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RINOE Journal-Health Education and Welfare

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Support the international scientific community in its written production Science, Technology and Innovation in the Field of Social Sciences, in Subdisciplines of Health: Analysis of health care markets, Health production: Nutrition, Mortality, Morbidity, Substance Abuse and Addiction, Disability, and Economic behavior, Government policy, Regulation, Public health; Education: Analysis of education, Educational finance, Government policy; Welfare and Poverty: General welfare, Basic Needs, Quality of life, Measurement and analysis of poverty, Government programs, Provision and effects of Welfare programs.

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Presentation of the content

In the first article we present, *Prevalence of injuries in the first round of the Tuzos de plata tournament in the Mexican blind soccer league in the 2020 season*, by BADILLO-FUENTES, Gustavo & MALAGÓN-OVIEDO Carina, with affiliation in the Fisioclinic, as next article we present, *STEAM conceptions, competencies and attitudes in higher education: a pilot study*, by SANDOVAL-PALOMARES, Jessica, with affiliation in Universidad Tecnológica de León, as next article we present, *School-family duality: emotional intelligence and academic performance*, by SÁNCHEZ-RIVERA, Lilia, MUÑOZ-LÓPEZ, Temístocles, RAMOS-JAUBERT, Rocío Isabel and NAJERA-CARRIZALES, Hannia Abigail, with affiliation in Universidad Autónoma de Coahuila, as next article we present, *Burnout and satisfaction in high-performance judo athletes*, by PONCE-CARBAJAL, Nancy, RAMÍREZ-NAVA, Rubén, JAENES-SÁNCHEZ, José Carlos and TRISTÁN-RODRÍGUEZ, José Leandro, with adscription in the Universidad Autónoma de Nuevo León and Universidad Nacional Autónoma de México.

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Prevalence of injuries in the first round of the Tuzos de plata tournament in the Mexican blind soccer league in the 2020 season

Prevalencia de lesiones en la primera vuelta del torneo de Tuzos de plata en la liga mexicana fútbol ciegos de la temporada 2020

BADILLO-FUENTES, Gustavo†* & MALAGÓN-OVIEDO Carina

Fisioclinic.

ID 1st Author: *Gustavo, Badillo-Fuentes* / ORC ID: 0000-0001-5321-9848, Researcher ID Thomson: V-7201-2018, arXiv Author ID: GUSTAVOBADILLO, PubMed Autor ID: gustavobadillo.

ID 1st Co-author: *Carina, Malagón-Oviedo* / ORC ID: 0000-0003-4115-8149, arXiv Author ID: CarinaMalagon

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Abstract

Objectives: identify the prevalence of injuries in blind football, as well as the most common pathologies in this sport variant. Methodology: The present study Longitudinal. In conclusion: The most common pathology according to the end of the days corresponding to the first round was skull trauma, due to constant head or fence collisions

Trauma, Sprain, Contusion

Resumen

Objetivos: Identificar la prevalencia de lesiones en el futbol ciego, asi como las patologías más comunes en esta variante deportiva. Metodología: El presente estudio es Longitudinal de tipo. En conclusión: La patología más común de acuerdo al termino de las jornadas correspondientes a la primera vuelta fue traumatismo de cráneo, debido a los choques constantes de cabeza o con la valla

Traumatismo, Esguince, Contusión

Citation: BADILLO-FUENTES, Gustavo & MALAGÓN-OVIEDO Carina. Prevalence of injuries in the first round of the Tuzos de plata tournament in the Mexican blind soccer league in the 2020 season. Journal-Health Education and Welfare. 2022. 6-11:1-5.

† Researcher contributing as first author.

Introduction

An observational study was carried out in the first round of the professional blind football tournament, specifically with the Tuzos de Plata football team, where the main pathologies that occur in the blind football modality were detected, as well as the importance of the specific or adjuvant work that should be done with this type of player for internal prevention of injuries.

But in reality, can all pathologies in this modality be prevented? There will not be some in which they are carried out in an extrinsic way and it does not depend on the player or the physiotherapist, so that even with preventive coadjuvant work, they will be present.

Within this modality of football some pathologies characteristic of this sport will be presented so it is of great importance to identify the pathologies that are presented during this type of sport events, because unlike the conventional football this type of injuries in 99% are presented in an official match due to the trainings that are carried out with less exigency or risk.

Background

The modality of the practice of this type of adapted football emerged several years ago with the aim of including people with different abilities in the sporting environment and independently of the circumstances in which these sportsmen and women find themselves with the practice of sport, they have managed to break their greatest fears, They have managed to break their biggest fears, aims and goals knowing their capacities and needs, so that nowadays at world level, since 1996, 5-a-side football is considered a Paralympic sport, but it is not until 2010 when it arrived in Mexico and until 2021 thanks to the Mexican League of Blind Football and the Mexican Federation of Sports for the Blind and Visually Impaired developed the first official league of 5-a-side football in Mexico of professional character.



Figure 1 Tuzos de plata team
Source: Own elaboration

This type of competition is an adaptation of the most popular sport in the world "football" but in this branch 5 players are involved in the field including the goalkeeper, of which 4 blind or visually impaired players covered with a special blindfold to prevent those who have any visual impairment from benefiting and a normovisual goalkeeper using a sound ball.

There are some different rules such as mentioning the word "VOY", one of the most indispensable and very important, when a player does not have the ball in possession they must emit it, this will warn the opponent that they are approaching the ball; unlike conventional football in most of its versions it is forbidden to say words like "MINE", "I HAVE IT" or "VOY"; But in this sport it is essential to say it for a matter of prevention and communication, accidents are avoided and the players are in contact with the ball to identify the distance they are at, this key is very important especially to prevent head injuries or collisions in the knee.

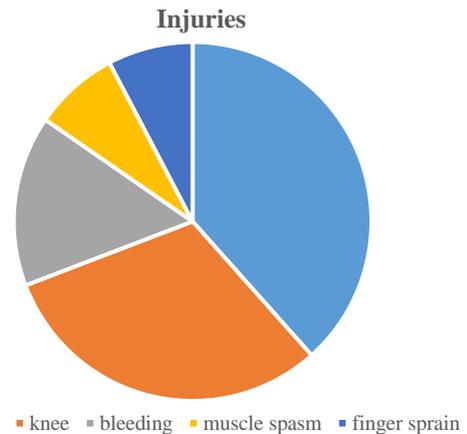
The role of physiotherapists is key in the prevention of injuries to the team, as they are exposed to different traumas due to their visual impairment. Obtaining statistical data and physiotherapeutic work will allow us to monitor injuries, determine their frequency and ensure a speedy recovery of the injured footballer.

In a match where the public must remain silent because the ear and the voice are essential, it is important that the work of the physiotherapist is nourished in the training sessions where the athlete manages to improve skills such as orientation, coordination, balance as the main characteristics of the player, This is done with specific tests and exercises but modified to blind football, such as the Unterberger test which evaluates dynamic balance, the sebt test or Y test which gives us important information about stability, as well as some auditory exercises with the ball, remembering that it emits a sound with bells which are found inside the ball.

For this, a previous evaluation was carried out with the neurofunctional tests for the 9 football players registered in the squad, but making some modifications for blind football, obtaining results below a score of 4 out of 10, after the work carried out, scores above 6 were obtained, but not above 8.

That is why it is important that the modified exercises to improve the aforementioned skills are worked on during the week and can be reflected in the matches. A neurofunctional assessment before the tournament as is normally carried out on the players will allow us to know the condition of each athlete and work with them on the skills where there is a deficit as part of their individual adjuvant training, apart from the group adjuvant work that is carried out.

During these 4 days that lasts the first leg tournament is competed once a month, in this period there were a total of 13 injuries of 9 registered players, all on the field during the official match, 100% of injuries present, 38.46% correspond to trauma to the head or face, 30.76% knee contusions, 15.38% slight bleeding, 7.69% muscle spasm and 7.69% finger sprain, showing that the main injury during the practice of the sport is head trauma, as the players when trying to defend and in the absence of communication with the word "go" received strong impacts to the head unconsciously between the two.



Graphic 1 Prevalence in percentage of injuries in the tournament

Source: Own elaboration

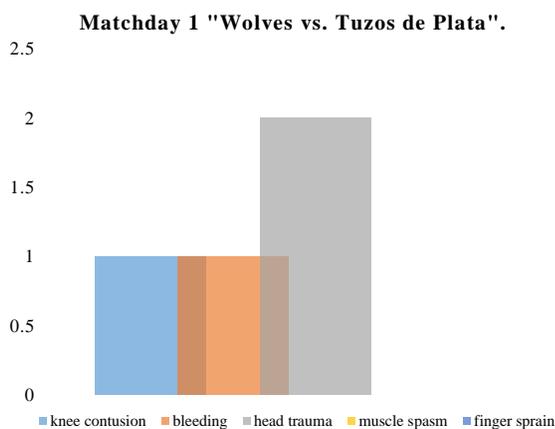
After presenting the knee contusion as the second highest incidence, the role of the physiotherapist is important, as on many occasions the knee injury is one of those that most affects the life of the athlete in an intrinsic or extrinsic way, so some were caused by the same reason as the trauma to the skull, but others were due to inappropriate turns of the player or stepping on an opponent.

Bleeding, which on both occasions was slight, was caused by a knee contusion on day 1 and on day 2 there was a nose and mouth haemorrhage due to an impact between opponents.

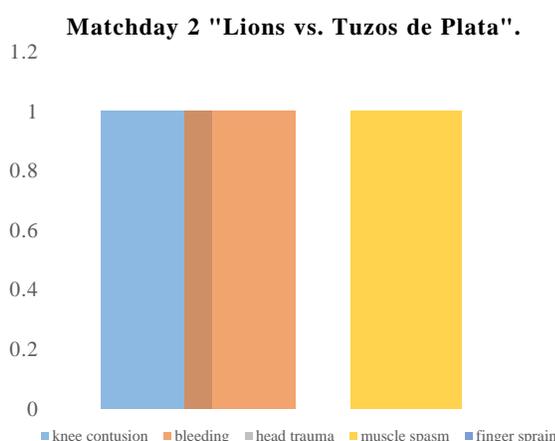
There will be some pathologies that can be prevented, but others it will be impossible to prevent injuries no matter how much preventive work is done because several injuries occur extrinsically where the weather, the opponent, or the field of play are involved.

Results

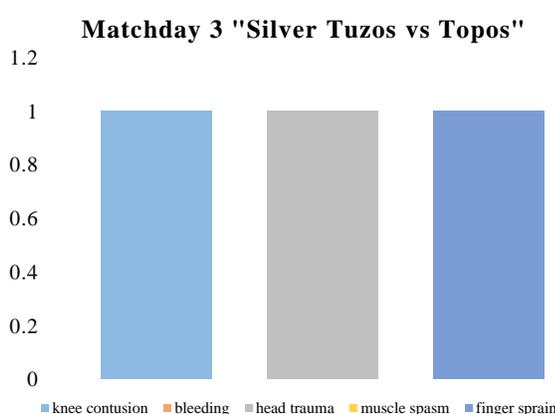
At the end of the first round of competition it was identified that head injuries were the most frequent injury that occurred during this period, followed by knee contusions, muscle spasms, cranial contusions and bleeding. Below are the graphs of injuries per month that were detected during the 4 months of the first round of the tournament.



