical academic competences, such as spelling mistakes, writing and syntax problems and, above all, a lack of knowledge, skills and abilities related to research (Capistrán, 2019; Carbajal, 2017).

And, as Phelps (1980: 5) asserts: "To the musician who has been trained in non-verbal skills, the idea of conducting research seems rather strange". (Capistrán, 2022, p. 265).

The teaching experience of the researchers favoured the application of the methods of pedagogical, experiential and systemic-structural observation; as a result, the preparation of the students who, when taking the Didactic Unit of Instruction (UDI) Degree Project, faced the writing of a thesis from practice, was evidenced. In order to reduce the negative effects of this process, good practices were systematised in order to design alternatives that would guide and motivate them to enter into research, which is the focus of our objective: to present a procedure for the guidance of music students that systematises work experiences during the research process.

### 1. The training of the professional musician, a look at the curriculum

A look at the curriculum of the Bachelor's Degree in Music indicates that its normative basis is governed by different pedagogical and curricular models; these depend, to a large extent, on the context, the social task and the concrete conditions of the institution. Hence, the core, own and optional/elective curricula retain the essential requirements, but differ in the objectives and other components present in the curricula.

The core curriculum comprises the social standards to be achieved at the higher level, together with the disciplines of the various branches of knowledge that underpin or complement the appropriate training of the professional. In general, it is planned within the first years, as its content precedes the specific disciplines of the speciality, i.e. those that make up the curriculum itself, which, as its name indicates, develops the qualities and competences specific to the speciality and the instrument, responding to the particularities of the institution and its social environment.

In addition to the disciplines or subjects of these curricula, we find those that make up the optional/elective subjects, characteristic of a flexible curriculum that offers students the possibility of choosing those that satisfy their needs or are of personal interest.

These subjects are mainly oriented towards specialisation, although others may be included whose objectives complement the instrumentalist's preparation, even if they are not considered specific to the profession. These may be related, for example, to the writing of essays or scientific texts, psychology, bodily hygiene, or protocol aspects, among many others. The relationship that is established between these curricula makes the organisation and hierarchy within and between them acquire a systemic character whose synergy is the quality of the professional that graduates from the academic institution in one of the profiles declared in its curriculum; which, according to De la Peña and Velázquez (2018), describes the interaction with the environment, with its own nature and is compatible with the properties of the elements of the system. In this way, the curriculum will have a look towards the internal, which reveals the link between disciplines and subjects within the curriculum in its vertical (by years) and horizontal (in the same year) articulation; and another towards the external that expresses the relationship with the environment and with its own nature, that is, the link between the university's departments and organisations with the community, companies and other organisations that receive the graduate; that is, the work placement, the integrative project, and the social service, among others.

The particularities of these curricula are specified during the design of the degree course, and specify the competences, objectives and contents that the future graduate must have. What has been described so far is understood by most authors from the perspective of curriculum theory or didactics; however, there are also different criteria in these fields, for example, in line with current globalisation, Carrillo and Benavides (2022) state that what is specific and specific to the speciality, the identity, has been lost, Whether we like it or not, in the 21st century professions imply flexible relations with one another, the projection of plural identities, diverse discourses, modes of organisation, new forms of control and professional and work practice, diverse methods of access to knowledge, and growing competitiveness in practices. They also imply a permanent flow of interdiscursive relations. This allows us to assume that the principle that inspires the development of professions and professional identities in the 21st century is plurality (Carrillo and Benavides, 2022, p.34).

Any study that expresses a theoretical, methodological or practical foundation evidences positioning with respect to the object under investigation, which shows us the degree of veracity that is revealed in the analysis carried out by these authors; however, we are of the opinion that the multi- and transdisciplinary relationship that is established in current professional training does not exclude the *raison d'être* of the profession, which on the one hand sets guidelines that define the modes of action and the profiles of the graduate, and on the other, declares his or her role within the universe of professions.

Those branches of knowledge that influence the training of today's professional, and that go beyond the existing limits between the disciplinary relations that have traditionally been declared in the curriculum with a growing tendency, are based on articulation nuclei, axes or projects determined by social and cultural patterns that reveal ways of acting that, together with the graduate profile, distinguish the object of the profession, the trends of its development, as well as the norms of society and the context in which they will act.

The graduate profile expresses, in synthesis, the nature of the activity, the characteristics of the professional and the professional tasks to be fulfilled according to the context, which frames the different activities that the student can carry out once graduated.

The Bachelor in Music with emphasis on instrument can work, for example, as a soloist, musician in an orchestra, chamber ensemble or band, specialist in a theoretical or research area, teacher, advisor, music critic (UAA, 2021a).

The normative character assumed by both the profile of the graduate and the modes of action during the design of the curriculum demands specific work when describing the qualities contained in them, as the knowledge that makes up the structure of the study plan for the degree course is derived from them.

For example, in the degree course under analysis, students have gradually and systematically received a series of contents that are defined on the basis of the qualities described in the model of the professional - an element that relates the modes of action and the profile of the graduate, among other aspects.

This means that when they reach the terminal years, they can identify one or several activities to carry out once they have graduated, in accordance with their preferences and competences, which, in some cases, influences the variant of exercise to complete their studies according to the alternatives offered by the syllabus: interpretation, examination, defence of final work, methodological class, essay and interpretation, dissertation, among others.

It should be remembered that one of the qualities of the curriculum is its systemic nature (Sánchez & Valenzuela, 2018; Yachi, 2022), which reveals the different areas of knowledge that interact and complement each other throughout the degree course, including Research Methodology, which is the fundamental background and premise for the Degree Project subject that is frequently developed during the last semester of the degree course (UAA, 2021) and the theoretical-practical subjects that, as transversal axes, complement the knowledge during the research that is carried out in this subject.

The Degree Project mainly requires the student to prepare a thesis or dissertation (according to the rules of the institution) whose methodological basis is based on the Methodology of Scientific Research. However, on reaching this process, students show shortcomings, theoretical and practical gaps that cause fear or rejection; in many cases, according to our experience and without taking into account other variables, caused by the lack of knowledge to structure - in practice - a design or research protocol.

## 2. Theoretical references in art research

Symmetrically, since at least the 17th century, music theorists (especially composers) have used arguments, metaphors and methods of science to describe music and demonstrate the link between their practices and their theories, following different paradigms of the nature that have arisen in the sciences (Le Marec & Ribac, 2019, n.p).

Among the recurrent difficulties in classes or tutorials is the appreciation of the lack of theoretical references in the students' work or textual copying without a critical analysis that allows them to reach conclusions regarding the subject of study on which they are focusing.



These problems sometimes arise due to a lack of knowledge of what research methodology contributes to practical work, together with the structures offered for writing scientific texts.

Research Methodology manifests itself in different ways in the curriculum for the training of musicians, either as a subject or as part of the teaching tasks of other subjects, in accordance with the curricula of the different educational institutions; However, as has already been stated, the pedagogical process is inclined towards training as a performer, which, together with the multiplicity of knowledge that the student receives in parallel (taking into account their general preparation and that specific to music), leads, according to our experience, to the fact that the time dedicated to the study of this subject is minimal or that its importance is downplayed during their preparation, which has a negative impact during the development of the Degree Project. In this regard, Morales, Bermúdez, & García (2018) express "...the meaning or sense of a science, of a theory, of a research method will not be understood if the epistemological background that supports it is not exposed to light" (p. 160).

With regard to the textual copy, not only is there a lack of critical analysis, but there is also the elimination of the sources generating the information, the presence of statements without theoretical, methodological or practical support, as well as the random structure of the text where the paragraphs do not follow a logic that facilitates the understanding of what is expressed or what is to be argued.

But the challenge for teachers today is greater with the presence of artificial intelligence (AI), which, regardless of the potential it offers the education system (González-Sánchez and Villota-García, 2023), presents as a disadvantage for the teacher, the existence of text-generating AI, capable of creating texts with the style, tone and language desired, but which may be incorrect with respect to the facts, or not be related to the context (Cárdenas, 2023).

This implies that the teacher, in addition to being alert to these situations, must increase the guidance work with the student so that he/she understands the impact that the theoretical framework has on a research process, regardless of the level at which he/she finds him/herself.

Even though the undergraduate level does not demand the scientific rigour required in postgraduate education research, the recognition of background and references, in addition to allowing students to advance their work on the foundations already established from theory, favours the understanding of their proposal and offers validity to the arguments and results.

The challenge for the teacher is to motivate the student to search for references that allow him/her to systematise experiences, identify solutions to problems of professional practice, select, argue and relate his/her practice to the theory constituted, which will favour the search for new alternatives to the problem being investigated.

Of course, in music research, the vision of the theory-practice relationship and the recognition of artistic creation as an investigative process give it a peculiar character due to the predominantly qualitative approach that sustains it and the degree of subjectivity present... in art, something similar happens, and as explained in the publication "De la práctica a la investigación en el arte contemporáneo, producir conocimiento desde la creación" (Ariza, 2021) the balance between theory and practice understood already in the context of research occurs in particular in the so-called research-creation where the contribution to knowledge could not occur without the practical exercise (Ariza, Alonso, & García, 2022, p. 5).

Therefore, from the very beginning, the student will be oriented towards the search for references and knowledge of the state of the art, that is, what has already been written on the subject under study and which offers better proposals, evolutionary trends, methodological evidence, alternative solutions or shortcomings that allow him/her to advance in his/her process without the regeneration of erroneous processes. ...a state of the art represents the first activity of an investigative and formative nature through which the researcher asks himself, from the beginning of his work, what has been said and what has not been said; how it has been said; and to whom it has been said, in order to reveal the dynamism and logic that must be present in any description, explanation or interpretation of any phenomenon that has been studied by theorists or researchers. (Londoño, Maldonado & Calderón, 2014, p. 6).

Another important aspect at this point is to teach them how to draw up the files of the documents within their reach so that the information is not lost during the construction of the theoretical framework.

It is important for the teacher to bear in mind that this moment involves the necessary motivation to study, which implies a characterisation of the student. If one is aware of the disciplines within the curriculum that are related to the subject of interest, and of the impact they have had on the student, this would be an option to take advantage of in order to encourage motivation towards the search for references that will allow them to increase their knowledge, which would facilitate the regulation of their actions in search of new knowledge...the essential characteristics of scientific concepts are the result of processes of abstraction and generalisation of the various characteristics of objects and phenomena in the world, but not all of these characteristics are part of the scientific concept. Due to the above, the formation of theoretical concepts requires particular intellectual effort, in which the teacher should serve as a guide and orientation for students (Solovieva, 2019, p.19).

On the variants to be developed by the teacher to increase student motivation, works have been elaborated from different branches of knowledge. From Psychology or Didactics, we can find the factors that trigger motivation, its relationship with the teaching process and with culture, the types of motivation (Gálvez, 2006), the motivation-context relationship (Alemán, Navarro, Suárez, Izquierdo & Encinas, 2018), the relationship with the different areas of the curriculum (Medina, 2015) or with age and academic performance (Cuenca, 2011).

A practice that has borne fruit in the development of the projects has been the formulation of questions ranging from the need to investigate, the evolution of the phenomenon or process to its particularities, with due orientation towards the scientific discipline that governs its subject matter, from which terms, categories, principles, solutions or ways of investigating and presenting results will be taken, taking into account the link that is discerned with other scientific disciplines and attending to the multidisciplinary nature of music where the presence of a broad and diverse field is revealed.

"The motivation stage introduces the student to the subject to be studied, through the presentation of a problem or exposition of curious data" (Solovieva & Quintanar, 2021, p. 165).

### 3. Procedure for student guidance in the Bachelor's degree in Music

From the teaching practice it is noticed that a good guiding base ensures a great percentage in the student's progress and leads to better results; if during the preparation of each activity we clarify about its typology, define the objective and ensure -from this- the relation of the components of the teaching-learning process, it will be easier to declare the actions that the student must develop to reach his goal.

Talizina (2009) expresses that the guiding basis of the action reveals the system of conditions that guarantees success in the execution of the action; the latter is part of any activity, together with the objective and the result (Solovieva, 2019; Martínez, 2022).

In general, it has been a good practice during the elaboration of the guidance basis to keep in mind:

- The characteristics and motives of the learner
- The context and conditions in which the research will take place;
- The scientific discipline to which the topics are affiliated;
- The real possibilities of access to literature, documents, and application of previous knowledge;
- The time allotted for the activity;
- How to vary the initial idea brought by the learner if necessary while maintaining a positive motivation; v what aspects can influence the development of the research and the writing of the thesis, dissertation or research paper.

As a result of the systematisation of experiences in the orientation process and the methodological references that have been consulted in this respect, a procedure was elaborated that specifies the actions to be taken during the initial orientation of students of the Bachelor's Degree in Music who begin their journey along the paths of research.

The procedure presents seven actions for the joint work of the teacher/tutor and the student.

1. To get to know the student's concerns, characteristics and possibilities for research.

According to Solovieva and Quintana (2021) the "...general motive of all learning activity, necessarily, is the cognitive motive" (p.154 ), we consider that the concern for knowledge represents the starting point for any orientation; knowing the idea that the student wishes to work on and seeing to what extent it conforms to the norms of the institution and the programmes of the degree, will make it easier to suggest changes according to the real possibilities for the development of the research in the time stated in the programme, in short, it is recommended to know everything that interests the student and maintains his or her motivation. In this work the pianist systematically studies his own process of construction of meaning with a repertoire of contemporary music that includes works by Berio, Boulez, Carter, Rautavaara and Sciarrino. He is interested in finding relationships between the works, but not from the perspective of score analysis, but from his own performance experience. He wants to learn more about those aspects that are developed by the imagination and skills of the performer from what is not entirely determined by the score. The research is conducted entirely through its practice and its method consists of the loop: interpret, reflect, articulate what is experienced with what is reflected, reflect again and interpret (López-Cano & San Cristobal, 2014, p. 132).