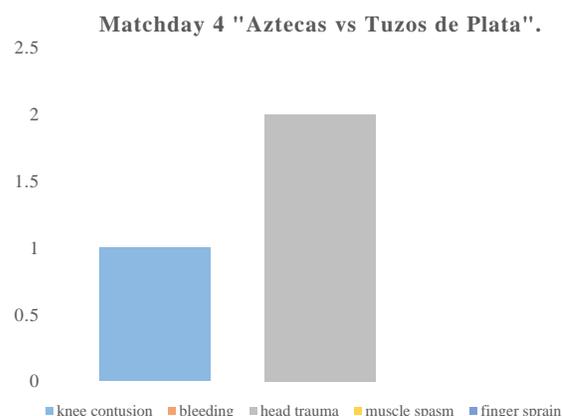
Graphic 2 Prevalence of injuries day 1
Source: Own elaboration



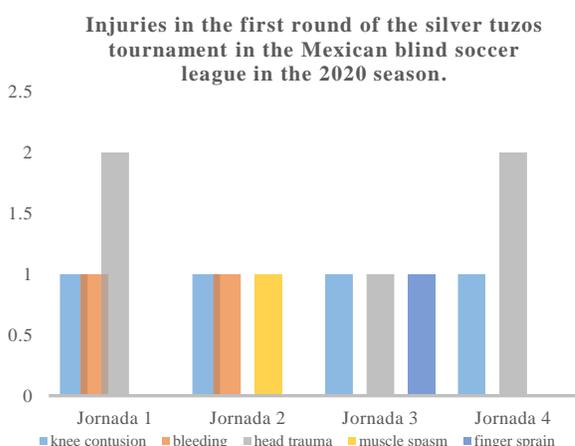
Graphic 3 Prevalence of injuries day 2
Source: Own elaboration



Graphic 4 Prevalence of injuries on day 3
Source: Own elaboration



Graphic 5 Prevalence of injuries on day 4
Source: Own elaboration



Graphic 6 Types of injuries in the first round of matches
Source: Own elaboration

Conclusion

Some injuries can be prevented in this type of sport if we work with a focus on orientation, balance, coordination and proprioception, but it is worth mentioning that involuntary collisions of structures such as knees and head that were the most prone in this first stage of competition is difficult to prevent, since there depends a lot on the communication that the players have within the field of play to warn that a player is approaching this is always with the word "go" which is allowed in this form of football.

The greatest demand of a physiotherapist who accompanies a professional group of football players in this modality is the previous design of a plan to prevent injuries as well as to invest the least time in their recovery, thus ensuring a better performance during the matches, being the physiotherapists a key piece in the recovery of football players.

Recommendations

It is extremely important to carry out this type of work during a complete tournament or with more teams in order to define which injury is the most prone during a complete season and to be able to obtain more concrete data on this type of sport.

References

Cuenca. M, Práctica deportiva escolar con niños ciegos y de baja visión. Universidad de Deusto Bilbao. 2000

International Blind Sport Federation. (2017-2021) Reglas de Juego de Futsal.

Parlebas, P. Juegos, deportes y sociedad: Léxico de praxiología motriz. Barcelona: Paidotribo. (2001)

Cayuela Maldonado, M. José. (1997). “Los efectos sociales del deporte: ocio, integración, socialización, violencia y educación”. Abril 2013. Disponible en: http://www.recercat.cat/bitstream/handle/2072/5400/WP060_spa.pdf?sequence=1

Amezcuapa, 2 abril 2013, “Santos, ejemplo de comunicación externa” 15 mayo 2013. Disponible en: http://consulta.mx/web/images/mexicoopinapdf/NA_futbol_aficion.pdf

Federación Internacional de Fútbol Asociado (FIFA). (2018). Directrices y programas de desarrollo del fútbol femenino de la FIFA. Recuperado de <http://resources.fifa.com/mm/document/footballdevelopment/women/02/43/90/64/wfguidelineinhaltesweb spanish.pdf>

Pérez-Parra, J. E., García-Solano, K. B., & Montealegre-Mesa, L. M. (2017). Efectos del programa de entrenamiento Los 11 FIFA ® sobre la fuerza resistencia, la flexibilidad y el equilibrio en mujeres futbolistas de 14 a 18 años. *Fisioterapia*, 39(5), 202–208. doi:10.1016/j.ft.2017.03.001

Pánics G1, Tállay A, Pavlik A, Berkes I. (2008) Effect of proprioception training on knee joint position sense in female team handball players. *Br J Sports Med Epub. Jun;42(6):472-6.* doi: 10.1136/bjism.

Adalid J. (2014). Propuesta de incorporación de tareas preventivas basadas en métodos propioceptivos en fútbol. Nuevas tendencias de educación física, deporte y recreación. Num 26. Murcia, España. pp. 163-167.

García K, Hernández S, Larraña A. (2016). Propuesta de rehabilitación funcional para el tratamiento de esguince de tobillo e inestabilidad lateral en atletas de alto rendimiento. *Medigraphic*, Volumen 12 numero 1, enero – marzo.

G. Cerulli, MD, D. L. Benoit, MS, A. Caraffa, MD, E. Ponteggia, (2001). Proprioceptive training and prevention of anterior cruciate ligament injuries in soccer. *J Orthop Sports Phys Ther.*

Vargas V, Paul J, Nakamura K. Trabajo (2009). Propioceptivo para la prevención de lesiones deportivas en futbolistas, Club Blooming Sta Cruz.

STEAM conceptions, competencies and attitudes in higher education: a pilot study**Concepciones, competencias y actitudes STEAM en la educación superior: un estudio piloto**

SANDOVAL-PALOMARES, Jessica†*

*Universidad Tecnológica de León, Centro Universitario CIFE, Mexico.*ID 1^{er} Autor: *Jessica, Sandoval-Palomares* / **ORC ID:** 0000-0002-3294-0916, **Researcher ID Thomson:** S-9841-2018, **CVU CONACYT ID:** 827848**DOI:** 10.35429/JHEW.2022.11.6.6.20

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Abstract

The rapid development of the STEAM disciplines (science, technology, engineering, art and mathematics) has allowed education based on this approach to be considered as a key and essential component for 21st century education, where students are required to have a range of science and technology skills, skills and knowledge, in addition to providing them with a range of tools to cope with the various situations that arise, many of them complex and challenging; the objective of this paper is to show the preliminary results of a pilot study that was carried out to validate two instruments that were designed in order to evaluate the competences and attitudes in STEAM education of students and university teachers. To meet this objective, four stages were implemented that included the following moments: Phase 1. Estimation of the distribution of data, Phase 2. Pilot study, Phase 3. Estimation of reliability and internal consistency. Phase 4. Preliminary results. The main results show favorable indicators in understanding, relevance and satisfaction of the items and an adequate internal consistency around the values of reliability and validity.

STEAM education, knowledge Socioformation and knowledge society, interdisciplinary approach, pilot study

Resumen

El desarrollo vertiginoso de las disciplinas STEAM (ciencia, tecnología, ingeniería, arte y matemáticas) ha permitido que la educación basada en este enfoque sea considerada como un componente clave y esencial para la educación del XXI, donde se le exige al estudiantado una serie de habilidades, destrezas y conocimientos de ciencia y tecnología, además de otorgarles una serie de herramientas para hacer frente a las diversas situaciones que se le presentan, muchas de ellas, complejas y desafiantes; el objetivo del presente trabajo es la de mostrar los resultados preliminares de un estudio piloto que se realizó para validar dos instrumentos que se diseñaron con el fin de evaluar las competencias y actitudes en la educación STEAM de estudiantes y docentes universitarios. Para cumplir con este objetivo se implementaron cuatro etapas que comprendieron los siguientes momentos: Fase 1. Estimación de la distribución de los datos, Fase 2. Estudio piloto, Fase 3. Estimación de la confiabilidad y la consistencia interna. Fase 4. Resultados preliminares. Los resultados obtenidos muestran indicadores favorables en comprensión, pertinencia y satisfacción de los ítems, así como una adecuada consistencia interna en torno a los valores de confiabilidad y validez.

Educación STEAM, Socioformación y sociedad del conocimiento, enfoque interdisciplinario, estudio piloto

Citation: SANDOVAL-PALOMARES, Jessica. STEAM conceptions, competencies and attitudes in higher education: a pilot study. Journal-Health Education and Welfare. 2022. 6-11:6-20.

* Author Correspondence (E-mail: jspalomares@utleon.edu.mx)

† Researcher contributing as first author.

Introduction

The concept of university education in the 21st century has evolved from the conceptualisation of the information society to the knowledge society, where students are expected to be competent problem solvers with a collaborative, systemic and ethical approach (Salazar-Gómez and Tobón, (2018). This is why there is a need to redefine and innovate teaching and learning models that allow students to develop the skills and abilities associated with creativity, communication, problem solving, and technical-scientific knowledge and competences to deal with the various complex and challenging situations of today's world (Toh, Causo et al. 2016).

According to Santillán, et al. (2019), education with STEM (Science, Technology, Engineering, and Mathematics) methodology is a proposal that allows us to respond to these new requirements of the knowledge society.

The term STEAM was introduced in 1990 by the National Science Foundation (2020) to describe the set of disciplines that will have the purpose of forming new skills and abilities in young people in the United States, with the aim of responding to the needs that were envisaged from the technological revolution and industry 4.0 (Jiménez-León, Et al., 2021); from this, changes were made in educational policies that in the short term were adopted by other countries such as the United Kingdom, Taiwan, Japan, China and Korea, who developed educational methods and systems that give importance to science and technology.

Mexico also adopted the STEM approach, emphasising the linkage that should exist between business and higher education institutions, which has led to significant progress in the development and practical application of real and innovative projects (Peña and Bermúdez, 2016; Jung, 2019).

After more than 30 years of the formulation of the term STEM, and the educational evolution in the teaching of science and technology that this entails, the STEM approach becomes relevant and is transformed to incorporate the arts, modifying its acronym to STEAM (Science, Technology, Engineering, Arts and Mathematics), with the aim of considering aspects such as creativity, ethics, aesthetics and innovation in academic work (Cilleruelo & Zubiaga, 2014). STEAM allows higher education institutions to formulate an educational ecosystem, allowing equal access to young people, regardless of their background, race, ethnicity, gender, religion or income (UNESCO, 2017).

By implementing the STEAM methodology at the university, students develop scientific and technological knowledge and skills through a series of academic practices framed in the context of the real world, promoting problem solving in a creative, collaborative and innovative way, in order to provide students with the necessary tools and a solid professional training, which promotes the social and economic progress of society (Levinson & Parrise Consortium, 2014; European Commission, 2014; Couso, 2017).

An educational proposal is considered a STEAM methodology when classrooms become a learning community, and the process for acquiring knowledge is student-centred, considering that it is the student who constructs it, with a focus on solving problems of daily life, with collaborative and interdisciplinary components, and its objects of study or phenomena are in the domain of the disciplines of the hard sciences (Pelajero, 2018).

The implementation of pedagogical practices and strategies to achieve STEAM objectives in the university classroom should be based on active didactics such as those presented below: Problem-Based Learning (PBLm), Cooperative Learning (CL), Project-Based Learning (PBLt) and Challenge-Based Learning (CBL). In general, the purpose of the four strategies previously mentioned, will allow students trained in STEAM to acquire scientific-technological knowledge; communication skills, creativity, useful search and treatment of information; attitudes such as commitment and responsibility; social competences reflected in project work, evaluation of processes, problem solving, implementing solutions, personal motivation, teamwork, interpersonal relationships, social relations, collaborative work, among others (Usache, 2019; Jiménez-León, et al, 2019); thus achieving the purpose that characterises STEAM: to connect students' learning with their reality and with the world of work, to generate practical learning and with a clear relationship between what they learn and what is expected of them in the future (Vo et al., 2017; Casado & Checa-Romero, 2020)

The four active strategies for the implementation of STEAM projects are described below, all of which are based on having a stimulus, be it a project, problem or challenge, with the aim of producing a specific response: outcome, resolution or solution:

Problem-Based Learning (PBL) is a student-centred method, it is based on the application of acquired knowledge and the development of skills, abilities and competences, teachers are facilitators in the learning process and students actively participate in the search for the solution (Diego-Mantecon, et al., 2021). Cooperative Learning (CL) is a strategy that is used with small groups of 5 or 6 students with the aim of maximising their own and their peers' learning, favours the development of social competence and inclusion (Thibaut et al., 2018). With the CA methodology, the working team is aware that the cooperation and participation of each of the members is required to achieve the common goal, therefore, the achievement obtained belongs to all.

Project Based Learning (PBL) is a strategy that gives importance to the students' ability to organise the work and activities for the development of the project, students start from a set of tasks and actions assigned among themselves in order to solve a real life problem; it focuses on the application of the knowledge acquired in the classroom. In Challenge-Based Learning (RBL), a practical solution to a problem is sought using technology for this purpose, its purpose is to produce a real impact on the community, it focuses on the acquisition of new knowledge that arises from the need to solve the challenge and on the development of skills and Soft Skills competences (Diego-Mantecon, et al., 2021).

An important element according to Gisbert, González & Esteve (2016), is the figure of university teachers in STEAM education, who have a key and leading role, so it is necessary to provide clear and explicit pedagogical guidelines, which in turn allows them to implement pedagogical practices in the classroom that promote scientific and technological education, with a character of innovation, using information technologies and the diversification of collaborative learning environments (Dijk, et al., 2020; Lioum & Daly, 2020). For Jho, Hong & Song (2016), designing classrooms with a STEAM approach leads to teacher open-mindedness and self-innovation.

Teachers must bear in mind that their goal is to train a generation of interested, skilled students with a set of skills and knowledge that will enable them to solve complex problems collaboratively, with an integrative approach, using technology, making use of critical, logical-mathematical and analytical thinking, with motivation, initiative, innovation, creativity, originality and mental flexibility, using assertive communication, leadership, ethics, social influence and stress tolerance, emphasising active participation in their future profession and society (Kurup, Li, Powell, & Brown, 2019; Pantoja Et al. , 2020).

A relevant aspect within STEAM learning that is important to keep in mind is the promotion of gender equity in this knowledge ecosystem (UNESCO, 2017), in which the participation of girls, adolescents and young people from different educational levels in the different existing areas of science is encouraged, providing an important boost in scientific vocations (Fernández, Schaaper and Bello, 2016; Ortiz-Revilla et al., 2020); to achieve this, a joint effort by teachers, institutions and families is required to eliminate the prejudices associated with the study of hard areas, which are traditionally considered as complex areas mainly intended for the male gender (Penuel, Clark, and Bevan, (2016); another relevant point is the issue of motivation from childhood to the university stage, for which it is necessary to highlight the skills that girls and young women have and encourage the development of curiosity in science (Simarro, C., Couso, D. 2021).

To achieve gender equity in STEAM, Rahm (2016) mentions five principles to keep in mind when designing learning activities, namely: (1) Leveraging values and practices to articulate shared learning goals; (2) Engaging stakeholders in co-design; (3) Making connections between settings; (4) Naming young people as contributors; and (5) Intentional learning from intermediaries in different settings.

Due to the importance of STEAM in education, a pilot test of two instruments was carried out in order to investigate the conceptions, competences and attitudes around the STEAM educational approach at university level, in teachers and students, the purposes of the study were: 1) to analyse the degree of understanding, wording, relevance and general satisfaction of the participants with respect to the instructions, items and descriptors of the instruments; 2) to estimate the reliability and internal consistency of the constructs and 3) to determine the level of development of STEAM conceptions, competences and attitudes.

Methodology

Type of study

This research was conducted with a quantitative, predominantly instrumental approach, whose methodological basis consists of administering the instruments to a small sample of cases to test their relevance and effectiveness (including the understanding of the instructions), as well as the conditions of the application and the procedures involved. Based on this test, the reliability and initial validity of the instrument is calculated (Soriano, 2014; Ventura-León & Caycho-Rodríguez, 2017).

Participants

In total, 253 university students answered the Scale for University Students on STEAM Education in Mexico (ESTEAM-34), of which 51% were female and 48.6% male, with an average age between 15 and 26 years old (97.2%), coming mostly from public universities in the country (95.7%) and enrolled in different semesters (from first to twelfth). Furthermore, as can be seen in Table 1, at least 44.7% of the participants have received recognition for their academic performance, 88.5% stated that they had not failed any subject in the previous semester, and only 10.8% confirmed that they had dropped out of the course once or twice at some point.

Variable	Category	Frequency	Percentage
Sex	Male	123	48.60%
	Woman	129	51%
	I prefer not to say	1	0.40%
Age range	15-20	108	42.70%
	21-26	138	54.50%
	27-32	4	1.60%
	33-38	2	0.80%
	43-48	0	0%
	More of 48	1	0.40%
Type of university	Public	242	95.70%
	Private	11	4.30%
Semester/	First	65	25.70%
semester term you are currently studying	Second	2	0.80%
	Third	4	1.60%
	Fourth	49	19.40%
	Fifth	3	1.20%
	Sixth	3	1.20%
	Seventh	45	17.80%
	Eighth	2	0.80%
	Ninth	1	0.40%
	Tenth	60	23.70%
	Eleventh	10	4.00%
	Twelfth	9	3.60%
	Number of times he/she has been recognised for academic performance	None	107
One		40	15.80%
Two		33	13%
Three		28	11.10%
Four		6	2.40%
Five		6	2.4%
More than five		33	13%
Number of	None	224	88.50%

subjects failed in the last semester	One	9	3.60%
	Two	11	4.30%
	Three	2	0.80%
	Four	3	1.20%
	Five	0	0%
	More than five	4	1.60%
Number of times he/she has withdrawn from the race	None	227	89%
	One	24	9.50%
	Two	2	0.80%

Table 1 Sociodemographic and academic characteristics of the students who participated in the study

On the other hand, we had the collaboration of 21 university teachers who responded to the scale for teachers on STEAM education in Mexico (DSTEAM-36). Of these, 61.9% were men and 38.1% were women, aged between 36 and 57 years (76.1%). These teachers claimed to have an average of 15 (\pm 10) years of teaching experience, 81% had a postgraduate degree in some area and 61.9% worked in public universities. They also described that they participated as speakers in scientific events more than once (61.8%), 51.6% published at least one scientific article and 23.8% published between 1 and 5 books.

Variable	Category	Frequency	Percentage
Sex	Woman	8	38.10%
	Men	13	61.90%
Age range	18-23	1	4.80%
	24-29	4	19.00%
	30-35	0	0%
	36-41	7	33.30%
	42-47	2	9.50%
	48-50	4	19%
Last degree obtained	51-57	3	14.30%
	Bachelor's degree	4	19%
	Master's degree	11	52.40%
Type of university where you work	Doctorate	6	28.60%
	Public	13	61.90%
Number of scientific articles published so far	Private	8	38.10%
	None	10	47.6
Number of times he/she has participated as a speaker at scientific events	01-may	4	19%
	06-nov	5	23%
	dic-17	1	4.80%
	18-23	0	0%
	24-30	1	4.80%
Number of books published so far	None	8	38.10%
	01-may	7	33.30%
	06-nov	4	19%
	dic-17	2	9.50%
	None	16	76.20%
	01-may	5	23.80%

Table 2 Socio-demographic and professional characteristics of the teachers who participated in the study

Procedure

After having validated the content of the two questionnaires, a pilot test was carried out with a group of 21 students and 21 teachers, who participated by answering a questionnaire of satisfaction with the instruments.

Through this procedure, the degree of satisfaction of the respondents was sought, the reliability of the instrument was evaluated and some preliminary results were reported. The collection of information was carried out through a form elaborated in the Google forms tool and the invitation was sent to the participants by e-mail.

Instruments

The scale for students on STEAM education in Mexico (ESTEAM-33) consists of a Likert-type scale, which has criterion validity by a group of judges, who evaluated in a satisfactory way the comprehension, wording and relevance to the totality of the proposed items (Aiken's $V > 0.80$). After considering some recommendations and making adjustments based on the judges' opinions, the final scale consisted of 33 questions, with five response options ranging from very low (1.0) to very high (5.0), other options are nominal and some have open answers. The instrument was provisionally distributed into five dimensions, which can be seen in table 3, and allows us to inquire about some STEAM conceptions, competences and attitudes in higher education students.