2. Guiding the exploration of literature and practical experiences on various topics related to their research interests.

The teacher can suggest books, websites, reliable browsers, what other documents (videos, recordings, scores, etc.) may be useful for the process, bearing in mind the preparation of the file that allows them to organise what has been explored thematically and to keep the origin of the sources consulted for use during the remaining stages of the research process. Knowledge of the state of the art allows you to argue your criteria and take positions for the construction of the theoretical framework.

The state of the art can be defined as a modality of documentary research that allows the study of the accumulated knowledge written within a specific area; its purpose is to account for the meaning of the documentary material submitted for analysis, in order to review in a detailed and careful manner the documents that deal with a specific topic (Londoño, Maldonado & Calderón, 2014, p. 6). During the exchange, the tutor will make the student aware of aspects related to research ethics, the responsibility acquired with writing, paraphrasing and quotations, bearing in mind that the student must not commit plagiarism and the importance of maintaining, throughout the work, a standard for citing or referencing sources.

3. Outline an idea and delineate the research topic.

Regardless of the topics already conceived by the teacher given his or her experience in the pedagogical process or the requirements of the discipline's programme, it is recommended to listen to the idea that the student brings with him or her and take them as a starting point to delimit the problem to be worked on and thus specify the topic to be investigated.

In music, the sources generating ideas can be diverse: listening to a concert, the performance of a piece of music or exercises that encourage the development of skills, texts on the history of music, the reading or analysis of a score, cultural activities in the community, the student's projection towards teaching or other outlets stated in the graduate profile, spaces, documents, recordings, magazines, scientific articles, projects, conversations and exchanges with other students or with teachers, television or radio programmes, etc.

There are many possibilities for outlining the topic, which will put the creativity of the teacher and the student to the test. In the specialised literature, a wide variety of techniques can be found that favour this action, among them we recommend the mind map, which, from a graphic representation of the thematic potential of the central idea, allows other ideas to be branched out in correspondence with the different edges to approach the topic. In this way, those that are important (or feasible) given the characteristics of the student in question will be selected.

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4. Provide the topic guide according to the chosen theme.

The lack of knowledge and skills regarding research methodology with which the students have been arriving at the Degree Project provoked the need to elaborate a thematic guide that offers them logically and hierarchically ordered actions to develop their process in correspondence with the type of result that is expected, and the demands of the university level:

- From *the analysis of a particular case*. This includes the notes to the programme to be performed, or one of the works in the programme, the analysis of the music of a film, the compilation of themes, scores, music, discography, etc.
- *On the basis of theoretical analysis*. This includes the analysis of one or more musical works, a historical and/or stylistic view of the work to be performed, the context of a composer and the creation of his or her work in general or in particular, the styles which influenced a given composer in the creation of a work, or the importance of a given musical composition in the technical and interpretative development of an instrument.
- *Taking into account the multidisciplinary quality of music*. The relationship of music with other arts and the study of works based on or inspired by stories, fables, literary works or paintings, among others, is conceived.
- These ideas were selected on the basis of reiterative results in the subjects in which pupils showed the greatest interest at this level of education.

From the normative point of view, the guide covers all the aspects that are required in the institution for the presentation of the work of culmination of studies; for its part, from the methodological point of view, it offers guidelines for the elaboration of the research project that refers to the points that should be evidenced from the title and throughout the design; in addition to the review of the background that describes the situations:

- He title should express what you want to achieve, be concise and attractive so that when it is read it motivates you to continue reviewing the work.
- The background describes the situations, processes, phenomena, or scientific results that precede the research. In this aspect, questions are formulated that lead the student to search for these elements.
- The justification; contains the reason for the chosen topic, its legal basis, what previous knowledge has contributed to it, what ideas have been developed on the topic and what its relevance is.

On this basis, the theoretical design of the research begins to be specified, and with this the students start to be motivated to write.

#### 5. Working on the theoretical design

Although research in music has a predominantly qualitative character, the structure of a quantitative or mixed research is usually manifested when the institutions declare the regulations for the design and presentation of the thesis. For this reason, the guidelines and the procedure for the formulation of the research problem, the object, the objectives (general and specific), the field of action, the scientific questions, the thematic guidelines or ideas to be defended, the expected results and the planning of the tasks were taken into account in the guidelines and the procedure.

#### 6. Working on the methodological design

Another relevant aspect for the student is the understanding of the methodological structure that their research may have according to the origin of the chosen topic. From our experience, a positive element has been that the student is able to identify the objective and function of the methods studied as part of the Research Methodology programme, thus making it easier for them to select those that allow them to obtain the information they need, make comparisons, analyse the data and reach relevant conclusions...the method is important, in that it is a scientific construction, since it links the characteristics, conditions, context, and all the particular elements of reality and intentions of the actors involved in the particular process of study being carried out (Morales, Bermúdez & García, 2018, p.177).



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## 7. Determining the initial idea for the structure of the thesis

As a last aspect, the ideas that will make up the chapters of the thesis are specified. It is essential to bear in mind that this constitutes a report on the results of the research from which others can be derived or the writing of books, articles, even at postgraduate levels. Consequently, they have a certain number of pages in correspondence with the educational level and writing standards. Another element is to delimit the aspects to be developed according to the objectives and the ideas to be defended, which will make it possible to discriminate other information and data that do not have a direct impact on these results.

An experience that allowed the procedure to be perfected while it was being applied was the flexibility of the research design; as a project, it demands transformations from the practice to obtain the preconceived results, which also indicates that, during the writing of the work, thesis or dissertation, the tutor must make gradual revisions and in this way, checking the existence, pertinence and logical relation between its problematic, the assumed referents and the state of the art, the development of its proposal, and the fulfilment of the norms.

### Methodology

The methodological strategy used initially combines experiential methods, systematisation and pedagogical observation, which allowed, based on the experience of the authors, to identify, firstly, the aspects in which the music students had most difficulty when faced with the development of the research project, and consequently, the need to seek alternatives that would encourage the student's motivation for initial exploration and the search for theoretical-methodological references that would allow them to argue their decisions.

In a second stage, the analytical-synthetic, document analysis and systemic-structural methods were used, with which, together with the experiential method, the procedure for the orientation of the music student at the UAZ was obtained, based on its curriculum and the need for the elaboration of the theoretical-referential framework.

### Results

The curriculum for the formation of the musician responds to the mode of action, is flexible and multidisciplinary, favouring the presence of different profiles and, accordingly, the different forms of final evaluation, among which stand out the elaboration of a thesis, a dissertation or a written research work, whose objective contributes to the initial formation of a researcher, which is aligned with the professional development. In art research, the starting point is generally practice. In its dynamics it demands processes of transformation and therefore the search for concepts, foundations, arguments or regularities from theory, which support this transformation. Introducing students to a process of theoretical exploration is a challenge for the teacher who, to this end, must encourage creative and motivating processes.

The procedure has been applied for several years at the Academic Unit of Arts of the UAZ, with positive results. The students have developed research on works by national composers, the impact of musical works or ensembles in a community (usually where they come from), the technical or stylistic contributions of composers to the development of their instrument, as well as knowledge of the repertoire through research on the composer's overall work, among others.

### Conclusions

Faced with the dilemma of preparing the Bachelor of Music student for the development of a research project from practice and in the final stage of their studies, a procedure was designed that constitutes a guiding basis for teachers or tutors who must carry out this work, taking into account motivational aspects, the skills that the student must acquire for the development of research, the actions that comprise the skill, the multidisciplinary nature of music and the profiles of the graduate of this degree course.

For reflection, the curriculum for the professional training of musicians was taken as a basis, from which it was shown that there are relationships between the disciplines of the study plan and between these and the professional's modes of action, with a direct impact on the culmination of studies and on the Degree Project.

Although the rigour of research at undergraduate level is less rigorous than at successive levels, it is necessary for the student to understand the importance of theoretical references and their relationship with practice as a quality of research in music.

It is in this practice that the main sources originate: systematised experiences, and socio-cultural and professional development. In this way, the positions taken on the basis of the description, explanation or interpretation made by other researchers are justified and new qualities of the object or phenomenon studied are revealed.

### Declarations

### Conflict of interest

There are no conflicts of interest among the authors

### Authors' contribution

*Mara-Lioba, Juan-Carvajal*,: Conception of the structure of the article, specific content from music and research methodology, contribution of experiences in working with music students and editorial review.

*Juan-Carvajal, Dargen Tania*: Review and contribution regarding the theoretical references from the methodology of scientific research, conception of the structure of the article, contribution of experiences in the work during the elaboration of research projects and review of the logical sequence of the content.

*Vdovina, María*: Contribution of the specific content of music, and of experiences in working with music students.

### Availability of data and materials

The application of the experiential method as a focus for the research, together with the experience as researchers, made the necessary documents available for the procedure.

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## The impact of the jurisprudential interpretation emanating from the Supreme Court of Justice of the Nation and its application in local courts in Mexico

### El impacto de la interpretación jurisprudencial emanada de la Suprema Corte de Justicia de la Nación y su aplicación en Tribunales locales en México

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#### Abstract

The jurisdictional decision when resolving specific cases often exceed the content of the spirit of the law itself. Or, the scope that the legislator intended to give to the law may be limited. The Supreme Court of Justice of the Nation, by means of its interpretation is mandatory for local courts. This is the case with the judgment in Amparo en Revisión 2666/2020, which resolves the unconstitutionality of the payment of the reparation of damages resulting from a crime and that crime and which is a right of the victims in criminal proceedings. Now then, justifies its analysis, derived from the fact that this interpretation will be applied in matters resolved on criminal matters resolved in local Courts, since the National Code of Criminal Procedures is applicable in all the courts of the country.

**Human Rights, Jurisprudence, Unconstitutionality, Law, Amparo Proceeding, Defendant, Victim**

#### Resumen

La decisión jurisdiccional cuando se resuelven casos concretos suelen rebasar el contenido del espíritu mismo de la ley. O bien, quedar limitado el alcance que el legislador pretendió dar a la misma. La Suprema Corte de Justicia de la Nación, a través de criterios jurisprudenciales interpreta lo que debe imperar, siendo obligatoria dicha interpretación para los Tribunales locales. Así acontece con la sentencia dictada en el Amparo en Revisión 2666/2020, que resuelve sobre la inconstitucionalidad relativa al pago de la reparación de daño proveniente de delito y que es un derecho de las víctimas en proceso penal. Ahora bien, justifica su análisis, derivado que esta interpretación se aplicará en asuntos resueltos en materia penal en Tribunales locales, toda vez que el Código Nacional de Procedimientos Penales, es aplicable en todos los tribunales del país.

**Derechos Humanos, Jurisprudencia, Inconstitucionalidad, Ley, Juicio De Amparo, Imputado, Víctima**

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## Introduction

The constitutional reform that establishes the adversarial justice system in Mexico entered into force on 18 June 2016 and has had as its main objective the unrestricted respect of the human rights of the accused and the victim. The final judgment under review analysed in this investigation bears witness to this.

Undoubtedly, it is unquestionable that, as this is a novel piece of legislation, the judicial interpretations visible in the various rulings merit challenges that are intended to set precedents for any act related to the matter. Such as occurred with the amparo in review 2666/2020, in which the unconstitutionality of an article of the Penal Code of the State of Mexico was raised, and consequent violations of human rights provided for in the Magna Carta and international treaties. These rights are enjoyed by all persons. For this reason, the judicial interpretation of this specific case may well be applied in other courts in the country.

## Contextualization

On this occasion, it is appropriate to analyse the amparo ruling on review identified as case number 2666/2020, which resolves the crime of injury with the aggravating circumstances of having been committed with a prohibited weapon, having caused a decrease in the function of mobility, having been committed with advantage and by a brother.

In order to contextualise our study, we will say that the sentence analysed derives from the decision in an abbreviated procedure carried out before the control judge of the Judicial District of Tenancingo, State of Mexico, in which, once the sentence was handed down, both the accused and the victim appealed. Subsequently, the victim filed a direct appeal for amparo before the Collegiate Circuit Court on Criminal Matters of the Second Circuit, which in its final judgment denied the amparo, which led to the corresponding appeal for review that resulted in the formation of the amparo under review that is now being analysed.

## Legal basis

The legal system that establishes human rights in our country is the Political Constitution of the United Mexican States, which in article 1 establishes in its first paragraph that:

...in the United Mexican States all persons shall enjoy the human rights recognised in this Constitution and in the International Treaties to which the Mexican State is a party, as well as the guarantees for their protection, whose exercise may not be restricted or suspended, except in the cases and under the conditions established by the Constitution. ([Congress of the Union, 2023](#)).

Based on this premise, it can be established that the right to challenge the jurisdictional decision issued in the first instance is supported by the aforementioned provision. In this way, it is established that, in our country, by the simple fact of being a person, the enshrined human rights are inherent to them, but not only that, but also the guarantees for their protection are also available. In the case under analysis, this guarantee is constituted by the amparo trial, the constitutional means of protection par excellence for the protection of human rights, which is recognised as "...a means of defence that individuals have to protect, before the courts, the rights recognised by our Constitution when we consider that an authority is violating them" ([Suprema Corte de Justicia de la Nación, 2014, p. 11](#)).

It can be seen, then, that the victim has the right to challenge the decision, having correctly opted to file an amparo lawsuit, initially trying to obtain the protection and protection of the federal justice system against the act that, according to him, was injurious to him.

Given that the ruling handed down in the direct amparo did not favour his interests, because he even considered that the decision was related to the direct interpretation of articles of the Constitution, he decided to file an appeal for review before the Supreme Court of Justice of the Nation, which, once admitted for processing, handed down the final ruling, which we are now analysing.

The present work is analysed under a qualitative approach, having a descriptive reflexive scope, making use of the argumentative methodology of study, under the constitutionally established criminal trials, as a first step, to obtain the most relevant information on the nature and scope of the case.