Dimensions	Items	V de Aiken	
		Relevance	Writing and comprehension
I. Pedagogical conceptions about the STEAM educational approach	1. Level of knowledge of the STEAM educational approach.	0.939	0.909
	2. Level at which teachers design their classes using the STEAM approach.	1	1
	3. Degree of importance of STEAM education at any educational level.	0.848	0.758
	4. Importance of STEAM education for professional and personal futures.	0.818	0.727
	5. Importance of applying STEAM knowledge and skills in everyday life.	0.939	0.788
	6. Sufficiency of time devoted to STEAM subjects in the school timetable.	0.848	0.727
	7. Importance of time allocated by the university for STEAM education.	0.939	0.818
	8. Sufficiency of the resources and spaces in the institution to work in STEAM areas.	0.909	0.848
	9. Resources and spaces that are still lacking to work on STEAM in your university (open response).	0.879	0.909
	10. Quality of STEAM teaching at the university.	0.939	0.879
	11. Quality of STEAM teaching in Mexico.	0.97	0.909

II. Self-efficacy, cognitive concept and STEAM competences	12. Understanding of concepts, purposes and challenges of STEAM education.	0.909	0.909
	13. Level of theoretical knowledge and STEAM competences.	0.818	0.788
	14. Level at which he/she seeks to learn about STEAM education.	0.758	0.697
	15. Level of teacher training in STEAM teaching strategies and techniques.	0.848	0.818
	16. Teachers' strengths in STEAM teaching (nominal).	0.909	0.848
	17. Ability to solve scientific problems through technology.	0.879	0.848
	18. Ability to solve problems with engineering.	0.97	0.879
	19. Ability to make use of logical-mathematical thinking.	0.939	0.909
	20. Ability to integrate technology, engineering and logical-mathematical thinking.	0.97	0.939
III. Affective attitudes towards STEM learning	21. Willingness to participate in classes with a STEAM approach.	1	1
	22. Motivation to practise acquired knowledge.	0.939	0.939
	23. Level of enjoyment when taking STEAM subjects.	1	0.97
	24. Level of motivation in the face of achievements.	0.879	0.879
IV. Need for STEAM education	24. The training received will allow him/her to work in STEAM areas in the future.	0.939	0.879
	25. Level of current training in STEAM areas.	0.879	0.848
	26. Level at which you would like to receive more STEAM training.	0.939	0.939
	27. Aspects in which you would like to receive more STEAM training (nominal).	0.97	0.879
	28. Most developed generic competence under this approach (nominal).	0.818	0.818
V. Conceptions of STEAM competences	29. Ability to identify challenges and propose solutions.	0.879	0.848
	30. Ability to solve problems creatively.	0.848	0.788
	31. Ability to identify the components and processes of the projects in which he/she participates.	0.909	0.788
	32. Ability to work collaboratively.	0.939	0.879
	33. Ability to identify problems, generate questions and issue hypotheses.	1	0.879

Table 3 ESTEAM-33 instrument

The scale for teachers on STEAM education in Mexico (DSTEAM-36) is a Likert-type scale with five response options, where some are ordinal and measure the variables by levels ranging from very low to very high, others list nominal options and some open questions are also included. The content of both the questions and the descriptors has been validated through the Aiken V and the instrument is made up of 36 items distributed in 5 dimensions (Table 4).

Dimensions	Ítems	V de Aiken		
		Relevance	Writing and comprehension	
I. Pedagogical conceptions of STEAM education	1. Level of knowledge of the STEAM educational approach.	0.956	0.889	
	2. Level at which you design your lessons with a STEAM approach.	0.933	0.956	
	3. Importance of STEAM education at any level of education.	0.889	1	
	4. Importance of STEAM subjects for students' professional and personal futures.	0.933	0.889	
	5. Importance of applying STEAM knowledge and skills in everyday life.	0.889	0.867	
	6. Sufficiency of time devoted to STEAM subjects.	0.911	0.8	
	7. Level at which they teach STEAM subjects in an innovative, creative and motivating way.	0.956	0.933	
	8. Main strategy used in STEAM teaching (open question).	0.911	0.933	
	9. Adequacy of resources and spaces for STEAM teaching.	0.911	0.911	
	10. Resources and spaces that are still missing for STEAM teaching at your university (Open question).	0.889	0.911	
	11. Quality of STEAM teaching at university.	0.978	0.911	
	12. Quality of STEAM education in Mexico.	1	0.956	
II. Self-efficacy, cognitive concept and competences in STEAM education.	13. Understanding of concepts, purposes and challenges of STEAM education.	0.956	0.978	
	14. Level of theoretical knowledge and competences for STEAM teaching.	0.933	0.889	
	15. Level at which he/she seeks further training in STEAM education.	0.978	0.933	
	16. Strengths of their teaching with the STEAM approach (nominal).	0.8	0.844	
	17. Ability to solve scientific problems using technology.	0.933	0.911	
	18. Ability to integrate engineering into teaching and learning activities.	0.822	0.822	
	19. Ability to use logical-mathematical thinking in problem solving.	0.844	0.911	
	20. Ability to integrate technology, engineering and logical-mathematical thinking in scientific problem solving.	0.978	0.911	
	III. Affective attitudes towards STEM education.	21. Willingness to teach using the STEAM approach.	0.978	0.978
		22. Motivation to put STEAM teaching into practice.	1	0.978
		23. Level of enjoyment for teaching with STEAM methodology.	0.844	0.822
		24. Level of	0.978	0.978

	motivation in the face of student achievement.		
IV. Professional development in STEAM.	25. The training received so far allows you to work with STEAM subjects.	0.978	0.956
	26. Level of education that you consider you still need to work with STEAM subjects.	0.889	0.933
	27. Level at which you would like to receive further training in STEAM.	0.978	0.978
	28. Aspects that you would like to improve in STEM education training (nominal).	1	0.956
	29. Level at which you would like to be part of the country's STEAM leadership team.	0.933	0.956
V. Conceptions of competences and attitudes in STEAM education .	30. Generic competence most developed in students under this approach (nominal).	0.933	0.8
	31. Ability of students to identify challenges and propose solutions.	1	0.956
	32. Ability to identify problems, generate questions and issue hypotheses by students who are trained through the STEAM approach.	0.956	0.844
	33. Students' ability to manage their own knowledge.	0.889	0.933
	34. Students' ability to work collaboratively.	0.978	0.978
	35. Motivation level of students to work with STEAM approach.	0.978	0.978
	36. Level of students' interest in developing STEAM competences.	0.978	0.978

Table 4 Dimensions and questions that make up the DSTEAM-36 instrument

Questionnaire of Sociodemographic and Professional Factors

This instrument was constructed for the present study and comprises a series of questions that inquire about the following aspects: age range, sex, last academic degree obtained, type of university where they work, number of scientific articles published so far, number of times they have participated as speakers in scientific events, number of books they have published so far, etc.

Data analysis

The statistical analyses of the present study were carried out in IBM SPSS v.26 and JASP v.0.12.2.0, based on the following phases:

Phase 1. Estimation of the distribution of the data. A Kolmogorov-Smirnov test with Lilliefors correction (K-S-L) was performed on the data obtained from the students' responses ($n > 50$), and the Shapiro Wilk test for the teachers' responses ($n < 50$). In the case of both tests, p -values > 0.05 indicate that the data have a normal distribution, while lower values show non-normality (Campo-Arias & Oviedo, 2008).

Phase 2. Pilot study. The degree of comprehension, wording, relevance and general satisfaction with the instructions, items and descriptors of the scales to the instruments was determined. For this purpose, responses were randomly taken from 21 participants for each instrument and percentages were calculated for each of the variables mentioned. In this study, the highest percentages are expected to be between medium, high and very high, indicating that the proposed construct is clear, adequately worded and the items are relevant to the study. Additionally, the average time needed to answer both questionnaires was estimated.

Phase 3. Estimation of reliability and internal consistency. Reliability is understood as the property of a test that has an important impact on the accuracy of the results obtained. Among the most widely used methods for estimating reliability is 1) Cronbach's Alpha, which is recommended for continuous variables, unidimensional constructs and with at least five response alternatives and, 2) the McDonald's Omega coefficient ideal for binary or ordinal variables with five or fewer response options (Ventura-León & Chaycho-Rodríguez, 2017). For both coefficients, values greater than 0.80 are expected, which indicates a good level of reliability of the scale (Campo-Arias & Oviedo, 2008; Cronbach, 1951).

Phase 4. Preliminary results. During this phase, we sought to determine whether a population mean is statistically different from a known or hypothetical value (Cressie, 1980; Box 2018; Mandeville, 2013). For each variable, the value assessed was 3.0, as it represents the theoretically accepted mean (or minimum expected value) in this study, and statistically significant differences were confirmed when p -values < 0.05 were obtained (Altman, 1991).

Since the values obtained from the student instrument (ESTEAM-33) had a normal distribution, a one-sample t-test was performed. Whereas the data obtained from the construct for teachers (DSTEAM-36) did not present a normal distribution, hence, they do not satisfy the conditions necessary to perform a parametric test, and that is why a Wilcoxon test was performed (Wilcox 2003). It should be noted that in this analysis only ordinal variables measured on the same scale were evaluated and nominal or other variables were excluded.

Variable	Category	Percentage of students	Percentage of teachers
Degree of understanding of instructions	Very low	4.76%	-
	Low	4.76%	4.76%
	Medium	38.10%	23.81%
	High	28.58%	28.58%
Degree of comprehension and wording of all questions in the instrument	Very high	23.80%	42.85%
	Low level of understanding	-	-
	Acceptable level of understanding	61.90%	47.62%
	High level of understanding	38.10%	52.38%
Degree of relevance of all questions in the instrument	Not relevant	-	-
	Low level	4.76%	14.28%
	Acceptable	42.85%	38.10%
	High level	52.39%	47.62%
Overall satisfaction with the instrument	Very low	-	-
	Low	-	4.76%
	Medium	23.80%	23.81%
	High	33.34%	28.58%
	Very high	42.85%	42.85%

Table 5 Percentages of students' (n=21) and teachers' (n=21) understanding, wording and relevance of the instructions and the proposed items.

Source: Own elaboration

Results

Understanding, relevance and satisfaction with the instruments

From the questionnaire on satisfaction with the instruments, favourable results were found in terms of comprehension, relevance and satisfaction (Table 5). Here, the degree of understanding of the instructions showed higher scores at the medium and high level according to the point of view of the students (90.48%) and teachers (95.24%). Also, 100% of the participants indicated that the understanding and wording of all the questions in the instrument was good and, the proposed questions were relevant according to 96.24% of the students and 85.72% of the teachers.

Furthermore, 76.19% of the students and 71.43% of the teachers indicated high and very high levels of satisfaction with each of the proposed instruments and, finally, it was estimated that, on average, students required at least 10.67 (SD \pm 6) minutes to answer the questionnaire and teachers 10.29 (SD \pm 6) minutes.

Reliability and internal consistency

Using the same sample, the reliability of the two questionnaires was estimated and optimal values for internal consistency were found, as they showed reliability values for both Cronbach's Alpha and McDonald's Omega above 0.80.

Instrument	Cronbach's alpha	McDonald's Omega
Students	0.851	0.896
Teachers	0.896	0.933

Table 6 Reliability

Source: Own elaboration

STEAM conceptions, competences and attitudes

Preliminary results obtained from the single-sample t-test indicated firstly that, although students have some mastery of the STEAM educational approach, the topic still needs further work to reach the minimum expected level ($p > 0.05$). Students indicated that their teachers tend to plan their classes under this approach at a higher level than expected ($M=3.38$, $p < 0.05$), and reported that the time dedicated in the school timetable ($M= 3.25$), the resources available ($M= 3.56$) and the quality of STEAM teaching at the university ($M= 3.57$) have satisfactory levels above 3.0. Likewise, high levels (scores ≥ 4.0) were evident in terms of the importance of: STEAM training at any educational level, STEAM training for professional and personal futures, and the time allocated at the curricular level to the subjects involved.

In terms of self-efficacy, cognitive concept and STEAM competences, students stated that they understand the general concepts, purposes and challenges of STEAM education ($M=3.41$), consider that they have been prepared with STEAM knowledge, competences and skills ($M=3.42$) and seek to learn about STEAM at a higher level than theoretically accepted ($M=3.29$).

They also reported confidence in: solving scientific problems using technology (M= 3.53), solving problems using engineering (M= 3.26), using mathematical logical thinking to represent data or solve scientific problems (M= 3.60) and integrating the use of technology, engineering design and mathematical thinking in problem solving (M=3.55).

Regarding affective attitudes, they expressed a high level of willingness to participate in classes that implement STEAM methodology (M=4.26), to put acquired knowledge into practice (M= 4.11) and a high degree of enjoyment towards STEAM-based classes (M= 4.22). Similarly, they indicated that the training they have received so far will allow them to work in STEAM areas in the future (M= 3.74) and to develop professionally in the subject (M= 3.69), although they would like to continue strengthening their training in this global trend (M= 4.17).

Similarly, students consider that those trained under this approach are able to: identify challenges and propose solutions (M= 3.93), use creativity to solve problems (M= 3.81), recognise the components and processes of the projects they carry out (M= 3.93), work collaboratively (M= 4.01) and identify problems, generate questions and issue hypotheses (M= 4.04) at high levels. Finally, Cohen's d indicates that large (d= 0.80), medium (d= 0.50) and small (d= 0.20) effect sizes were found in these observations, thus providing an estimate of the extent of these findings.

Table 7 Differences of students' STEAM skills and attitudes with respect to the minimum accepted value (3.0) and their effect size (n= 253)

Note: Student's t-test determines the existence of statistically significant differences with $p < 0.05$

Regarding the teachers' responses, they stated that they know the approach (M=3.52) and design their classes based on STEAM education strategies (M= 3.52) at a higher level than expected. They also stated that STEAM education is important at any educational level (M= 4.57), has an important impact on students' professional and personal lives (M= 4.85), and is highly applicable in everyday life (M= 4.81). They also mentioned that the time devoted to STEAM subjects (M=3.28; $p= 0.271$) and its innovative and motivating teaching (M= 3.33; $p= 0.183$) are acceptable in the university

context. Whereas, the adequacy of resources and spaces and the quality of STEAM teaching at university and national level are below the minimum accepted level.

In relation to the cognitive concept, self-efficacy and STEAM competences, it was found that teachers have a good understanding of the concepts, purposes and challenges of STEAM education (3.85), they consider that they have the theoretical knowledge and competences necessary for teaching STEAM (3.61) and that they receive acceptable training in the subject (M=3.33; $p= 0.183$). Despite this, they claim to have a good ability to solve scientific problems using technology, to include engineering in teaching and learning activities, to integrate technology, engineering and mathematical logical thinking in problem solving and to make use of mathematical logical thinking.

Similarly, teachers' affective attitudes towards STEAM teaching showed very positive scores, as they indicated high levels of willingness (M= 4.47), motivation (M= 4.28) and enjoyment (M= 4.61) towards STEAM teaching and reported being highly motivated by their students' achievements (M= 4.66). At the same time, they indicated that the training received so far allows them to work in STEAM areas at a level above acceptable (M= 3.52), that they would like to receive more training in the subject (M= 4.52) and that they would like to be part of the STEAM leaders in the country (M= 4.52).

Finally, they consider that students who are trained in STEAM have a good ability to identify challenges and propose solutions (M= 3.85), identify problems, generate questions and issue hypotheses (M= 3.76), manage their own knowledge (M= 3.76) and work collaboratively (M= 4.2). In addition, teachers perceive that the level of motivation (M= 3.95) and interest (M= 4.23) of students is higher when working under this approach.

Ítems	Media	DE	t	p	Cohen's d
1	2.941	1.062	-0.888	0.375	0.056
2	3.387	0.96	6.421	< .001	0.404
3	4.282	0.83	24.509	< .001	1.544
4	4.423	0.75	30.178	< .001	1.897
6	3.253	1.019	3.948	< .001	0.248
7	4.209	0.84	22.897	< .001	1.44
8	3.565	0.918	9.798	< .001	0.616
10	3.577	0.908	10.109	< .001	0.636
11	3.055	0.941	0.935	0.351	0.059
12	3.415	0.844	7.823	< .001	0.492
13	3.237	0.854	4.417	< .001	0.278
14	3.292	0.905	5.141	< .001	0.323
15	3.565	0.984	9.133	< .001	0.574
17	3.534	0.857	9.907	< .001	0.623
18	3.261	0.961	4.317	< .001	0.271
19	3.601	0.892	10.709	< .001	0.673
20	3.557	0.892	9.94	< .001	0.625
21	4.269	0.877	23.017	< .001	1.447
22	4.111	0.884	19.986	< .001	1.256
23	4.221	0.816	23.821	< .001	1.498
24	3.747	0.89	13.344	< .001	0.839
25	3.696	0.876	12.625	< .001	0.794
26	4.178	0.838	22.355	< .001	1.405
29	3.937	0.784	18.999	< .001	1.194
30	3.818	0.811	16.052	< .001	1.009
31	3.933	0.806	18.4	< .001	1.157
32	4.016	0.84	19.228	< .001	1.209
33	4.047	0.849	19.635	< .001	1.234

Table 8 Differences of teachers' STEAM competences and attitudes with respect to the minimum accepted value (3.0) and their effect sizes.

Note: Wilcoxon signed-rank test determines the existence of statistically significant differences at $p < 0.05$

Discussion

There has been little progress in the development of valid and reliable instruments to probe conceptions, self-efficacy and need for STEAM training so far. The scales that have been presented (Çevik & Sıtkı, 2019; Korkmaz et al., 2020), generally focus on inquiring about STEAM knowledge, students' attitudes towards STEAM and basic skills that can be acquired through STEM training and are targeted only at students.

Thus, the constructs proposed in this paper arise from the need to strengthen STEAM education in Mexico (Rojas and Segura, 2019; UNESCO, 2019). Studies related to this purpose have focused on investigating the reasons why students choose STEM careers (Oliveros-Ruiz, 2019); designing didactic strategies to incorporate STEAM models in the education system (Castellanos, 2020; Escobar and Ramírez, 2021; Fuentes et al., 2019; Juvera and Hernández, 2021) and critically analysing the implementation of STEAM education in the Mexican national territory (Diehl et al., 2020).

However, so far, no research has been conducted on the ideas, notions and mental elaborations of educational actors about the approach; neither has the self-efficacy of teachers and students regarding STEAM core competences been addressed, nor has the affective attitudes of the participants towards this approach, particularly in higher education, been questioned.

Thus, a pilot study was conducted to test methodological, logistical and feasibility aspects in order to carry out a larger scale and more complex investigation using the ESTEM-33 and DESTEM-36 instruments. In this way, the adequacy of the methods and processes was evaluated, in order to have greater knowledge or certainty about the functioning of the research and thus reduce possible biases and errors in obtaining the data (Abeille et al., 2015; Díaz-Muñoz, 2020). Casas et al., (2003) state that this phase makes it possible to determine whether the questions have been correctly understood by all subjects, whether they have produced fatigue or rejection, whether the duration has been excessive or any other deficiency; and that these deficiencies will be reflected in the data obtained. Based on this, the results presented here suggest that both instruments are understandable, relevant and generate high satisfaction among participants. Similarly, Cronbach's Alpha and McDonald's Omega coefficients indicated that each instrument consistently measures a sample of the population and represent valid constructs (Campo-Arias & Oviedo, 2008; Cronbach, 1951; Domínguez-Lara & Merino-Soto, 2015; Muñiz, 2010).

Preliminary results show that, in general, students have positive conceptions of STEAM education at their university. According to them, the lesson plans, the time devoted, the resources available and the quality of STEAM education have satisfactory scores. They also indicated that receiving STEAM education is important at any level of education and has an important effect on professional and personal futures. In this respect, authors such as Arabit and Prendes (2020) reported similar results, where, students shared positive views regarding the STEAM education received in the country.

The teachers' perspective on this point is different in some respects, as they point out that resources and spaces are not sufficient for effective STEAM teaching. This same need has been reported by other authors (Adams et al., 2022; Catterall, 2017; Malecha, 2020), who state that the lack of materials means that STEAM education is not as immersed in institutions as we would like it to be. Furthermore, from the teachers' point of view, the quality of STEAM education is below the acceptable level, which coincides with the view of other teachers regarding the quality of STEAM education in Mexico.

Now, speaking in terms of self-efficacy, both teachers and students stated that, thanks to the training received so far, they have a good ability to solve problems through engineering, make use of logical mathematical thinking to represent data or solve scientific problems by integrating the use of technology, engineering design and mathematical thinking. This belief of both actors in their own ability is critical to the success of educational activities, leading to better teaching and learning outcomes (Ahmad & Safaria, 2013). In other studies, self-efficacy has been found to be positively related to teachers' effective teaching, as those who see themselves as well-prepared are more likely to set higher goals, believe in innovative teaching and undertake challenging professional development (Bautista 2011; Nadelson et al. 2013); while self-efficacy has been described as an essential predictor of students' overall academic performance (Ferla, Valcke, & Cai, 2009). Therefore, it is essential that STEAM content is presented in an engaging way, through techniques that inspire students and regardless of the difficulty, they believe that they are capable of performing the activities and can achieve the desired results.

On the other hand, the results presented here suggest that teachers are willing to change and would like to receive more continuous training in STEAM. This is a demand that has already been reported in other works and there has been a call for universities in Mexico to incorporate specialised and high quality professional development programmes in the subject (Aziz & González, 2017; Romero-Ariza et al., 2021). But why does this need for professional development arise in both teachers and future professionals?

According to Chen et al. (2020), developing knowledge and understanding of STEAM enhances their positive pedagogical beliefs towards the approach and promotes the need for professional development. Affective attitudes have also been shown to play a role, as the more positive they are, the more motivated people are to act and learn about STEAM, increasing the need for education and training. This is consistent with the high levels of willingness, motivation and enjoyment found in this study in relation to STEAM-based training processes.

Finally, regarding the limitations of our study, it should be noted that participation in the survey was voluntary, with the risk of under-representing or over-representing a certain group of people and therefore the results cannot be interpreted in a general way for all teachers or students in higher education in Mexico. It is also necessary to highlight that, in this study, some of the participants' conceptions and self-assessments of their STEAM knowledge, skills and attitudes were investigated, so it is possible that the data obtained only reflect the perceptions of individuals and may not be representative of reality. On the other hand, it is worth mentioning that these results are presented in a preliminary way, as it is expected to work with a larger and more heterogeneous sample, in order to carry out more complex statistical analyses. Finally, we stress the need to continue assessing the validity and reliability of the proposed instruments, as so far neither construct validity, criterion validity nor test-retest reliability of the scales have been evaluated.