The analysis of the amparo en revisión 266, which was issued in the first instance, is based on the terms and logic of the body that issued it.

### Analysis of amparo en revisión 2666/2020

We will begin by referring to the full reparation of damages that must be satisfied in criminal trials, as is constitutionally established.

Article 204 of the National Code of Criminal Procedures establishes that: "the opposition of the victim or injured party will only be admissible when it is accredited before the supervising judge that the reparation of the damage is not duly guaranteed" ([Chamber of Deputies, 2066/2020](#)). ([Chamber of Deputies, 2023a](#)).

One aspect that the victim complained about in the revision filed, he considers that in the criminal proceedings the reparation of the damage was not duly guaranteed, a procedural requirement that brings with it the consent to opt for an abbreviated procedure, in addition, as one of the purposes of the criminal proceedings. In short, he considered that the compensation should be higher than the one he received, in accordance with the provisions of the Federal Labour Law.

It is worthwhile for our analysis to pronounce ourselves on the issue of reparation of damages. In the first place, we maintain that reparation of damages constitutes a public penalty, once an act is committed that the law indicates as a crime, it is fair that the person who committed it is punished, if necessary, with corporal punishment, but he/she will also be obliged to compensate the damage caused, in other words, he/she will repair what he/she damaged or affected.

This implies the protection of a human right that translates into legal certainty for the victim that the harm suffered will be compensated, in terms of what the law establishes.

In similar terms, the American Convention on Human Rights, in Article 63.1 provides that: ...when it decides that there has been a violation of a right or freedom protected by this Convention.

The Court shall order that the injured party be guaranteed the enjoyment of his violated rights or freedoms.

It shall also order, if appropriate, that reparation be made for the consequences of the measure or situation that constituted the violation of those rights and the payment of fair compensation to the injured party. ([Inter-American Court of Human Rights, 1978](#)).

From the above, it can be deduced that in national and international legal systems, the payment of reparation for the damage when it stems from a crime, must be paid to the victim.

The question that would occupy us in terms of the analysis that is being developed is: with the judge's decision in relation to the sentence of payment of reparation for damages, were the principles of legal certainty and security violated? In our opinion, no. We will try to explain: Articles 201, section I, 202, 205 and 206, of the National Code of Criminal Procedures, in relation to Article 20, Section C, section VII of the Constitution, regulate the payment of reparation for damages. ([Chamber of Deputies, 2023a](#)).

In order for the hypothesis of reparation of damages to be fulfilled, the supervising judge must take into consideration the following:

- That reparation of the damage as a pecuniary sanction constitutes a penalty or public sanction that consists of: the return of the thing obtained with the commission of the crime, and if this is not possible, the payment of its price; the indemnification of the material and moral damage caused, AND; the compensation of the damages derived from the commission of the illicit.

Another aspect that should not be left aside is that the reparation of the damage will be determined by the judges, according to the damage that needs to be repaired, in accordance with the evidence obtained during the process. Substantial notes that, in our opinion, the judges fully observed in the case in question.

The National Code of Criminal Procedures is imperative in specifying that the opposition made by the victim in relation to the payment of the reparation of damages must be founded, in other words, that there must be elements that leave no room for doubt as to his opposition, not a mere refusal.

It is therefore concluded that there was no violation of the principles of legal certainty and security to the detriment of the victim. Criterion strengthened by the Supreme Court of Justice of the Nation in the thesis illustrated.

Integral reparation of the damage. Article 42 of the criminal code for the federal district, applicable in Mexico city, which defines the items that must be included, is not limiting and, therefore, does not violate said fundamental right.

Facts: A person was held criminally responsible for the crime of culpable injuries, for which he was sentenced to the payment of various amounts for reparation of material damage, compensation under the Federal Labour Law, reparation of damage by subrogation to the victim's insurer and, reparation of moral damage, a resolution that was modified on appeal.

Against this sentence, the victim of the crime filed a direct appeal in which he raised, among other arguments, the unconstitutionality of article 42 of the Criminal Code for the Federal District, applicable in Mexico City, considering that it limits the right to a comprehensive, proportional, efficient and fair reparation, as it restricts the judge to condemn only in relation to the concepts that are listed in a limitative manner.

The Collegiate Circuit Court considered the arguments of unconstitutionality of the aforementioned article to be unfounded and granted the amparo on various grounds. The complainant filed a petition for review of this ruling.

Legal criterion: The First Chamber of the Supreme Court of Justice of the Nation considers that article 42 of the Criminal Code for the Federal District, applicable in Mexico City, does not violate the victim's right to full reparation of damages, as it does not limit the items that must be included nor does it avoid such reparation.

Justification: In accordance with the doctrine of this Supreme Court regarding the right to comprehensive reparation of damages, it is concluded that the fact that the aforementioned article does not regulate certain expenses does not lead to it being considered unconstitutional, as the legislator is not obliged to list all possible cases, since the article is enunciative, especially when it comes to rules that protect victims, the one that provides the greatest benefit or is most favourable to them in order to achieve comprehensive reparation of damages, in accordance with the principle of maximum protection, always applies. This is so, since the article is so broad that it allows the judge who decides on the reparation of damages, according to each case in the free and prudent exercise of his or her power, to guide his or her criteria with complementary provisions, such as the General Victims Law, the Victims Law for Mexico City or the criteria of the Inter-American Court of Human Rights. ([Supreme Court of Justice of the Nation, 2022](#)).

It is not possible to ignore the character of victim that has been duly accredited in the trial by the person who has filed the appeal for review that we are dealing with here. In other words, whoever appears in the criminal proceeding as a victim, accredited such character, according to the law that regulates it. In this specific case, it is clear from paragraph 4 of the General Victims Law that: ...those natural persons who have suffered any economic, physical, mental or emotional harm or damage, or in general any endangerment or injury to their legal assets or rights as a consequence of the commission of a crime or violations of their human rights recognised in the Constitution and in the international treaties to which Mexico is a party, shall be called direct victims. ([Chamber of Deputies, 2023b](#)).

Thus, the procedural prerequisites for the analysis of the remedy of review have been met. The fact that the victim considered that the stipulated payment for reparation of damages did not satisfy his claims in no way amounted to a violation of his constitutional and international rights enshrined in legal orders. In the resolution that is now being analysed, it is clear that the body that resolves at all times observed the provisions of the National Code of Criminal Procedures, the Magna Carta and the General Law on Victims, in order to resolve in the sense that it did.

Flores-Corvera, Saúl Oswaldo, Mercado-Castellanos, Juan Carlos, Muñoz-García, Martha María de los Ángeles and Pinedo-Muñoz, Ma. Concepción. The impact of the jurisprudential interpretation emanating from the Supreme Court of Justice of the Nation and its application in local courts in Mexico. *Journal of Social Researches*. 2024. 10-25:12-18. <https://doi.org/10.35429/JSR.2024.25.10.12.18>

The complainant argued in her complaint the unconstitutionality of the first paragraph of Article 30 of the Penal Code of the State of Mexico, which establishes:

In cases of injury, rape and in the absence of specific evidence regarding the damage caused, the judges will take as a basis twice the tabulation of compensation set by the Federal Labour Law and the highest general minimum wage in the State.

In the case of homicide, the compensation will be the equivalent of two thousand one hundred and ninety days of the highest general minimum wage in force in the state.

In the cases of femicide, as well as the aforementioned crimes, if they are committed in public passenger transport vehicles, official vehicles, staff vehicles, school vehicles in service or other vehicles that without official authorisation provide an equivalent service, the amount of the reparation of the damage will be three times the tabulation of compensations established by the Federal Labour Law.

In the case of injuries and homicides committed by the driving of public passenger transport vehicles, official vehicles, staff vehicles, school vehicles on duty or any other vehicle that without official authorisation provides an equivalent service, and in the absence of specific evidence regarding the damage caused, judges shall take as a basis the tabulation of compensation established by the Federal Labour Law and the highest general minimum wage of the State. ([Congress of the State of Mexico, 2023](#)).

It is considered in the final analysis that the grievance lacks legal support. A careful reading of the aforementioned article is sufficient to realise that, contrary to what the complainant argues, there is no impediment in this provision to grant reparation for damages. Given that the previous article should be related to Article 26 of the same legal ordinance, which establishes the conditions or requirements for full reparation of damages.

Furthermore, it is considered that there must be a clear difference between the fact that the issue of reparation of damages is not regulated in the legislation and the fact that the victim, in a specific case, does not agree with the judge's sentence in terms of the economic amount that is established.

The judge's criteria is shared in this sense, as Article 30 of the Penal Code for the State of Mexico cannot be considered unconstitutional when it is not in accordance with what was intended. There must be more weighty elements for it to be considered as such. In addition, a reading of the legal provisions listed here makes it clear that it is imperative that whoever causes damage derived from the commission of a crime must make reparation for it, which is the only way to explain the public penalty nature of the concept of reparation for damage.

The ruling in the sentence under analysis is related to the various criteria that the Supreme Court of Justice of the Nation has established on the subject, such as the thesis cited above: Fundamental right to full reparation or fair compensation. Concept and scope.

The right to full reparation or fair compensation is a substantive right whose extension should be protected in favour of the governed, and should not be restricted unnecessarily. In accordance with the criteria issued by the Inter-American Court of Human Rights, the right to full reparation allows, as far as possible, to annul all the consequences of the unlawful act and re-establish the situation that should have existed in all probability if the act had not been committed, and if this is not possible, it is appropriate to pay fair compensation as a measure of redress for the damage caused, which in no way should imply generating a profit for the victim, but rather granting him or her adequate compensation. Modern tort law looks at the nature and extent of the damage, at the victims and not at the perpetrators.

It is the damage caused that determines the compensation. Its nature and amount depend on the damage caused, so that reparations can imply neither enrichment nor impoverishment for the victim or his or her successors.



Liability is not intended to be excessive, as it must be subordinated to qualitative requirements. Compensation will be excessive when it exceeds the amount sufficient to compensate the victim.

However, limiting liability by setting a quantitative ceiling implies marginalising the specific circumstances of the case, the real value of the reparation or of the impaired health. Compensation is not fair when it is limited by ceilings or tariffs, when instead of the judge quantifying it based on criteria of reasonableness, it is the legislator who arbitrarily fixes compensation amounts, regardless of the case and its reality. Only the judge, who knows the particularities of the case, can quantify the compensation fairly and justly. ([Suprema Corte de Justicia de la Nación, 2012](#)).

As can be seen from the above-mentioned decision, the legislator has had the wisdom to ensure that the concept of payment of compensation for damages is not left to the discretion of the judge, nor much less, outside the range of the legal norm. By means of the legislation, the aim is for the victim to find legal support for his claim, without forgetting that the presence of the prosecutor and his legal advisor will ensure that his payment is made in accordance with the provisions of the law.

### Conclusions

One of the most important aspects of the reform of the Political Constitution of the United Mexican States, in criminal matters, has been precisely that which is closely related to the payment of reparation for the damage caused by the crime. This is one of the main aims of the criminal process. As it is established as a public penalty, it is in the State's interest that, in the various criminal proceedings, it is duly guaranteed along with the sanction or penalty that may be imposed on the accused.

The effort made by the courts in our country to guarantee this right of the victim at trial is unquestionable, as can be seen in each of the sentences that are handed down. The scope of these rulings leads us precisely to the Supreme Court of Justice of the Nation having to pronounce itself when there is an undeniable right to challenge a legal provision as unconstitutional.

Rulings such as the one analysed in this study are proof of this. Respectful of the exercise of the right of action that corresponds to the governed, but in accordance with the legal provisions that apply to the case and the criteria that have set precedents in the current issue.

Undoubtedly, there will continue to be challenges to jurisdictional decisions on the grounds of interpretation of the law, but far from wearing us down, it is an opportunity to establish judicial criteria that contribute to respect for the human rights of the governed.

### Declarations

#### Conflict of interest

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

#### Authors' contribution

*Flores-Corvera, Saúl Oswaldo:* Contribution in the research idea and main writing.

*Mercado-Castellanos, Juan Carlos:* Contribution in the search for information and writing of conclusions.

*Muñoz-García, Martha María de los Ángeles:* Contribution to the search for information, writing and style.

*Pinedo-Muñoz, Ma. Concepción:* Contribution to the search for information, writing and style.

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# Analyzing the effectiveness of graduate competencies at the Polytechnic University of Zacatecas

## Análisis de efectividad de las competencias de los egresados de la Universidad Politécnica de Zacatecas

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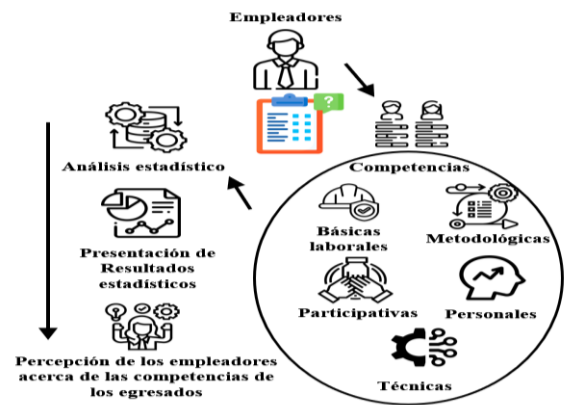
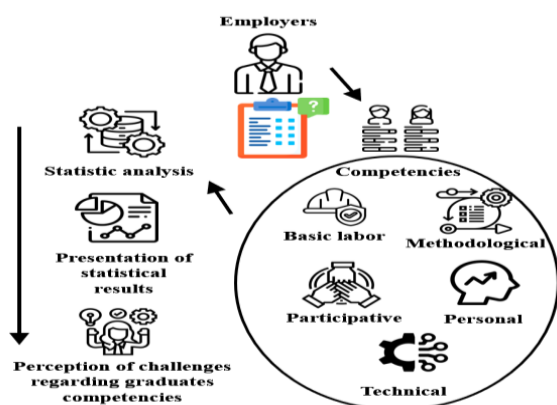
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**Abstract**

This article discusses the results of the evaluation of graduates' competencies from the UPZ academic programs, taking into account the opinions and perceptions of employers or companies. The present research reviews the literature on the concept of competency and its dimensions, establishes study variables, describes the methodology used, and presents the results through statistical techniques such as Spearman's Rho, Mann-Whitney U, and Kolmogorov-Smirnov tests. Together, these techniques allow for an understanding of the achieved results and contribute to the improvement of educational quality.

**Resumen**

En este artículo se discuten los resultados de la evaluación de las competencias de los egresados de los programas académicos en la UPZ, tomando en cuenta la opinión y percepción del empleador o empresa. En la presente investigación se revisa la literatura del concepto de competencia y sus dimensiones, se establecen variables de estudio, metodología empleada y se muestran los resultados a través de técnicas estadísticas como Rho de Spearman, U de Mann de Whitney y Kolmogorov-Smirnov, que en su conjunto permiten conocer los resultados alcanzados y así contribuir a la mejora de la calidad educativa.



**Employer, Graduate, Competencies, Evaluation**

**Empleador, Egresado, Competencias, Evaluación**

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## Introduction

Currently, there are many definitions of competencies, as well as a variety of classifications and uses in both work contexts and theoretical perspectives of the concept, which leads to it being complex and involving a multidisciplinary approach. Therefore, there is growing interest in the identification and evaluation of competencies as a training element and subsequent professional development. The assessment of competencies allows understanding the performance of the worker and thereby facilitating decision – making and strategies for the company or institution. That is why, the present research aims to understand the professional competencies acquired by graduates of the academic programs of the Polytechnic University of Zacatecas, as evaluated from the perspective of the employer or company. To achieve this, a survey was conducted with 94 employers to assess basic labor, methodological, participative, personal, and technical competencies, which allowed determining the main characteristics demanded by employers towards graduates and describing the capacities acquired during their training and professional performance. In order to improve the educational quality of the University's academic programs and increase the degree of compliance with competencies in the workplace, statistical techniques are applied to understand the behavior of the gathered information.

## Background

In the context of the information and knowledge society, the term "competence" emerged in the workplace to respond to the changes occurring in an increasingly complex, flexible, unstable world with greater technological inclusion (Vargas et al., 2001). From an educational perspective, competencies arose to promote student learning, based on comprehensive education that includes a series of elements related to quality education. However, the discussion on competencies is based on the link between university education and the work environment through practical training, topics that have been developed by international institutions and organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), which has sought to link theory with practice.

In the university world, the issue of competencies has been revisited by questioning whether fundamental notions for effective professional practice are learned in this space (United Nations Educational, Scientific and Cultural Organization, 1998). However, a current concern is the detachment between professional knowledge and the competencies demanded in the workplace.

When considering the nature of the connection between the labor and educational worlds, the need for a theoretical review of the competencies acquired by graduates emerges from higher education institutions in order to identify which competencies employers demand for efficient and productive work. Spencer and Spencer (2008) define competence as, "An underlying characteristic in an individual that is causally related to an effectiveness standard and/or superior performance in a job or situation." Additionally, they propose the existence of five types of competencies. The first is motivation, understood as the interests that a person consistently considers or desires; thereby, directing, involving, and selecting behaviors towards certain actions or goals and distancing it from others. The second refers to physical characteristics. The third is self-concept, which is related to a person's attitudes, values, or self-image. The fourth is knowledge, which belongs to the information a person possesses about specific areas, and the fifth refers to the ability to perform certain physical or mental tasks.

On the other hand, Agut and Grau (2001, cited in Charria Ortiz et al. 2011), have proposed four categories according to the elements that form a competence in order to guide its conceptualization: behavior, knowledge, skills, and other individual characteristics.

In the report of the Secretary's Commission on Achieving Necessary Skills [SCANS] (1993, cited in Charria Ortiz et al. 2011), it is stated that academic competencies are associated with fundamental knowledge acquired in general education, and they classify them into basic skills: reading, writing, mathematics, speaking, and listening. Development of thinking, consists of creative thinking, problem-solving, decision-making, assimilation and comprehension, ability to learn and reason; and personal qualities: self-responsibility, self-esteem, sociability, self-direction, and integrity.



It is worth mentioning that most research agrees with the assumption that competencies are related to good job performance and involve communication skills, leadership, customer orientation, understanding, and emotional sensitivity (Levy Leboyer, 2000). From the same point of view, Cotton (2001, cited in Charria Ortiz et al. 2011) defines competencies as the skills that a person has to perform the functions assigned according to the position or job, and by this be more competitive in the face of organizational demands, thereby securing entry and permanence in the workforce. He also emphasizes teamwork, communication skills, problem-solving, and aptitudes acquired through experience or formal education as the main competencies demanded by most employers.

Additionally, several classifications were found aiming to distinguish competencies according to their origin. Most of them propose the existence of general or generic competencies, and specific or technical competencies, according to the particularities of each profession and field of application.

Ruiz, Jaraba, and Romero (2005, cited in Charria Ortiz et al. 2011) classify competencies into intellectual, interpersonal, personal, organizational, technological, and business competencies; Aneca's proposal (2005, cited in Charria Ortiz et al. 2011) suggests general instrumental, personal, systemic competencies, and other competencies, while Charria, Sarsosa, Uribe, and López (2009) and Charria and Sarsosa (2010, cited in Charria Ortiz et al. 2011) classify generic competencies as academic, professional, and labor competencies.

It should be noted that upon reviewing the literature, an overabundance of competency classifications focused on specific areas can be found.

For instance, in the industrial sector, competencies are classified into labor and professional categories; the first one refers to skilled workers who undergo technical education studies for employment and are trained for very specific tasks, while the professional ones are those performed by individuals who have completed higher education studies (Tobón, 2005).

According to the OECD (2002, cited in Figueroa Rodríguez, 2013), through Working Group B, competencies are classified as interpretive (based on understanding information, seeking its meaning), argumentative (based on a set of knowledge, skills, and attitudes aimed at explaining certain processes), and propositional (involving the proposition of hypotheses to explain certain facts or construct solutions to problems).

On their part, Auburn and Orifiamma (1990, cited in Zabalza Beraza, 2007), identify four major classifications: 1) Competencies related to professional and social behaviors (which include technical actions along with others related to management, decision-making, or shared work); 2) Competencies related to attitudes (personal motivation, commitment, ways of treating others, and adaptability); 3) Competencies related to creative abilities (risk-taking, originality, search for new solutions); and 4) Competencies related to existential and ethical attitudes (self-criticism, personal project, humanistic values, and social and ethical commitment). On the other hand, Figueroa Rodríguez (2013) maintains a distinction based on four fundamental areas: 1) Specific competencies (individual cognitive requirements for professional development); 2) Generic competencies (cross-cutting competencies, suitable for different professions); 3) Reflective competencies (critical judgment and intuitive knowledge); and 4) Academic competencies covering both professional aspects or products to be achieved, as well as intellectual habits or processes to be developed. These competencies refer to both students in training and the Professor responsible for the teaching process. As a complement to everything mentioned before, Iriarte (2005, cited in Figueroa Rodríguez, 2013), points out the existence of six traditional personal competencies: 1) specialization; 2) lifelong learning; 3) confidence and collaboration; 4) creativity; 5) assembly; and 6) self-management. However, he adds a new one called the seventh competence: "The management of complexity". This competence has four distinctive features: bipolarity as a method (the ability to analyze from different perspectives), the logic of collaboration and autonomy, the interconnection between knowledge and action and between what is particular and collective, as well as the butterfly effect (individual actions that can have multiplier effects).

For Bunk (1994, cited in Figueroa Rodríguez, 2013), he distinguishes up to 4 classifications of competencies; however, Echeverría, Isus, Sarasola (1999, cited in T. de Zan et al., 2011), manage to adapt these categories, indicating that a professional must have: technical competence (knowledge and skills required to address professional tasks in a broad work environment); methodological competence (analysis and problem-solving, as well as the transfer of solutions to other contexts); participative competence (collaboration in work and teamwork); personal competence (active participation in work, decision-making, and acceptance of responsibilities). To complement this classification, basic labor competencies are added (which constitute the basis for the development of other competencies), and were used in the present research to evaluate graduates. To complement the research, the theoretical definitions of the study variables are presented:

- 1) Regarding the variable "level of competency fulfillment," Spencer and Spencer (2008) define competency as, "An underlying characteristic in an individual that is causally related to a standard of effectiveness and/or superior performance in a job or situation." This definition is complemented by that established by the Tuning project, which expresses it as, "A dynamic combination of attributes, related to procedures, skills, attitudes, and responsibilities, that describe those in charge of learning from an educational program or what students are capable of demonstrating at the end of an educational process" (Bravo Salinas, 2007, p. 13). Since this study examines the competencies of graduates at the professional level in their work performance, the idea of competencies in the workplace is combined with those competencies expected as a result of professional training.

In addition to these main variables, information was obtained from five secondary variables:

- 1) Type of company: This variable considers public and private companies. Public companies are those that provide essential goods and services to the population, where government participation is total or majority.

On the other hand, private companies are owned by private investors, non-governmental, shareholders, or owners, constituting the private sector of the economy. Their main objective is to generate profits for the owners or shareholders.

- 2) Main activity of the company: This category considers industrial, commercial, and service companies. The first are those that buy goods or extract raw materials for transformation. Commercial companies are intermediaries between producer and consumer, with their main function being the purchase and sale of finished products. Finally, service companies are those that direct, organize, and facilitate the productive activity of the primary and secondary sectors. One of their main functions is to offer an intangible service with the aim of satisfying a need.
- 3) Size of the company: Companies can be classified as micro, small, medium, and large, based on the amount of their capital and the criterion of the employed personnel. A microenterprise is one in which 0 to 10 employees work; a small business has 11 to 50 employees; a medium-sized business has 51 to 100 employees, and finally, a large business has 101 employees and above (National Institute of Statistics and Geography, 2020).
- 4) Number of graduates currently working in the company.
- 5) Educational programs to which the graduates working in the company belong.

### Methodology

The methodology implemented in this research is of an applied and non-experimental nature. Hernández, Fernández, and Baptista (2014) define non-experimental research as research conducted without deliberately manipulating variables, where only phenomena is observed in their natural environment and then analyzed.

For these authors, non-experimental design is divided taking into account the time during which the data is obtained.

This research is cross-sectional because data is collected at a single point in time, in a unique timeframe, aimed at describing variables and their interrelationship at a given moment.

Additionally, this research is descriptive and correlational with a quantitative approach, as these designs describe the existing relationships between two or more variables at a certain moment. The primary purpose of correlation studies is to understand how a concept or variable may behave given the behavior of other related variables, while descriptive studies aim to specify the important properties of individuals, groups, communities, or any other phenomenon subjected to analysis.

A survey instrument will be used, which is a technique that incorporates a set of standardized research procedures where a series of data is collected and analyzed from a representative sample of cases from a larger population or universe. The aim is to explore, describe, predict, and/or explain a series of characteristics (García, 1993). Furthermore, the questionnaire is the basic instrument used in the survey research, defined as a "Document that systematically collects indicators of the variables involved in the survey objective" (Casas et al., 2003, pp. 527-538).

For this purpose, a survey was designed to gather information on the opinions that employers hold regarding the graduates of the Polytechnic University of Zacatecas, having as a reference various instruments from other institutions of higher education where they have already been applied within both national and international contexts.

The questionnaire begins with a presentation directed to the employers about the purpose of the survey pointing out that the information given is of a confidential and reserved character, and the results obtained are strictly used for scientific purposes. The questionnaire is divided in two parts:

**Part 1.** General information of the company, organization or institution. This part identifies the company with its corporate name, the position of the employer, type, size and main activity of the organization, number of graduates who are currently working, and what program and areas they belong to.

**Part 2.** This part identifies the employers' perception of the basic labor, methodological, participatory, personal and technical competencies of graduates. These competencies were measured through the Likert scale defined in five levels, ranging from low, average, sufficient, high and even excellent. Basic work competencies include 18 items, methodological competencies 8 items, participatory competencies 9 items, personal competencies 13 items, and technical competencies 6 items. With this information, the aim is to know the attitudes, skills, knowledge, competencies and capabilities of the graduates, which will allow us to know the opinions of employers regarding the qualification of skills and their job performance.

### **Instruments and strategy for collecting information**

The survey was carried out using the Microsoft Forms application, which is an intuitive, accessible and open tool for conducting online surveys that allows you to create questionnaires with multiple choice, open-ended questions, classifications, etc. in a very short time. Furthermore, the application allows you to answer all the mandatory questions and thereby reduce the percentage of rejected or incomplete questionnaires. As a complement, the results are shown with detailed statistics in the form of very visual graphs with all the relevant information. The results can be consulted immediately and downloaded into Excel for data processing.

Once this option was considered for the application of the questionnaire, the following steps were carried out:

1. Several tests were carried out on the Microsoft forms application to measure response times, trying to make it agile and easy to respond to employers. The questionnaire could be completed on a computer or mobile device, organized into sections, upon completion, by only pressing the "submit" button, the employer's provided information would appear automatically.
2. A pilot test was carried out by sending the web link to 8 employers for corrections before final implementation. In this case, only a modification was made to an open question that was not explicit enough to answer.

3. Once the questionnaire was approved, the web link generated was distributed to the head of the Department of Linkage and Academic Exchange at the Polytechnic University of Zacatecas, as they have the employers' database, as well as their personal information.
4. The survey was distributed through social networks such as WhatsApp, Facebook and Instagram to teachers, administrators and alumni of the Polytechnic University of Zacatecas. They were encouraged to share the survey with employers within their networks to gather the necessary information.
5. In the application of the instrument, the problem encountered was that according to the database of the Linkage department, there was outdated personal information of employers, businesses that had closed due to the pandemic, or companies where graduates were no longer working.