Conclusions

The scales on STEAM Education in Mexico for university students and for teachers, whose acronyms are respectively ESTEAM-33 and DSTEAM-36, were designed with the purpose of having information about the perception of students and university teachers about the conception, competences and attitudes of the term STEAM, which will allow the teacher to design strategies and methods to achieve a significant learning of the student, allowing him to reach a more complete and realistic vision of the professional world, he will have an approach to the different problems that he will face in the workplace.

The selection of active, integrative and collaborative strategies presented in the study (Problem-Based Learning (PBL), Cooperative Learning (CL), Project-Based Learning (PBL) and Challenge-Based Learning (CBL)) will facilitate the teaching of academic content and the development of students' scientific and technological thinking, as they are pedagogical methods that allow students to consolidate their learning in the classroom; the choice of which method or strategy to use will depend on the educational context, the institution, the subject or objective of the syllabus and what is to be achieved, and it should always be kept in mind that they should be focused on a clear and achievable objective.

References

- Abeille, E., Amelia, A., Muñoz, V., Sánchez, R., Carrera, S., Pérez, E., & Landeros-Olvera, E. (2015). Características de la prueba piloto: revisión de artículos publicados en enfermería. *Revista de Enfermería Neurológica*, 14(3), 169–175. <https://doi.org/10.37976/ENFERMERIA.V14I3.212>
- Adams, E. C., Oduor, P., Wahome, A., & Tondapu, G. (2022). Reflections on two years teaching earth science at the women in science (Wisci) steam camp. *Journal of Women and Minorities in Science and Engineering*, 28(1), 23–40. <https://doi.org/10.1615/jwomenminorscieng.2021033536>
- Ahmad, A., & Safaria, T. (2013). Effects of Self-Efficacy on Students' Academic Performance. *Journal of Educational, Health and Community Psychology*, 2(1). DOI: <http://dx.doi.org/10.12928/jehcp.v2i1.3740>
- Altman DG. *Practical statistics for medical research*. London: Chapman & Hall; 1991.
- Arabit-García J. & Prendes-Espinosa, M^a. P. (2020). Metodologías y Tecnologías para enseñar STEM en Educación Primaria: análisis de necesidades. *Pixel-Bit. Revista de Medios y Educación*, 57. <https://doi.org/10.12795/pixelbit.2020.i57.04>
- Aziz, C., & González, E. (2017). Preparando a Chile para la sociedad del conocimiento. <https://www.ecosisteam.cl/wp-content/uploads/2019/10/Coalicion-educacion-STEAM.pdf>
- Bautista, N. U. (2011). Investigating the use of vicarious and mastery experiences in influencing early childhood education majors' self-efficacy beliefs. *Journal of Science Teacher Education*, 22(4), 333–349. <https://www.jstor.org/stable/43156605>
- Box, G. Hunter, S. Hunter, W. (2018). *Estadística para investigadores. Diseño, innovación y descubrimiento*. Reverte; Edición 2.
- Campo-Arias, A., & Oviedo, H. C. (2008). Propiedades Psicométricas de una Escala: la Consistencia Interna Psychometric properties of a scale: internal consistency. *Revista de salud pública*, 10(5), 831–839. <https://www.redalyc.org/pdf/422/42210515.pdf>
- Casado, R. & Checa-Romero, M. (2020). Robótica y Proyectos STEAM: Desarrollo de la creatividad en las aulas de Educación Primaria Pixel-Bit. *Revista de Medios y Educación*. 58, 51-69. <https://doi.org/10.12795/pixelbit.73672>
- Castellanos, P. (2020). Modelo de aplicación de herramientas STEAM en la educación básica de México [Universidad Autónoma de Baja California]. <https://repositorioinstitucional.uabc.mx/bitstream/20.500.12930/2418/1/MXL122514.pdf>
- Çevik, M., & Sıtkı, M. (2019). Turkish Validation of STEAM Scale and Examination of Relations Turkish Validation of STEAM Scale and Examination of Relations Between Art Attitudes, STEM Awareness and STEAM Attitudes Between Art Attitudes, STEM Awareness and STEAM Attitudes among Pre-Service Teachers among Pre-Service Teachers Rıdvan ATA. *i.e.: inquiry in education*, 11(2). <https://digitalcommons.nl.edu/cgi/viewcontent.cgi?article=1208&context=ie>
- Chen, Y. L., Huang, L. F., & Wu, P. C. (2020). Preservice Preschool Teachers' Self-efficacy in and Need for STEM Education Professional Development: STEM Pedagogical Belief as a Mediator. *Early Childhood Education Journal* 2020 49:2, 49(2), 137–147. <https://doi.org/10.1007/S10643-020-01055-3>
- SANDOVAL-PALOMARES, Jessica. STEAM conceptions, competencies and attitudes in higher education: a pilot study. *Journal-Health Education and Welfare*. 2022

- Cilleruelo, L., & Zubiaga, A. (2014). Una aproximación a la educación STEAM. Prácticas educativas en la encrucijada arte, ciencia y tecnología. *Actas Jornadas de Psicodidáctica*.
- Couso, D. (2017). Per a què estem a STEM? Un intent de definir l'alfabetització STEM per a tothom i amb valors. *Ciències*, 34, 22-30 <https://raco.cat/index.php/Ciencies/article/view/338034>.
- Cressie, N. (1980). Suposiciones relajantes en la prueba t de una muestra. *Australian Journal of Statistics*, 22 (2), 143-153. doi: 10.1111 / j.1467-842x.1980.tb01161.x culturales de la educación científica, 11 (1), 11-26
- Cronbach, L. J. (1951). Coeficiente alfa y estructura interna de las pruebas. *PSYCHOMETRIKA*, 16(3). <https://doi.org/10.1007/BF02310555>
- Díaz-Muñoz, G. (2020). Metodología del estudio piloto. En *Rev Chil Radiol* (Vol. 26, Número 3). <https://www.ncbi.nlm.nih.gov/>
- Diehl, C., Marlow, J., Tetreault, B., & Uryase, M. (2020). STEAM Education: Accessibility, Availability, and Equity in Northern New Mexico. Worcester Polytechnic Institute. <https://digital.wpi.edu/pdfviewer/1z40kw75r>
- Diego-Mantecon JM, Prodromou T, Lavicza Z, Blanco TF, Ortiz-Laso Z. An attempt to evaluate STEAM project-based instruction from a school mathematics perspective. *ZDM*. 2021;53(5):1137-1148. doi: 10.1007/s11858-021-01303-9. Epub 2021 Sep 3. PMID: 34493944; PMCID: PMC8413685.
- Dijk, E., Tartwijk, J., Schaaf, M. & Kluijtmans, M. (2020). What makes an expert university teacher? A systematic review and synthesis of frameworks for teacher expertise in higher education. *Educational Research Review*, 31(100265), 1-84. <https://doi.org/10.1016/j.edurev.2020.100365>
- Domínguez-Lara, S., & Merino-Soto, C. (2015). ¿Por qué es importante reportar los intervalos de confianza del coeficiente alfa de Cronbach? César Merino-soto. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud*, 13(2), 1326-1328. <https://www.redalyc.org/pdf/773/77340728053.pdf>
- European Commission. (2014). *Measuring Digital Skills across the EU: EU wide indicators of Digital Competence*
- Ferla, J., Valcke, M., & Cai, Y. (2009). Academic self-efficacy and academic self-concept: reconsidering structural relationships. *Learning and Individual Differences*, 19(4), 499-505. <https://doi.org/10.1016/j.lindif.2009.05.004>
- Fernández, E.; Schaaper, M., y Bello, A. (2016). Mujeres en STEM en América Latina: Una nueva metodología de análisis de políticas públicas. El proyecto SAGA (STEM and Gender Advancemet). XI Congreso Iberoamericano de Ciencia, Tecnología y Género. San José, Costa Rica: Universidad de Costa Rica. Recuperado de <https://congresoctg.ucr.ac.cr/memoria/descargar.php?id=25>
- Fuentes del Burgo, J., Huertas Gallardo, P., & Torres Aranda, A. M. (2019). Promoción De La Ciencia, La Tecnología, La Ingeniería Y Las Matemáticas (Stem). El Proyecto Precampus. *Promotion of Science, Technology, Engineering and Mathematics (Stem). the Precampus Project.*, 34(2), 101-121. <http://search.ebscohost.com/login.aspx?direct=true&db=ejh&AN=142077137&lang=es&site=ehost-live>
- Gisbert, M., González, J. & Esteve, F. (2016). Competencia digital y competencia digital docente: una panorámica sobre el estado de la cuestión. *RIITE. Revista Interuniversitaria de Investigación en Tecnología Educativa*, 0, 74-83. Recuperado de <https://bit.ly/2WwEOms>
- Jiménez, R., Magaña, D. E. y Aquino, S. P. (2021). Gestión de tendencias STEM en educación superior y su impacto en la industria 4.0. *Journal of the Academy*, 5, 99-121 <https://doi.org/10.47058/joa5.4>
- Jho, H., Hong, O & Song, J. (2016). An analysis of stem/steam teacher education in korea with a case study of two schools from a community of practice perspective. *EURASIA Journal of Mathematics, Science and Technology Education*. 12 (7), 1843-1862. DOI: <https://doi.org/10.12973/eurasia.2016.1538a>
- SANDOVAL-PALOMARES, Jessica. STEAM conceptions, competencies and attitudes in higher education: a pilot study. *Journal-Health Education and Welfare*. 2022

Juvera, J., & Hernández, S. (2021). STEAM en la infancia y la brecha de género Una propuesta para la educación no formal. *Revista Internacional de Educación y Aprendizaje*, 9(1). <https://journals.gkacademics.com/revEDU/article/view/2712/1656>

Korkmaz, Ö., Çakır, R., & Ugur-Erdogmus, F. (2020). International Journal of Psychology and Educational Studies A Validity and Reliability Study of the Basic STEM Skill Levels Perception Scale. *International Journal of Psychology and Educational Studies*, 2020(2), 111–121. <https://doi.org/10.17220/ijpes.2020.02.010>

Kurup, P.M., Li, X., Powell, G. & Brown, M. (2019). Building future primary teachers' capacity in STEM: based on a platform of beliefs, understandings and intentions. *International Journal of STEM Education*, 6(1). DOI: <https://doi.org/10.1186/s40594-019-0164-5>

Levinson, R., & PARRISE Consortium. (2014). Socio-scientific issue-based learning: taking off from STEPWISE. In J. Bencze (Ed.), *Science & technology education promoting wellbeing for individuals, societies & environments*. Dordrecht: Springer Science + Business Media B.V <https://www.parrise.eu/wp-content/uploads/2018/04/parrise-en-rgb.pdf>

Lioum Y., & Daly, A. (2020). Obstacles and opportunities for networked practice: a social network analysis of an inter-organizational STEM ecosystem. *Journal of Educational Administration*, 59(1), 94-115. <https://doi.org/10.1108/JEA-02-2020-0041>

Malecha, E. (2020). The Role of Environmental Education in Steam Education The Role of Environmental Education in steam education the role of environmental education in steam education. *School of Education Student Capstone Projects*, 463. https://digitalcommons.hamline.edu/hse_cp/463
Mandeville, P. B. (2013). Tips bioestadísticos: análisis robusto de grupos apareados. *Ciencia UANL*, 16(62), 99-102.

Muñiz, J. (2010). Las teorías de los test: teoría clásica y teoría de respuesta a los ítems. *Papeles del psicólogo*, 31(1), 57–66. <http://www.cop.es/papeles>

Nadelson, L. S., Callahan, J., Pyke, P., Hay, A., Dance, M., & Pfiester, J. (2013). Teacher STEM perception and preparation: Inquiry-based STEM professional development for elementary teachers. *The Journal of Educational Research*, 106(2), 157–168. <https://doi.org/10.1080/00220671.2012.667014>. National Science Foundation. (2020). *STEM Education for the future, a visioning report*, may 2020. National Science Foundation a Subcommittee of the advisory committee of the education & human resources directorate. <https://www.nsf.gov/ehr/Materials/STEM%20Education%20for%20the%20Future%20-%202020%20Visioning%20Report.pdf>

Oliveros-Ruiz, M.A. (2019). STEAM as a tool to encourage engineering studies. *Revista científica*, (35), 158-166. <https://doi.org/10.14483/23448350.14526>

Ortiz-Revilla, J., Adúriz-Bravo, A. y Greca, IM (2020). Un marco para la discusión epistemológica sobre la educación STEM integrada. *Ciencia y Educación*, 29 (4), 857–880. <https://doi.org/10.1007/s11191-020-00131-9>

Pantoja-Amaro, Peña-Aguilar, Mendoza-Torres, (2020). Desarrollo de habilidades STEM en media superior como mecanismo para impulsar la continuidad en educación superior: Caso programa Bases de Ingeniería. *RIDE. Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, 10(20), e016. Epub 18 de noviembre de 2020. <https://doi.org/10.23913/ride.v10i20.614>

Pelejero de Juan, M. (2018). *Educación STEM, ABP y aprendizaje cooperativo en tecnología*. Trabajo de grado, Universidad Internacional de La Rioja.

Penuel, WR, Clark, TL y Bevan, B. (2016). Infrastructures to Support Equitable STEM Learning Across Settings, 24 , 12-20. <https://files.eric.ed.gov/fulltext/EJ1120471.pdf>

Peña, J. M. y Bermúdez, C. P. (2016). Vinculación universidad empresa. Innovación para la diversificación de mercados en cacao. *RICEA Revista Iberoamericana de Contaduría, Economía y Administración*, 4(7), 103-121 <https://dialnet.unirioja.es/servlet/articulo?codigo=5156016>

Rahm, J. (2016). Historias de aprendizaje, identidad, navegaciones y traspasos de fronteras en STEM en comunidades no dominantes: nuevos imaginarios para la investigación y la acción. *Estudios culturales de la educación científica*, 11 (1), 61–75. DOI: <https://doi.org/10.15517/revedu.v42i1.23470>

Rojas, G., y Segura., L. (2019). Visión STEAM para México. <https://talentoaplicado.mx/wp-content/uploads/2019/02/Visio%C3%ACn-STEM-impresio%C3%ACn.pdf>

Romero-Ariza, M., Quesada, A., Abril, A.-M., Cobo, C., 2021. Changing teachers' self-efficacy, beliefs and practices through STEAM teacher professional development (Cambios en la autoeficacia, creencias y prácticas docentes en la formación STEAM de profesorado). *Journal for the Study of Education and Development* 44, 942–969.. doi:10.1080/02103702.2021.1926164

Salazar-Gomez, E., & Tobon, S. (2018). Análisis documental del proceso de formación docente acorde con la sociedad del conocimiento. *Revista Espacios*, 39(53). <https://http://www.revistaespacios.com/cited2017/cited2017-17.html>

Santillán Aguirre, J. P., Cadena Vaca, V. del C., & Cadena Vaca, M. (2019). Educación Steam: entrada a la sociedad del conocimiento. *Ciencia Digital*, 3(3.4.), 212-227. <https://doi.org/10.33262/cienciadigital.v3i3.4.847>

Simarro, C., Couso, D. (2021). Prácticas de ingeniería como marco para la educación STEM: una propuesta basada en matices epistémicos. *IJ STEM Ed* 8, 53 <https://doi.org/10.1186/s40594-021-00310-2>

Soriano, A. (2014). Diseño y validación de instrumentos de medición. *Diálogos* 14, 19-40. <https://core.ac.uk/download/pdf/47265078.pdf>

Toh, L. P. E., Causo, A., Tzuo, P. W., Chen, I. M. & Yeo, S. H. (2016). A Review on the Use of Robots in Education and Young Children. *Educational Technology & Society*, 19(2), 148–163. <http://dx.doi.org/10.12795/pixelbit.73672>

United Nations Educational, Scientific and Cultural Organization. (2017). Cracking the code: Girls and Women's education in science, technology, engineering and mathematics (STEM).UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000253479?posInSet=20&queryId=302e1749-d414-4ce7-a4f0-b69fd3008e8f>

United Nations Educational, Scientific and Cultural Organization UNESCO (2019). Necesaria la educación STEAM+H para cultivar un pensamiento y habilidades transformadoras, innovadoras y creativas para avanzar hacia un desarrollo sostenible. <https://es.unesco.org/news/necesaria-educacion-steamh-cultivar-pensamiento-y-habilidades-transformadoras-innovadoras-y>

Useche, G., & Vargas, J. (2019). Una revisión desde la epistemología de las ciencias, la educación STEM y el bajo desempeño de las ciencias naturales en la educación básica y media. *Revista TEMAS*, III(13), 109-121. <https://doi.org/10.15332/rt.v0i13.2337>

Ventura-León, J., & Caycho-Rodríguez, T. (2017). El coeficiente Omega: un método alternativo para la estimación de la confiabilidad. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud*, 15 (1), 625-627. ISSN: 1692-715X. Disponible en: <https://www.redalyc.org/articulo.oa?id=77349627039>

Vo, H. M., Zhu, C., Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, 53, 17-28. Recuperado de <https://doi.org/10.1016/j.stueduc.2017.01.002>

Wilcox. R.R. (2003). *Applying Contemporary Statistical Techniques*. Academic Press, San Diego, CA, USA [https://books.google.com.mx/books?hl=es&lr=&id=-yBQeej1QNQC&oi=fnd&pg=PP1&dq=Wilcox.+R.R.+\(2003\).+Applying+Contemporary+Statistical+Techniques.+Academic+Press,+San+Diego,+CA,+USA&ots=2XolxO1-6I&sig=OdUXQnytl0_AkHRcvkjOSjmFY0#v=onepage&q&f=false](https://books.google.com.mx/books?hl=es&lr=&id=-yBQeej1QNQC&oi=fnd&pg=PP1&dq=Wilcox.+R.R.+(2003).+Applying+Contemporary+Statistical+Techniques.+Academic+Press,+San+Diego,+CA,+USA&ots=2XolxO1-6I&sig=OdUXQnytl0_AkHRcvkjOSjmFY0#v=onepage&q&f=false)

School-family duality: emotional intelligence and academic performance

Dualidad escuela-familia: inteligencia emocional y rendimiento académico

SÁNCHEZ-RIVERA, Lilia†*, MUÑOZ-LÓPEZ, Temístocles, RAMOS-JAUBERT, Rocío Isabel and NAJERA-CARRIZALES, Hannia Abigail

Universidad Autónoma de Coahuila, Faculty of Science, Education and Humanities, Mexico.

ID 1st Author: *Lilia Sánchez-Rivera* / ORC ID: 0000-0001-9468-2599, Researcher ID Tomson: T-1404-2018, CVU CONACYT ID: 613195

ID 1st Co-author: *Temístocles, Muñoz- López* / ORC ID: 0000-0003-4940-5730, Researcher ID Thomson: X-7834-2018, CVU CONACYT ID: 202437

ID 2nd Co-author: *Rocío Isabel, Ramos-Jaubert* / ORC ID: 0000-0003-3289-5390, Researcher ID Thomson: T-1652-2018, CVU CONACYT ID: 201861

ID 3rd Co-author: *Hannia Abigail Najera-Carrizales* / ORC ID: 0000-0001-5130-7959

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Abstract

The objective of this work was to identify the relationship between emotional intelligence and the academic performance of students at Margarita Masa de Juárez High School and Ignacio De Zaragoza School. The methodology used was quantitative, with a cross-sectional design, with a correlational and integrational methodical derivation. The collection of information was carried out through an instrument where the topics of emotional intelligence and academic performance were observed, the sample was made up of 120 students, the sampling method was non-probabilistic, through the strategy of sampling for convenience. The statistical techniques used were frequencies and percentages, comparative, correlational and integrational through factor analysis. The contribution of the study is from the statistical empirical evidence that allows us to affirm that when there are teachers with willingness, responsibility and who understand the capacities and how young people learn, there is a security connection between the teacher - student; With this, emotions are recognized through the observation of the behavior of difficult situations and problems in an empathic way where the family environment plays an important supporting role; the school-family duality impacts the academic performance of adolescents.

School, Family, Emotions, Academic performance, Adolescents

Resumen

El objetivo de este trabajo fue identificar la relación que existe entre la inteligencia emocional con el rendimiento académico de los estudiantes de la secundaria Margarita Masa de Juárez y del Colegio Ignacio de Zaragoza. La metodología que se utilizó fue de enfoque cuantitativo, con diseño transversal, con derivación metódica correlacional e integracional. La recopilación de la información se realizó a través de un instrumento donde se observaron los tópicos de inteligencia emocional y el rendimiento académico, la muestra se conformó por 120 estudiantes, el método de muestreo fue no probabilístico, mediante la estrategia de muestreo por conveniencia. Las técnicas estadísticas que se utilizaron fueron frecuencias y porcentajes, comparativo, correlacional e integracional a través del análisis factorial. La contribución del estudio radica en la evidencia empírica estadística que permite afirmar que cuando existen docentes con disposición, responsabilidad y que comprenden las capacidades y cómo aprenden los jóvenes se da una conexión de seguridad entre el docente – estudiante; con ello, se reconocen las emociones a través de la observación del comportamiento a situaciones y problemas difíciles de manera empática donde el ambiente familiar juega un papel importante de apoyo; la dualidad escuela-familia impacta en el rendimiento académico de los adolescentes.

Escuela, familia, emociones, rendimiento académico, adolescentes

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* Correspondence from the Author (E-mail: lsr14712@uadec.edu.mx)

† Researcher contributing as first author.