It is worth mentioning that information was obtained from 94 out of the 120 registered employers, including companies or organizations of various types, sectors, and sizes, representing a response rate of 78.33%. The questionnaire application took approximately one month to collect information for the current research, starting on January 7, 2021, and ending on January 25 of the same month. Furthermore, due to the functionality of the digital application, no rejected or incomplete questionnaires were recorded, resulting in a percentage of incomplete or invalid questionnaires of 0%.

### Instrument reliability

Various techniques were employed for statistical analysis, as described below. Descriptive analyses were conducted using the statistical program SPSS (Statistical Package for the Social Sciences) version 24 to calculate the mean and the results of the statistical techniques to be employed. The Mann Whitney U test was used to test the difference in means of these indicators. This test is non-parametric and is used to identify differences between two populations based on the analysis of two independent samples (Johnson, 2000). In other words, this type of non-parametric test is used to measure the statistical significance of observed differences between two sets of data.

It involves comparing the totals of categories corresponding to the two conditions based on joint classification (Gómez, 2003). If there are approximately the same categories for both conditions, then the differences between the classified correlations are random, and the null hypothesis should be accepted. However, if there is a significant predominance for one of the conditions in the expected direction, this significant difference between the totals of the categories for the two conditions allows rejecting the null hypothesis and accepting the research hypothesis (Miller & Freud, 2021). To determine if the difference between the means is statistically significant, the p-value must be compared with the significance level. Typically, a significance level (denoted as alpha) of 0.05 works adequately. A significance level of 0.05 indicates a 5% risk of concluding that there is a difference when there is no real difference, meaning it is the probability of committing a type 1 or type 2 error. In the present research, the comparison of means is made among the type of organization, main activity, and size of the organization.

On the other hand, goodness-of-fit tests are used to determine if sample data can be considered to come from a specific distribution or probability model. Ultimately, goodness-of-fit tests allow us to verify what type of distribution our data follows and, as a consequence, what tests (parametric or non-parametric) can be conducted in statistical analysis. The Kolmogorov-Smirnov test, known as the K-S test, is a non-parametric statistical significance test that measures the degree of agreement between the distribution of a set of data and a specific theoretical distribution (Gómez Gómez, 2003). This test is used when the sample size is larger than 50. The null hypothesis in the K-S test indicates whether the observed frequency distribution is consistent with the theoretical distribution (good fit), while the alternative hypothesis tests whether the frequency distribution observed is not consistent with the theoretical distribution (poor fit).

Furthermore, to assess its normality, it is important to consider the level of significance. So, if the data is normally distributed, meaning the assumption of normality is met, the significance level should be higher than 0.05 (p-value > 0.05).



If the data is not normally distributed, meaning the assumption of normality is not met, the significance level will be less than 0.05 ( $p < 0.05$ ) (García Bellido et al., 2010). Moreover, to evaluate the correlation between dimensions, the Spearman's rank correlation coefficient (Rho) technique was employed. Spearman's rank correlation is a bivariate technique that does not assume normality and is used to observe representations of information, allowing for the establishment of similarities or dissimilarities between variables to highlight joint variability and therefore typify what happens with the data. The interpretation of the Spearman's rank correlation coefficient agrees at values close to 1, indicating a strong association between rankings; as one rank increases, so does the other. While values close to -1 indicate a strong negative association between rankings, meaning that as one rank increases, the other decreases. When the value is 0.0, there is no correlation (Hair J. et al., 2008). The interpretation of the values has been expressed by various authors on scales, with one of the most commonly used being presented in Table 1.

**Box 1**

**Table 1**

Degree of relationship between variables according to the Spearman's rank correlation coefficient (Rho)

Coefficient Range	Relationship
-0.91 a -1.00	Perfect negative correlation
-0.76 a -0.90	Very strong negative correlation
-0.51 a -0.75	Considerable negative correlation
-0.11 a -0.50	Moderate negative correlation
-0.01 a -0.10	Weak negative correlation
0.00	No correlation
+0.01 a +0.10	Weak positive correlation
+0.11 a +0.50	Moderate positive correlation
+0.51 a +0.75	Considerable positive correlation
+0.76 a +0.90	Very strong positive correlation
+0.91 a +1.00	Perfect positive correlation

Source: Own elaboration based on Hernández et al. 2014, Page 305

**Results Obtained**

The following table shows the descriptive results comparing each of the indicators belonging to the competence variable dimensions, considering the type of company (whether it is public or private), the sector (industrial, commercial, services, or multisector), and size (micro, small, medium, and large), as well as an overall rating for each indicator and dimension.

**Box 2**

**Table 2**

Competence Ratings by Type, Sector, and Size of the Surveyed Companies

Variable	Dimension	Indicator	Type		Sector			Size			Overall rating for indicator	Overall rating for dimension	
			Public Company	Private Company	Industrial Sector	Commercial Sector	Service Sector	Multisector	Micro Company	Small business			Medium business
Competencies	Basic Competency	Knowledge	4.2	4.0	3.8	4.2	4.2	4.0	4.0	4.3	3.9	4.0	4.1
		Time and resource management	4.0	4.0	3.5	4.1	4.3	3.7	4.2	4.1	3.9	3.9	4.0
		Reasoning	4.3	4.0	3.9	4.1	4.2	3.9	4.1	4.2	3.8	4.0	4.0
		Leadership	4.4	4.0	3.9	4.1	4.2	4.0	4.0	4.3	4.0	4.1	4.1
		Communication	4.3	4.0	3.7	4.1	4.1	3.9	3.9	4.2	3.7	4.0	4.0
	Methodological Competency	Execution	4.5	4.2	4.0	4.4	4.3	3.9	4.1	4.4	4.0	4.1	4.2
		Forecast	4.2	4.0	3.8	4.1	4.2	3.7	4.1	4.2	3.8	3.9	4.0
		Diagnosis	4.1	4.0	3.8	4.1	4.1	3.8	4.0	4.2	3.7	4.0	4.0
		Integration	4.4	4.1	3.9	4.3	4.3	3.9	4.1	4.3	3.9	4.1	4.1
		Beginning	4.5	4.2	4.0	4.4	4.3	4.1	4.0	4.4	4.0	4.2	4.2
Personal Competency	Decision making	4.2	4.0	3.9	4.0	4.2	3.9	3.8	4.1	3.9	4.1	4.0	
	Responsibility	4.4	4.2	4.1	4.4	4.3	4.0	4.0	4.4	4.0	4.2	4.2	
	Initiative	4.5	4.1	3.9	4.2	4.3	3.9	4.0	4.4	3.8	4.1	4.1	
Technical Competency	Skills	4.1	3.9	3.8	4.1	4.0	3.8	3.8	4.1	3.8	3.9	3.9	
	Competencies	4.3	4.0	3.9	4.2	4.2	3.9	4.0	4.3	3.9	4.1	4.1	

Source: Own elaboration based on the analysis of the extracted data

Regarding the analysis by type of company, in the public sector, it can be observed that the indicator with the highest average rating is the application of principles in the company or organization (CP), while the lowest-rated indicator with a mean of 4.0357 is time and resource management (CBL). However, it can be concluded that in public companies, graduates are well-rated by employers, as all indicators are above the value of 4 (High). It should be noted that the total number of public companies that evaluated graduates is 14. On the other hand, the total number of private companies that rated graduates is 80, therefore they are evaluated with lower ratings than in public companies, as several values with a mean below 4 (High) can be observed. In private companies, the results show that the lowest-rated indicator is technical competence skills (CT) with a mean of only 3.8938, while the highest is responsibility (CPe) with a mean of 4.1813. By analyzing the mean ratings by sector, it can be concluded that the industrial sector (which consists of 23 companies) and the multisector (which consists of 11 companies) are the worst-rated sectors.

Only 2 indicators out of all reach the value of 4 (High), indicating that all others are below this value and well below the overall average. Regarding the ratings of graduates, concerning the size of the company, it is observed that the small-sized companies (consisting of 26 companies or organizations) are where employers are most satisfied with the various competencies acquired by graduates. This is because the ratings of graduates in all indicators are above the value of 4 (High).

In contrast, to test whether the differences found in the means of competency fulfillment levels among different groups of companies (type, sector, and size) are significant or not, the Mann Whitney U test was applied. Ranks were created to calculate the asymptotic significance (bilateral) according to the type, size of the company, and sector. Regarding the size of the company, the difference in means was tested between micro and small, micro and medium, micro and large, small and medium, small and large, and finally medium and large.

However, concerning the sector to which companies belong, the difference in means was calculated between industrial and commercial, industrial and services, industrial and multisector, commercial and services, commercial and multisector, and finally, services and multisector. To conclude, the difference in means considering the type of company is calculated, where the only possible range is private and public. To simplify the results, only the significance of the Mann Whitney U test for each of the comparisons is presented in Table 3.

### Box 3

**Table 3**

Significance of the Mann Whitney U test for difference in means between groups of companies

Groups Compared	Asymptotic (bilateral)	Significance
Micro-Small	0.590	
Micro-Medium	0.727	
Micro-Large	0.335	
Small-Medium	0.659	
Small-Large	0.680	
Medium-Large	0.342	
Public-Private	0.575	
Industrial-Commercial	0.151	
Industrial-Services	0.155	
Industrial-Multisector	1.000	
Commercial-Services	0.957	
Commercial-Multisector	0.295	
Services-Multisector	0.282	

Source: Own elaboration based on the analysis of the extracted data

As stated earlier, to determine if there is a difference between the means, the p-value is compared with the significance level. Therefore, since the adopted significance level is 0.05, and upon comparing this value with the data obtained, it is concluded that there are no significant differences between the mean ranks.

Therefore, evaluations between categories behave in the same way. In other words, comparing the size of the company or organization, does not illustrate any significant differences, as well as in the comparison between sectors and type of company.

Furthermore, the correlation between the five dimensions of the variables is calculated, which are: labor basic competencies (CBL), methodological competencies (CM), personal competencies (CPe), participative competencies (CP), and technical competencies (CT). The results of applying the Spearman's rank correlation test are presented in the following table:

### Box 4

**Table 4**

Spearman's Rank Correlation Coefficient (Rho) between the dimensions of the variable Rating of the overall level of competency fulfillment (CG) and its significance level.

	Basic Competencies	Methodological Competency	Participative Competency	Personal Competency	Technical Competency
<b>Basic Competencies</b>	1.000				
<b>Methodological Competency</b>	.857**	1.000			
<b>Participative Competency</b>	.774**	.723**	1.000		
<b>Personal Competency</b>	.870**	.889**	.790**	1.000	
<b>Technical Competency</b>	.672**	.670**	.655**	.704**	1.000

\*\* . The correlation is significant at the 0.01 level (2-tailed).

Source: Own elaboration based on the analysis of the extracted data

The correlation between personal competence and methodological competence is 0.889, a value that can be interpreted according to established parameters as a very strong positive correlation, while the dimensions in which the correlation is only 0.655 are technical skills with participatory skills, interpreted as a considerable positive correlation. Normality tests were carried out to verify what type of distribution the data follows, and, therefore, determine what tests, whether parametric or not, would be carried out for the statistical analysis.

For this reason, in order to estimate the normality of the distributions, the Kolmogorov-Smirnov test is calculated to determine the significance level of the test for the level of compliance with the general competencies, their dimensions, and the promotion potential, which are the variables under study. The results are shown in the following table.

### Box 5

**Table 5**

Results of the Kolmogorov-Smirnov test for the variables and their dimensions

	Statistic	gl	Sig
Average overall competency score	.152	94	.000
Basic competencies	.159	94	.000
Methodological competence	.169	94	.000
Participative competence	.132	94	.000
Personal competence	.103	94	.015
Technical competence	.121	94	.002

*Source: Own elaboration based on the analysis of the extracted data*

In the Kolmogorov-Smirnov test, the assumption of normality is met when the significance level is greater than 0.05. In this case, the values obtained from the total results are lower than the said value, indicating that the assumption of normality is not satisfied. Therefore, it can be concluded that the data from the variables and dimensions do not follow a normal distribution. This conclusion requires that the treatment of these data for statistical correlation tests should be conducted using non-parametric analysis methods (M.H., Guillen et al. 2014).

### Discussion and conclusions

As a conclusion, it was found that the term "competence" constitutes a complex and multifaceted concept from which a wide variety of definitions and theoretical classifications have been constructed. That is why, it is emphasized that competence is a set of skills and aspects of personality, knowledge, and behaviors that, in a given context, allow for both the resolution of a particular situation and the achievement of successful performance in a task or role in a job position.

It is important to mention that the different classifications found allow us to see that there is no single standard for defining and classifying competencies. This situation makes this topic continue to be a subject of discussion and further exploration in the literature, as there is a diversity of approaches to define it. However, even though it is a concept in development with multiple approaches, the classifications made, despite their differences, seek to cover the competencies that must be developed in professional training and in the workplace.

In addition to the above, there has been a great interest in understanding and identifying the competencies that allow for adequate academic training and professional success. However, an appropriate strategy must be implemented within educational models since, nowadays, graduates from different Higher Education Institutions depend not only on academic training or knowledge but also on learning experiences in real contexts and variables such as motivation, behavior, or attitudes. This implies a challenge and a paradigm shift in institutions that makes the curriculum more flexible based on students' interests and conceives dialogical learning forms and teaching methodologies through which students develop as comprehensive, competent, dynamic professionals capable of responding to the needs of the context (Aguilar Gordón, 2016).

Finally, it is concluded that the concept of competencies and their classification are focused on improving the quality of higher education and its ability to develop strategies that allow professionals to perform adequately in the workplace. Precisely because of this, the topic must continue to be researched and implemented to the extent that it leads to an understanding of the training and development needs of future professionals and in line with the demands of the job market.

On one hand, the level of competency performance of the graduates evaluated by employers, within the Likert scale, is high, meaning it is close to excellent. This indicates that the academic level of the Polytechnic University of Zacatecas is good and reaffirms its status as one of the best universities in the state. Even though the dimensions of the competency variable received favorable evaluations, participative competencies received the highest ratings.

This suggests that employers appreciate collaboration, adaptation, and integration in the workplace for adequate job performance. On the other hand, areas for improvement were identified that allow UPZ to enhance its academic processes, such as deficiencies in English language proficiency primarily. The evaluation makes it clear that the ratings of graduates by employers are acceptable and highlights the strengths and weaknesses of graduates in the workplace. It can be mentioned that a significant part of this study focuses on determining the competencies that students acquire during their professional and work performance, and through their development, the satisfaction levels of employers are known.

Based on the statistical techniques applied in the present research, it is concluded that the correlation between personal competence and methodological competence is 0.889, a value that can be interpreted according to the established parameters as a very strong positive correlation. Meanwhile, the dimensions in which the correlation is only 0.655 are technical competencies with participative competencies, interpreted as a considerable positive correlation.

Regarding the Kolmogorov-Smirnov test, the assumption of normality is not satisfied, and therefore, the data from the variables and dimensions do not follow a normal distribution. Consequently, it is concluded that there are no significant differences between the mean ranks. In other words, the evaluations between categories behave in the same manner. Specifically, when comparing the size of the company or organization, there are no significant differences, as well as in the comparison between sectors and types of companies.

It is worth mentioning that this work is by no means conclusive but should be considered as a foundational element for further in-depth study of professional competencies and promotion potential. In other words, it serves as an indication to understand competencies and their relationship with promotion potential. However, it's important to note that the employer's opinion or perception does not directly influence the decisions or planning of educational programs at the Polytechnic University of Zacatecas. Nonetheless, it serves as a foundational document to understand the needs of employers with current information.

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Furthermore, it represents an initial study on the relationship between graduates and employers within the Polytechnic Universities of the country. However, from a perspective aimed at improving the quality of higher education, the evaluation of competencies must be complemented with comprehensive student training to address both theoretical and practical knowledge, as well as attitudes or personal commitments, ranging from knowing and doing to knowing how to be. The training of graduates should integrate a set of transversal or generic learning experiences that guarantee a smooth integration into the job market, enabling good performance and, consequently, the likelihood of promotion within the company or organization.

In the present study, it is evident that employers generally express satisfaction with the job performance of graduates from the Polytechnic University of Zacatecas. Nonetheless, there are deficiencies that require attention and improvement to enhance the educational quality of the institution.

## Declarations

## Conflicts of interest

The authors declare that they have no conflicts of interest.

## Contribution of the authors

*Lara-Torres, Claudia Guadalupe*: Contributed to the bibliography search for the elaboration of the background and theoretical framework. I supported in the writing of the article as well as in the elaboration of tables and graphs, and in the systematization of the results and revision of the bibliographic citations.

*Velázquez-Macias, Jesús*: Contributed to the preparation of the summary, introduction, discussion of the results and conclusions. He also participated in the drafting of the article and revision of the bibliography.

*González-Hernández, José Roberto*: Contributed to the idea of the project, methodology, elaboration of the strategies and instruments. He supported the application of the instrument as well as the analysis of results and the final revision of the research.



## Article

*Guirette-Barbosa, Omar Alejandro*: Contributed to the translation of the article and final revision.

### Availability of data and materials

The data collected for this study were obtained survey prepared for employers.

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### Abbreviations

CBL	Labor basic competencies
CG	Competency fulfillment
CM	Methodological competencies
CPe	Personal competencies
CP	Participative competencies
CT	Technical competencies
KS	Kolmogorov-Smirnov
OECD	Organization for Economic Cooperation and Development
RHO	Spearman's rank correlation coefficient
SPSS	Statistical Package for the Social Sciences
SCANS	Secretary's Commission on Achieving Necessary Skills
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPZ	Universidad Politecnica de Zacatecas

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## Anxiety and depression in students of third semester of “Facultad de Medicina y Nutrición de la UJED, Campus Durango”

### Ansiedad y depresión en Alumnos de Tercer Semestre de la Facultad de Medicina y Nutrición de la UJED, Campus Durango

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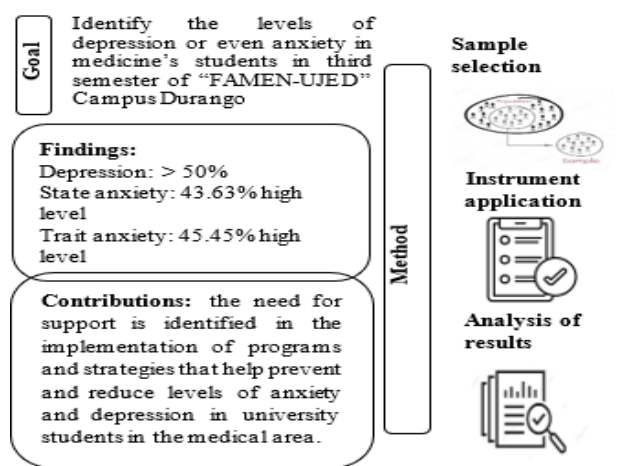


#### Abstract

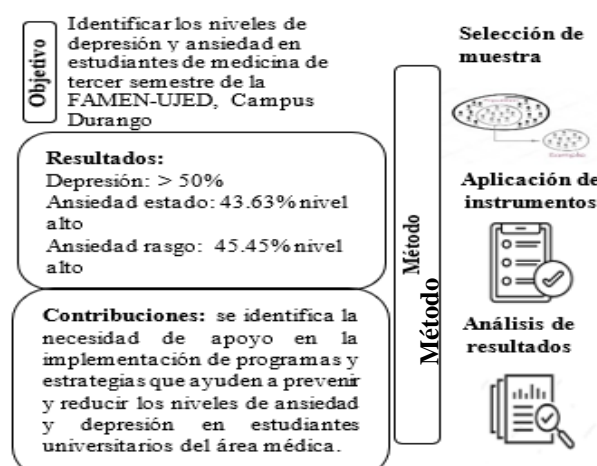
Mental health in university students can be a limitation or an ally to enhance professional and social skills. The evaluation of level's depression was realized by the Beck Depression Inventory (BDI). The anxiety was evaluated through of State-Trait Anxiety Inventory (STAI) with a total of 110 participants.

#### Resumen

La salud mental en estudiantes universitarios puede ser una limitante o una aliada para potenciar las competencias profesionales y sociales. La evaluación de los niveles de depresión se realizó mediante el Inventario de Depresión de Beck. La ansiedad fue evaluada mediante el Inventario de Ansiedad Estado-Rasgo a un total de 110 participantes.



#### Depression, Anxiety, University Students



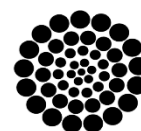
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## Introduction

Nowadays, psychosocial disabilities represent a serious public health problem that affects all sectors of society regardless of age, gender, socio-economic and cultural level, thus representing a high social cost. Global evidence shows that there is no health without mental health (H. Congreso del Estado de Durango, 2018).

The pressure and demands of studying a career can generate high levels of anxiety and depression in students, which can negatively affect their academic performance and emotional well-being (Londoño Arredondo et al., 2021).

Mental health is a phenomenon that can be determined by various factors, including social, environmental, biological and psychological factors, and conditions such as depression, anxiety, stress, dementia, etc. are often represented. These conditions can have serious consequences such as a decrease in people's development potential. In this sense, achieving good mental health in the population depends, to a large extent, on the implementation of public health actions (Sandoval De Escurdia and Richard Muñoz, 2005).

Depression and anxiety are mental health problems that affect a large number of people worldwide, including medical students. According to a recent study, medical students have a higher prevalence of depression and anxiety compared to other sectors of the population (Rotenstein et al., 2016), as the high levels of stress, academic pressure, lack of time to take care of themselves, long study hours and clinical practices to which they are exposed are some of the factors that contribute to the occurrence of these disorders (Dyrbye et al., 2006).

For Gutiérrez et al., (2010) it is of utmost importance to identify the prevalence of depression, anxiety or stress in students entering higher education, in order to know the state of mental health of such students, which may be affected by the demands, level of development and competences that may determine the possibility of success or failure in their learning process (Gutiérrez et al., 2010).

Currently, the mental health of university students is an issue of great relevance and concern for teachers, as it constitutes a limiting situation for achieving the enhancement of their professional, social and personal competences (Cuenca Robles et al., 2020).

In this research work, the current panorama of mental health in medical students will be presented, as well as the relevance of recognising and raising awareness about the importance of its care, so that they can identify the relevance of seeking help from a specialist in this area when necessary and thus gain access to intervention in a timely manner in case it is required.

Early interventions and appropriate treatment can prevent deterioration in mental health and improve students' well-being and performance.

## Rationale

First clinical encounters, usually occurring during the first semesters of medical school, trigger strong feelings and sensations in students, who are confronted with complex illnesses and/or confusing emotional states and, sometimes, feelings of guilt for using patients' conditions for their own learning (Segura Azuara et al., 2020).

High levels of stress as well as emotional morbidities can have negative personal and professional consequences for students, including social isolation, emotional exhaustion, undetected or untreated mental disorders that can lead to poorer prognosis, such as substance use and abuse and, in the worst cases, even suicidal behaviour (Cuttilan et al., 2016).

University students are a sector of society prone to a high risk of suffering from mental health problems due to curricular demands, thus significantly affecting all spheres of their lives, which is a product of the stress to which they are constantly exposed (Cardona et al., 2014).

Agudelo Vélez et al., (2008) report that, in the university population, one of the main reasons for consultation in psychological care is depression and anxiety (Agudelo Vélez et al., 2008).



For Gutiérrez Rodas et al, (2010) it is of utmost importance to identify the prevalence of depression, anxiety or stress in students entering higher education, in order to know the state of mental health of such students, since, due to the academic demands and difficulties in the learning process, accompanied by the pace of study, extended class schedules, teachers' demands, peer pressures, competition among classmates, variable eating schedules and changes in the sleep-wake cycle, can alter health conditions, including mental health (Gutiérrez Rodas et al. , 2010).

Regarding this issue, the Institute of Mental Health of the State of Durango (ISMED) announced at a press conference held in the framework of World Mental Health Day, that currently this problem has not been given the importance it deserves, neither in terms of budgets nor as a society, in addition, the difficulties faced by different public and private organisations is the lack of specialised places where patients with psychosocial disabilities can be given dignified treatment, requiring a short stay in hospital, so that they can continue their treatment on an outpatient basis (H. Congress of the State of Durango, 2018). For the aforementioned reasons, the present research on anxiety and depression in medical students is justified, in order to identify risk factors and, in this way, consider the feasibility of developing and implementing programmes as prevention and treatment strategies with the aim of promoting the mental health and well-being of university students, especially those who are trained in the medical field.

## Problem

The World Health Organization (WHO) in 2021 mentioned that, in school settings, including at university level, both anxiety and depressive disorders can significantly compromise school attendance, study and also the performance of professional, social, family and personal duties. This can have negative repercussions on students, as social withdrawal can exacerbate isolation and loneliness and, in the worst cases, depression can lead to suicide, which is of alarming concern to mental health professionals, as the fourth leading cause of death among 15-29 year olds is suicide (World Health Organization, 2021), figures that could continue to rise if an action plan is not implemented to help reduce or eradicate the problem.

According to the National Morbidity Yearbook 1984-2022, for the year 2022 in Mexico, depression was found to be number 19 of the 20 causes of national disease, where the general population aged 15 to 24 years gave a total of 26,450 people with this condition; of which, 19,329 correspond to the female sex, placing depression in women at number 18 of the 20 causes of disease, while the remaining 7,121 correspond to the male sex, in the latter, depression is not found within the 20 causes of disease (Government of Mexico, 2022).

Data provided by the Ministry of Health (SSA) through the epidemiological bulletin of the National Epidemiological Surveillance System showed that the state of Durango closed the year 2023 (week 52) with 4986 cases of depression, of which 1154 correspond to the male sex and 3832 to the female sex. Regarding the year 2024, updated figures for week 09 showed that there are a total of 804 cases of depression, of which 222 correspond to males and 582 to females (Secretaría de Salud, [SSA], 2023) and (SSA, 2024).

Regarding anxiety, in 2018 the Pan American Health Organization (PAHO) together with the World Health Organization (WHO) reported that, in most countries of the Region of the Americas, of which Mexico is part, anxiety disorders are the second most disabling mental disorder. In addition, mental disorders account for 23% of years lost to disability in low- to moderate-income countries, and are associated with lower life expectancy and higher mortality rates (Pan American Health Organization [PAHO] and WHO 2018).

These figures for mental disorders are highly relevant as the years go by, as failure to treat them immediately often has consequences that can extend into adulthood, and thus impair a person's physical and mental health, restricting their chances of living a full life in the future (WHO, 2021).

## Overall objective

To identify the levels of depression and anxiety in third-semester medical students of the Faculty of Medicine and Nutrition of the Universidad Juárez del Estado de Durango, Durango Campus.

## Theoretical framework

### Background

The State-Trait Anxiety Inventory (STAI) was applied to 268 medical students of the Pontificia Universidad Católica del Ecuador, Sede Ambato (PUCESA), enrolled in the periods August - December of the academic year 2022. The results showed that the levels of Anxiety-Rasgo and Anxiety-State presented moderate and severe levels in 86.2% and 77.4% of the sample respectively (Yáñez Yáñez, 2023).

In a study carried out using the Beck Anxiety Inventory (BAI) on 219 students from all semesters of the medical career at the Universidad del Norte de Barranquilla, in Colombia in the academic period 2022-10, resulted in an overall prevalence of anxiety symptoms of 70.8%, which corresponds to 155 people among all individuals in the study. Thus, the semester where the highest prevalence was found was the third semester, with 92.6%, followed by the fifth and sixth semesters with 82.6% and 78.9% respectively (Angarita Villegas et al., 2022).

On the other hand, in the national context, an investigation was carried out with 122 first-year medical-surgeon students at the Chimalhuacán Professional Academic Unit in the State of Mexico, with the aim of exploring their mental health, where levels of anxiety, depression and stress were studied, resulting in anxiety being the most prevalent condition, with 21.3% obtained through the Trait-State Anxiety Inventory, where 40.2% showed state anxiety and 44.3% had it as a range. Regarding depression, 9% showed intermittent depression, 5.7% moderate depression and 0.8% extreme depression (Arzate Salgado, 2020).

Likewise, in an investigation carried out with 274 students enrolled in fifth semester of the five degrees belonging to the Health Sciences (Medical Surgeon, Dental Surgeon, Nursing, Psychology and Nutrition) of the Universidad Juárez Autónoma de Tabasco, using data collection techniques and instruments such as direct observation, available information, as well as a questionnaire technique based on the Hamilton Anxiety Scale (HAS), it was found that 79.2% of the participants suffer from some type of anxiety, and 14.65% of the students suffer from a severe anxiety disorder.

In addition, it was found that the bachelor's degrees with the highest prevalence were Medical Surgeon and Nutrition with 88.85% (López-Wade and Viveros-Ojeda, 2018).

A study conducted in 2020 involving 177 students from all semesters of the Medical Surgeon degree at the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) campus Guadalajara, who were administered the Goldberg General Health Questionnaire, reported the results of this research, where it was found that 35.8% of students had symptoms of anxiety, and 8% had symptoms of depression. They also found that there is a significant difference between the academic years of the participants, with a higher percentage of cases in the fifth year of their degree (Ruvalcaba Pedroza et al., 2021)

Regarding depression, an investigation was conducted with the help of the Patient Health Questionnaire-9 (PHQ-9) to identify the prevalence of this condition in 63 students of the Bachelor of Medicine of the Benemérita Universidad Autónoma de Puebla (FMBUAP) where it was obtained that 95.23% of them reported at least one symptom in the last two weeks, in addition, 31.72% of these students could have a diagnosis of major depressive syndrome (Martínez-Martínez et al., 2016).

For his part, Fouilloux Morales (2002) conducted a study aimed at identifying probable cases of mental disorders in medical students in the first years of their studies. The results showed that 10.5% of the students suffered from some kind of mental disorder, within which decreased concentration, depressive mood and anxiety were the symptoms most frequently reported by students (Fouilloux Morales, 2002).

### Mental health

According to WHO (2013) mental health is a state of well-being in which the individual develops his or her abilities, can cope with the pressures of life and can also work productively, being able to make contributions to his or her community (WHO, 2013). It is also a fundamental human right, which allows us the ability to relate, to function in all areas and to thrive (WHO, 2022).

Mental disorders lead to considerable disability. They are clinical entities of long evolution, which generally begin in adolescence or early adulthood, and have remissions and recurrence that have a great impact on the personal, family and work functioning of the individual (Campo-Arias and Cassiani Miranda, 2008).

PAHO (2017) refers that common mental disorders refer to two categories: depressive disorders and anxiety disorders. They are diagnosable health conditions, and can be distinguished from feelings of sadness, stress or fear that any individual may occasionally experience in his or her life.

These disorders are highly prevalent in the population and often have an impact on the mood or feelings of the people who suffer from them, and their symptoms vary in intensity and duration (PAHO, 2017).

According to Martínez-Martínez et al., (2016), most mental disorders generally begin in the first decades of life, meaning that 50% of adults who have suffered from a mental disorder began to suffer from it before the age of 21, and when these disorders occur before the age of majority, the course of the illness tends to be more chronic and of longer duration (Martínez-Martínez et al., 2016).

### Mental health in university students

When talking about mental health in university students, it is well known that many of the authors who have dedicated themselves to research on this topic agree that between 10% and 25% of students require some kind of psychological-medical help, and that these figures tend to drop significantly in the case of more severe psychiatric disorders, which even cause students to drop out of their studies (Fouilloux Morales, 2002).

The education of medical students has been particularly characterised by a high level of demand, generating high levels of stress and a greater likelihood of suffering from psychological morbidities compared to the general population, such as anxiety and depression (Aktekin et al., 2001).

According to Borges (2016), some studies have pointed out that poor school performance tends to occur more frequently in students with depressive symptoms, associating depression with difficulties in concentration, social relations and reading and writing performance, even perceiving these tasks as a heavy burden (Borges, 2016).

### Anxiety

According to the SSA (2010), people who have suffered from anxiety experience it as an unpleasant, diffuse sensation, accompanied by physical discomfort such as retro sternal tightness, tachycardia and sweating. It is also characterised by excessive worry about events or activities such as work performance, with a prolongation of more than six months, and expressed in a series of symptoms such as: restlessness, impatience, easy fatigability, difficulty concentrating, muscle tension and sleep disturbances (SSA, 2010).

With regard to aetiology, anxiety disorders have a genetic variability that is estimated at between 30% and 50%, however, there are usually associated influencing factors that may be temperamental, social and/or environmental factors (Chacón Delgado et al., 2021).

The American Psychiatric Association (APA) in 2014, through the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), classifies anxiety disorders as follows:

Separation Anxiety Disorder: is an anxiety experienced by people who are faced with being away from their home or home, or the people to whom they are attached.

Selective mutism: one of the characteristics is that when the sufferer is faced with the situation of interacting socially they are not able to initiate dialogue or do not respond reciprocally when trying to talk to others. It is common for them to talk at home in the presence of their immediate family, but not outside this context.

Specific phobia: one of the essential characteristics of this disorder is a fear or anxiety of specific objects or situations.

Social anxiety disorder (social phobia): characterised by an intense or marked fear or anxiety of social situations or experiences, where the individual feels that they may be analysed by others.

Panic disorder: these are unexpected and recurrent panic attacks, with a panic attack being understood as a sudden sensation of intense fear or discomfort that occurs within minutes.

Agoraphobia: this is essentially characterised by an intense or marked fear or anxiety in the face of actual or anticipated exposure to a series of situations.

Generalised anxiety disorder is characterised by excessive anxiety and worry about a series of events or activities, the symptoms experienced are often disproportionate in intensity, duration and frequency to the actual impact of the anticipated event.

Substance/medication-induced anxiety disorder: prominent symptoms of panic or anxiety occur due to the effects of certain substances (drugs, medications, toxins, etc.).

Anxiety disorder due to another medical condition: occurs due to some organic conditions, endocrine diseases, cardiovascular disorders, respiratory diseases, among others, are an example.

Other specified anxiety disorder: refers to cases in which the characteristic symptoms of anxiety predominate and cause clinical distress or impairment in different areas of the individual's life, but do not meet the criteria of any of the above-mentioned disorders. It is used on occasions where the clinician communicates why the representation does not meet these criteria.

Other anxiety disorder not otherwise specified: refers to cases in which symptoms characteristic of anxiety predominate and cause clinical distress or impairment in different areas of the individual's life, but do not meet the criteria for any of the above-mentioned disorders. It is used on occasions where the clinician chooses not to communicate why the representation does not meet those criteria (American Psychiatric Association [APA], 2014).

## Depression

According to WHO (2001) depression is a mood disorder characterised primarily by the loss of an individual's ability to maintain interest and enjoyment (WHO, 2001).

Depression is also often accompanied by changes in sleep, appetite and psychomotor function, as well as a decline in cognitive functions such as attention, concentration and decision making; in addition to this, loss of self-confidence, feelings of worthlessness and guilt, hopelessness and recurrent thoughts of death with suicidal ideation, planning and/or acts or ideation (Beltrán et al., 2012).

According to the National Institute of Mental Health (NIH) in 2015, depression is not age-specific, i.e. it can occur at any age, but often begins in adolescence or early adulthood, i.e. approximately between 20 and 35 years of age (National Institute of Mental Health [NIH], 2015).

The APA (2014), through the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), releases the classification of depressive disorders, which are described below.

Disruptive state dysregulation disorder: the main feature of this disorder is chronic, severe and persistent irritability, with two relevant clinical manifestations, the first being frequent outbursts of anger and the second being a persistently irritable or chronically angry mood.

Major depressive disorder (includes major depressive episode): generally presenting symptoms are insomnia and fatigue, however, other depressive symptoms should be considered. The main feature is a period of time of at least two weeks where depressed mood or loss of interest in almost all activities of daily life is experienced. Persistent depressive disorder (dysthymia): the main feature is a depressed mood that occurs most of the day, most of the days and is experienced for at least two years (in children and adolescents at least one year). Premenstrual dysphoric disorder: the main features are the expression of affective lability, dysphoria and anxiety symptoms that usually recur during the premenstrual phase of the cycle and carry over to the onset of menstruation or shortly thereafter.



These symptoms may be accompanied by behavioural and physical symptoms.

Substance / medication - induced depressive disorder: the features of this disorder include the symptoms of major depressive disorder, however, these are associated with the use, injection or inhalation of a substance (e.g. drugs, psychotropic medication, etc.).

Depressive disorder due to another medical condition: the essential feature is a depressed mood or a significant decrease in interest in all or almost all activities over a significant and persistent period of time. This must be predominant in the clinical picture and thought to be related to physiological effects of another medical condition.

Other specified depressive disorder: symptoms characteristic of a depressive disorder that usually cause clinically representative distress, or impairment in social, occupational or other areas, but do not meet the criteria for any of the depressive disorders mentioned above, may predominate. In this case, the clinician chooses to report the specific reason why the criteria for a depressive disorder are not met.

Other unspecified depressive disorder: symptoms characteristic of a depressive disorder that typically cause clinically representative distress, or impairment in social, occupational or other areas, but do not meet the criteria for any of the depressive disorders already mentioned, may predominate. In this case, the clinician chooses not to report the specific reason for not meeting the criteria for a depressive disorder (APA, 2014).

### Beck Depression Inventory (Beck Depression Inventory; BDI-I)

The Beck Depression Inventory (BDI) was developed in the 1960s, with the aim of reflecting clinical consent on the symptoms that were then considered defining for depression (APA, 1980).

In Mexico, the BDI has been translated and its popularity has grown significantly in clinical practice, as well as in its use by psychologists or psychiatrists for research. Currently, it is one of the most widely used instruments to measure the severity of depressive symptoms (Jurado et al., 1998).

It is made up of 21 items, where in each item the respondent must choose from 4 the sentence with which he/she best identifies according to the last week and the day of answering the questionnaire. Each item is scored from 0 to 3 points according to the alternative chosen. The resulting total score ranges from 0 to 63 points. The cut-off scores proposed by Beck et al. (1988) to discriminate between different degrees of depression are presented in the following table (table 1).

#### Box 1

**Table 1**

Levels of depression and their cut-off scores for the interpretation of the results of the Beck Inventory

Total scores	Level of depression
0-9	Normal
10-18	Leve
19-29	Moderada
30-63	Grave

Source: Beck et al. 1988

A study by Jurado et al. (1998) concluded that the Mexican version of the BDI meets the psychometric requirements for use as an instrument to assess depression, and its statistical figures demonstrate content, criterion and construct validity (Jurado et al., 1998).

### State-Trait Anxiety Inventory (STAI)

Consists of 40 items. Each subscale consists of a total of 20 items in a Likert-type response system with four response options taking into account intensity (0=almost never/not at all; 1=somewhat/sometimes; 2=quite often; 3=a lot/almost always).

For the response to the items corresponding to the anxiety-state subscale, the participant is instructed to read the sentences and then choose the answers with a score from 0 to 3 that best indicate "how he/she feels in the now, at this moment". For the response to the items of the anxiety-trait subscale, the participant is instructed to read the sentences and then choose the answers with a score from 0 to 3 that best indicates "how he/she feels in general, most of the time". In the two subscales, anxiety-state and anxiety-trait, one percentage is inverted, assessing well-being or absence of anxiety, while the rest of the items assess the presence of anxiety.



The resulting total score for each of the scales ranges from 0 to 60 points. The total score is obtained by summing the items, taking into account the inversion of the items that are positively worded (Spielberg et al., 1982).

The scores for the interpretation by categories for the university population, both for men and women, can be seen in the table below (table 2).

## Box 2

**Table 2**

STAI scores by category for university students (male and female)

University students	Males		Women	
	A/E	A/R	A/E	A/R
High	27-60	26-40	29-60	31-60
Medium	10-26	12-25	11-28	14-30
Low	0-9	0-11	0-10	0-13

Source: Spielberg et al., 1982

The questionnaire shows good internal consistency in the Spanish adaptation, with scores between 0.9 and 0.93 for state-anxiety and between 0.84 and 0.87 for trait-anxiety (Spielberger et al., 1982).

## Research methodology

For the analysis of the present research, a quantitative methodology was used, of an exploratory type, with a non-experimental design, descriptive in scope and cross-sectional, with a descriptive statistical analysis. A non-probabilistic convenience sample was used, selected with 90% reliability. For the statistical analysis of the results of the quantitative variables of the sample studied, measures of central tendency (mean, mode, median) and dispersion (standard deviation) were used. For the qualitative variables (sex, marital status and occupation), frequencies and proportions were used (Hernández Sampieri et al., 2014).

## Participants

The study universe was 541 male and female students in the third semesters of the Bachelor's Degree in Medicine at the Faculty of Medicine and Nutrition (FAMEN) of the Universidad Juárez del Estado de Durango (UJED), Durango Campus, enrolled in semesters A2019, B2020, A2020 and B2021, of which 110 students (men and women), located in a range of 18 to 34 years of age, agreed to participate.

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## Instruments

Three instruments were used for this study:

- 1) Clinical interview: instrument applied individually through which the personal and sociodemographic data of the participants (sex, age, marital status, occupation, among others) were obtained.
- 2) Beck Depression Inventory (BDI): the adapted version of the BDI-I for the Mexican population by Jurado et al. (1998) was used. This inventory evaluates the presence of symptoms of depression such as: sadness, crying, loss of pleasure, feelings of failure and guilt, thoughts or desires of suicide, pessimism, among others. The instrument is easy to administer and takes approximately 10 to 15 minutes (Jurado et al., 1998).
- 3) State-Trait Anxiety Inventory (STAI): we used the State-Trait Anxiety Inventory questionnaire created by Spielberger et al. It is a self-report instrument whose purpose is to assess two concepts of anxiety: anxiety as a state (transient emotional condition), whose time reference is "right now, at this moment"; and anxiety as a trait (relatively stable anxious propensity), whose time reference is "in general, most of the time" (Spielberger et al., 1982).

## Procedure

In the first instance, the idea of carrying out this research was presented to the directors of the Faculty of Medicine and Nutrition (FAMEN) of the Universidad Juárez del Estado de Durango (UJED), located in the city of Victoria de Durango, with the aim of obtaining their consent for the application of the evaluation instruments to students who agreed to participate in the study.

In coordination with the academic heads, the type of students to whom the study would be directed was determined, with those enrolled in the third semesters (A2019, B2020, A2020 and B2021) of the medical degree course being the ones chosen.

A total of 541 students were invited to participate, 110 of whom agreed to take part. The appropriate time and place for the surveys were determined. The times of maximum student attendance were taken into account in accordance with the school's own dynamics. When the population agreed to participate voluntarily in the research, the objective of the study was explained to them, guaranteeing the confidentiality of their personal data. Interested students were given the informed consent form to return signed by them.

Afterwards, the assessment instruments (clinical interview, BDI and STAI) were distributed respectively to the participants, who were given clear and precise instructions for their self-application. The development period of the present project started in August 2019 and ended in February 2021.

It is worth mentioning that in the process of applying the evaluation instruments, the students were accompanied in person by the researchers until February 2020, and subsequently, due to the SARS-CoV-2 virus pandemic, it was not possible to continue with the in-person accompaniment due to the health contingency, so from March 2020 it was decided to send the evaluation materials via email to the participants who remained pending, all of this with their respective instructions and through virtual accompaniment when required.

### Inclusion criteria

- 1) To be a student in the third semesters A2019, B2020, A2020 and B2021 of the FAMEN-UJED, Durango Campus, with current enrolment.
- 2) Individuals of both sexes.
- 3) To have signed the letter of informed consent.

### Elimination criteria

- 1) Students who handed in their evaluation incomplete.
- 2) Students who gave apocryphal information.

## Results

The sample consisted of a total of 110 students, belonging to the third semester of the medical degree course at FAMEN-UJED, Durango Campus, enrolled during semesters A2019, B2020, A2020 and B2021; of which 76 (69.09%) were female and 34 (30.90%) were male, whose frequencies and age proportions can be seen in the following table (table 3).

### Box 3

**Table 3**

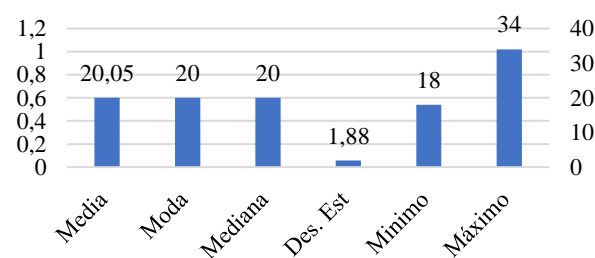
Frequencies and proportions according to sex and age of the sample studied.

Variables	Levels	Quantity in number	Quantity in percent
Sex	Female	76	69.09%
	Male	34	30.90%
Age	18	4	3.63%
	19	41	37.27%
	20	44	40.0%
	21	11	10.0%
	22	4	3.63%
	23	2	1.81%
	24	1	0.90%
	26	2	1.81%
	34	1	0.90%

Source: own elaboration

The analysis of the age of the participants using measures of central tendency and dispersion showed a minimum of 18 and a maximum of 34 years of age, a mean of 20.05, a median of 20, a mode of 20 and a standard deviation of 1.88 (graph 1).

### Box 4



**Graph 1**

Measures of central tendency and dispersion of participants' ages

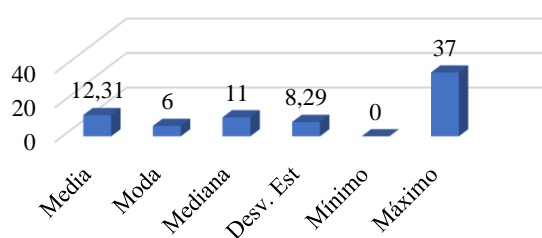
Source: own elaboration

On the other hand, the results regarding the frequencies and proportions according to the marital status of the sample studied showed that 109 participants (99.09%) are single, and only 1 (0.09) is married.

Similarly, the results regarding occupation showed that 107 participants (97.27%) only study, while only 3 (2.72%) study and work.

According to the results obtained from the total assessment score of the 110 students through the BDI-I, an analysis of measures of central tendency and dispersion was carried out, from which a mean of 12.31 was obtained, the median was 11, the mode was 6, and the standard deviation was 8.29, as well as a minimum of 0 and a maximum of 37 (graph 2).

### Box 5



### Graph 2

Measures of central tendency and dispersion of the total score obtained through the BDI Source: own elaboration

From the results obtained taking into account the cut-off scores for the interpretation of the results proposed in the BDI-I, we obtained that 45 students (40.90%) are not depressed, while 35 students (31.81%) are reported to be mildly depressed, 25 students (22.75%) are moderately depressed and 5 students (4.54%) are severely depressed (table 5).

### Box 6

#### Table 5

Results taking into account proposed cut-off scores in the BDI

Ranking	Number of pupils	Percentage of pupils
Normal	45	40.90%
Leve	35	31.81%
Moderate	25	22.72%
Severe	5	4.54%

Source: own elaboration

On the other hand, taking into account the cut-off scores for the interpretation of the results proposed in the STAI, with respect to anxiety as a state, it was obtained that 48 (43.63%) students have a high level of anxiety, 53 (48.18%) students have a medium level and 9 (8.18%) students have a low level of anxiety (table 6).

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### Box 7

#### Table 6

Results of the anxiety-state subscale taking into account the cut-off scores proposed in the STAI

Anxiety-state		
Ranking	Number of pupils	Percentage of pupils
High	48	43.63%
Medium	53	38.18%
Under	9	8.18%

Source: own elaboration

Regarding the level of anxiety as a trait, and according to the cut-off scores proposed in the STAI, 50 (45.45%) students are at a high level, 49 (44.54%) students are at a medium level and 11 (10.0%) students have a low level of anxiety (table 7).

### Box 8

#### Table 7

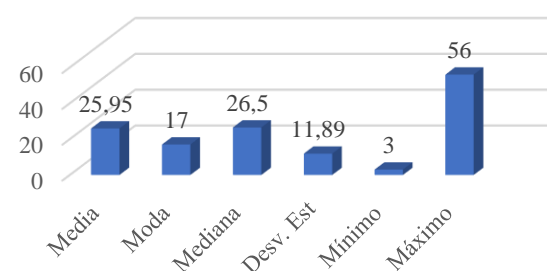
Results of the anxiety-trait subscale taking into account the cut-off scores proposed in the STAI

Trait anxiety		
Ranking	Number of pupils	Percentage of pupils
High	50	45.45%
Medium	49	44.54%
Under	11	10.0%

Source: own elaboration

According to the results obtained from the total score of the evaluation of the 110 students by means of the STAI, an analysis of measures of central tendency and dispersion was carried out, where anxiety as a state presented a mean of 25.95, the mode of 17, the median of 26.5 and the standard deviation of 11.89, as well as the minimum score was 3 and the maximum score was 56 (graph 3).

### Box 9



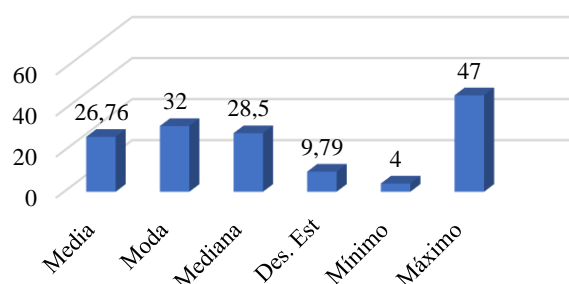
### Graph 3

Measures of central tendency and dispersion of the total score obtained by means of the STAI, in the anxiety-state scale

Source: own elaboration

For its part, anxiety as a trait in the total score resulted in a mean of 26.76, the mode was 32, the median was 28.5 and the standard deviation was 9.79, in addition, the minimum score was 4 and the maximum score was 47 (Figure 4).

### Box 10



### Graph 4

Measures of central tendency and dispersion of the total score obtained by means of the STAI, in the anxiety-trait subscale

Source: own elaboration

### Conclusion

After the statistical analysis of the data collected through the evaluations to determine the level of depression in medical students at FAMEN-UJED, Durango Campus, it can be concluded that more than half of the students evaluated in this study (65 students) corresponding to 59.07% of the sample have this condition, while 40.90% of the sample (45 students) did not report any level of depression.

These results are similar to those obtained in the study conducted in 2011 in university students in the area of Health Sciences at a public university in Colombia, where it was found that more than half of the sample studied (52%) suffer from some degree of depression (Ferrel Ortega et al., 2011).

In addition, the results obtained in the present research showed figures above those obtained in the study conducted on students of the Bachelor of Medicine of the Benemérita Universidad Autónoma de Puebla (FMBUAP) by Martínez-Martínez et al. in 2016, where the results showed that 31.72% could have a major depressive syndrome (Martínez-Martínez et al., 2016).

On the other hand, the results obtained regarding anxiety as a state and anxiety as a trait, are similar to those obtained in a study conducted by Arzate Salgado in 2020 to medical students at the Autonomous University of the State of Mexico, where he reports that these students presented an incidence percentage of 40.2% as a state and 44.3% as a trait (Arzate Salgado, 2020), similar to those obtained in the present research work.

Regarding the international comparison, in a study conducted with medical students at the Pontificia Universidad Católica de Ecuador, Sede Ambato (PUCESA), the results differ, since in this research conducted by Yañez Yañez in the year 2023 the participants showed moderate and severe levels in the anxiety-trait and anxiety-state dimensions in 86.2% and 77.4% respectively; these figures are higher than those obtained in the evaluation of medical students at FAMEN-UJED.

Similarly, according to the results concerning the number of students with some level of anxiety, it is noticeable that a large percentage of participants have high levels of anxiety, both state and trait, the latter being where the largest number of medical students are found.

These results differ from a study conducted by Reyes Carmona et al. (2017) on students from the Faculty of Medicine of the National Autonomous University of Mexico, as their results showed that anxiety as a trait was present in a lower percentage (Reyes Carmona et al., 2017).

It is worth mentioning that after an exhaustive search of the literature indicating studies on depression and anxiety in medical students in the third semester of their degree, no studies were found that investigated this specific type of population.

However, the results obtained in this study have been compared with those obtained in research conducted on medical students in general, regardless of the semester studied, which shows the need to conduct studies on these problems in the first semesters of the medical career.



## Article

For all of the above reasons, it is important that both medical school authorities and governmental institutions support university students in the area of mental health, especially those studying medicine, since due to the demands of their careers, they are the ones who require the implementation of measures that cover the prevention, detection and management of these problems, ensuring them early, constant and specialised attention.

### Declarations

### Conflict of interest

We declare that we have no conflict of interest

### Author's contribution

The contributions of each researcher to this research were as follows:

*Salas-González, Cecilia:* contributed with the idea of the project, as well as in the application of the evaluation instruments, data collection and background. She also supported the writing of the article.

*Ríos-Valles, José Alejandro:* contributed to the application of the instruments, as well as to the analysis of the data, definition of the methodology and systematisation of the results.

*Pérez-González, Ivonne:* contributed to data analysis, systematisation of results, as well as to the writing of the article.

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We would also like to thank the students who voluntarily and kindly participated in the evaluations.

### Abbreviations

APA	American Psychological Association
BAI	Beck Anxiety Inventory
DSM	Diagnostic and Statistical Manual of Mental Disorders
FAMEN	Facultad de Medicina y Nutrición
FMBUAP	Facultad de Medicina de la Benemérita Universidad Autónoma de Puebla
HAS	Hamilton Anxiety Scale
ISMED	Instituto de Salud Mental del Estado de Durango
ITESM	Instituto Tecnológico y de Estudios Superiores de Monterrey
NIH	National Institutes of Health
OMS	World Health Organisation
OPS:	Pan American Health Organization
PHQ-9	Patient Health Questionnaire-9
PUCESA	Pontificia Universidad Católica del Ecuador, Sede Ambato
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SSA	Ministry of Health
STAI	State-Trait Anxiety Inventory
UJED	Universidad Juárez del Estado de Durango

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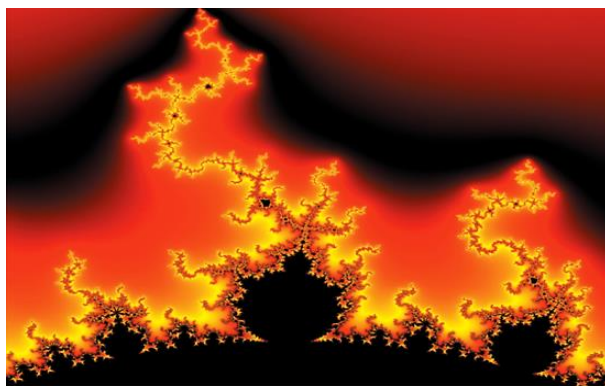
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