Introduction

For Regader, B. (2018) emotional intelligence is a construct that helps us to understand how we can influence in an adaptive and intelligent way both our emotions and our interpretation of the emotional states of others. So it is understood that human beings not only act and understand the personal, they are also able to understand what happens to other people, showing empathy and solidarity with others. Emotional intelligence is not an innate trait; human beings can develop it throughout life.

Following this line Otero (2006), cited in Olvera and Ángeles (2022), shares his idea that emotions fulfill their function by being part of a complex regulation system, which is responsible for avoiding dangers, helping the organism to take advantage of opportunities, and indirectly to facilitate social relationships; on the other hand, Aguado (2019), also quoted by Olvera and Ángeles, explains that emotions result from a series of brain processes that arises before an external event, these emotions are composed of the: cognitive, which performs an evaluation with subjective experiences; and the reactive, which refers to physiological reactions, motor-expressive reactions and action tendencies.

Then, emotional intelligence is the management of what makes you feel an emotion, that is why it is so complicated to have such intelligence, because it is to have the ability to reason for the regulation of emotions. López Mero et al., (2019) in their research point out that the family presents important tasks in society, directly related to the preservation of human life, its development and well-being. Thus, there are characteristics in the family dynamics that drive students to maintain their level of academic performance or not, for example, dysfunctionality. In their work, they briefly address how dysfunctional families can be one of the causes of low academic performance in elementary school students and point out that its causes are very varied, of which the following can be mentioned: family disintegration, parenting styles, working parents, parental disinterest, addictions, favorite children, unwanted children. Therefore, the question "How is emotional intelligence related to the academic performance of the students of Margarita Maza de Juárez High School and Ignacio de Zaragoza School" was asked. With the working hypothesis.

H₁. Emotional intelligence is related to the academic performance of the students of Margarita Maza de Juárez High School and Ignacio de Zaragoza School. The present work is carried out with the purpose of helping high school students to improve their academic performance.

Theoretical reference

Emotional Intelligence is a construct that helps to understand how to influence in an adaptive and intelligent way both personal emotions and the interpretation of the emotional states of others (Regader, 2018). So it is understood that human beings not only act and understand the personal, they are also able to understand what happens to other people, showing empathy and solidarity with others.

Barrio affirms that emotional intelligence is not an innate trait, as he affirms that human beings can develop it throughout life. To train it, it is essential to educate and recognize emotions, this will increase emotional self-awareness; self-motivation; improve interpersonal relationships; develop empathic capacity (learning to put oneself in the other person's place in order to understand how he or she feels); and enhancing the ability of self-control to regulate the emotional state (Barrio, 2018).

On the other hand, Trufino (2022) comments that adolescence is a time of greater reaction to stress, which makes them more vulnerable to emotional disorders. Parental education, accompaniment and closeness, the acquisition of social skills and emotional intelligence and self-regulation, will help prevent drug use, sexual promiscuity, eating disorders, behavioral addictions, antisocial activities and suicidal tendencies, as well as to face life's challenges safely and effectively and to take responsibility for their own actions.

For Universidad Privada del Norte (UPN, 2019), a student who has the emotional support of his or her family, in addition to economic support, will experience an intense desire to want to excel in studies. Likewise, he/she will be more motivated and willing to continue studying and to overcome the difficulties he/she faces in the academic scenario and in life.

On the contrary, a student who does not have the emotional support of his family, or faces conflicts at home, will lose motivation and interest in his studies. In addition, these types of problems may impair their memory or concentration, as well as their emotional health. When we talk about academic performance, we generally refer to the grades that a student obtains by means of the evaluations, therefore, the need arises to distinguish the functions of the of the evaluation, distinguishing the formative function and the certifying function. Both functions, formative and certifying are by no means exclusive but complementary (Fernández, 2018). In the academic environment, evaluation usually tries to complement the formative function with a pedagogical treatment by the teacher from whose results he/she tries to feedback the teaching-learning process, however, the other function arises at the end of the process, the certifying one that enables and/or sanctions the absence of achievements, this function is the most criticized when it shows signs of its lack of objectivity.

Academic performance is closely related to the evaluation of learning, since it is the reflection of the grades obtained in each of the subjects of the school curriculum. This assessment involves many factors that are intertwined, including the individual perception of teachers and that make evaluation a complex process, which in the daily life of the institutions involves differential positions among the various members of the educational community and sometimes generate conflicts between the actors involved in the process (Quintero, 2013).

The Mexican Institute of youth, mentions that the concept of youth is a term that, on the one hand, allows identifying the period of life of a person that is located between childhood and adulthood which, according to the Law of the Mexican Institute of Youth, is between the ages of 12 to 29 years (IMJ, 2017). Youth is an arduous issue to decipher completely, insofar as it depends on aspects such as physical maturity, psychological maturity, training, the interweaving of social relations, the possibility of joining the labor market.

Methodology to be developed

This research was conducted through the national strategic line called emotional education, considering that the topic was emotional intelligence.

An opinion survey was applied to 120 subjects made up of 60 students from Margarita Maza de Juárez High School and 60 students from Ignacio de Zaragoza School in the city of Saltillo, Coahuila.

Now, once the research question was established, we proceeded to investigate the bibliography that supported the main proposal of this work, the research objectives, questions and hypotheses were developed. The research instrument was elaborated; with a total of 57 variables, 8 of them general data: sex, favorite subject, average, hours dedicated to study, another language, religion, hobby; 3 variables that represent the phenomenon under study: expression of emotions, suicide and exclusion.

The scale used in the instrument is 0 - 10, where 0 indicates zero frequency and 10 indicates the highest frequency. A pilot test is carried out to make adjustments to the items, and the final application of the questionnaire is carried out in one session. The data are obtained with the analysis of frequencies and percentages, comparative, correlation and integration through factor analysis, and are given statistical treatment to explore the results.

The approach of the present research is quantitative since:

The order is rigorous, although of course we can define some phases. It starts from an idea that is being delimited and, once delimited, objectives and research questions are derived, the literature is reviewed and a framework or theoretical perspective is constructed. From the questions, hypotheses are established and variables are determined; a plan is drawn up to test them (design), the variables are measured in a certain context; the measurements obtained are analyzed using statistical methods, and a series of conclusions are drawn with respect to the hypothesis or hypotheses.

By design it is trans-sectional or cross-sectional since it is a research that collects data at a single point in time. Its purpose is to describe variables and analyze their incidence and interrelation at a given time (Hernández, Fernández & Baptista, 2014).

By implication and methodical derivation it is correlational and integrational, for defining the existing relationships and denotes the relevance between the factors of the study phenomenon.

The population was 740 high school students from the Margarita Maza de Juárez school and of the 180 high school students from the Ignacio de Zaragoza School, only 60 high school students from the Margarita Maza de Juárez school and 60 high school students from the Ignacio de Zaragoza School participated, being a sample of 120 students.

The conceptualization of variables:

Emotional intelligence: is the capacity and innate trait that all human beings have for showing affection to others, understanding their emotions and those of others, being able to build their identity, self-esteem, security and confidence.

Academic performance: level of knowledge that a student shows in class, where different elements are involved, as well as the attitude, disposition and personality of the students in each class.

High school students: young adolescents ranging from 12 to 15 years old who are studying the last level of basic education, being this time where young people are in constant change and time to form bonds of friendship.

Results

In order to explain the research axes, the relative frequencies obtained from the application of the research instrument were processed through statistical analysis with the purpose of characterizing both the population and the study phenomenon through: frequencies and percentages, correlation, comparative and integrative.

Frequencies and percentages

Of the total sample of 120 students, half were students from Margarita Maza de Juárez High School and the other half from Ignacio de Zaragoza High School, 50% of the respondents were female, 41.7% were male, while 8.3% did not answer. The average of the students ranged between 8 and 9 with 34.2% respectively.

Correlation analysis

At the present statistical level, the total variance is worked with the objective of presenting explanations of the study phenomenon based on the relationships that exist. It should be noted that the operationalization of these relationships is based on a lower $p < 0.05$ and an $r \geq 0.30$.

- Correlation of the variable family problems

When students are distracted at school by their family problems, they are young people who attend therapy ($r=0.32$); obtain low grades in their evaluations ($r=-0.32$) and lack self-confidence ($r=-0.30$).

- Correlation of the variable grades

When young students obtain outstanding grades in their evaluations, they manage to understand the emotions of the people around them ($r=0.33$), respect the rules of the place where they are ($r=0.31$) and do not attend therapy ($r=-0.34$). Therefore, it is inferred that the outstanding grades obtained by the subjects have a positive relationship with mentally healthy adolescents.

Comparative analysis

The following is a comparative analysis of the variables that make up the study phenomenon, carried out through the T-test procedure for independent samples. This analysis explains the significant differences in the suicide variable between Margarita Maza de Juárez High School and Ignacio de Zaragoza High School. With the purpose of accepting or rejecting the working hypothesis, highlighting that the probability level is less than $p < 0.05$.

According to the analysis of means, it is observed that those who have thought about suicide have gone to therapy ($x=4.04$), are considered to have ease of conversation with strangers ($x=6.16$), however, those who have not thought about suicide are adolescents with more confidence ($x=8.53$), self-esteem ($x=8.24$), and that they sleep 8 hours a day ($x=6.38$).

It is inferred that suicidal thoughts in young people are triggered by different causes such as low self-confidence and low self-esteem, in addition to sleep disturbances; although adolescents have social skills, this does not prevent them from thinking about suicide.

Integrational analysis

Factor analysis

To identify the factors that describe emotional intelligence and academic performance in high school students, an exploratory factor analysis was performed and evidence was found to prove the concurrence of 10 factors. The r^2 multiple communalities method was used as extraction method; with normalized varimax rotation since it is integrated with variables that support the proposal of the article. It works with an r value of ≥ 0.35 .

There were 10 factors, which are called

Factor 1, School; factor 2, Observation; factor 3, Emotions; factor 4, Connection; factor 5, Family environment; factor 6, Disposition; factor 7, Problems; factor 8, Difficult situations; factor 9, Support and finally, factor 10, Environment, in which the most outstanding variables are observed according to their factorial load for their reading. (Figure1)

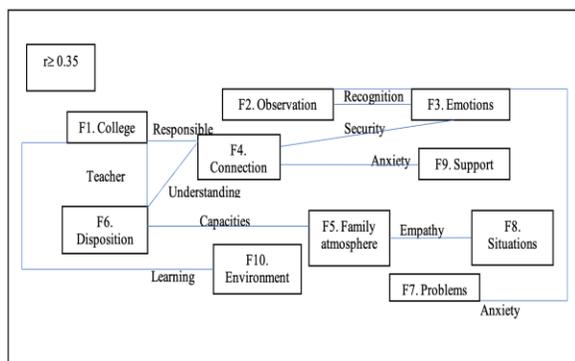


Figure 1 Factorial statistical analysis

It is observed that when there are teachers in the school who are willing, responsible and who understand the capabilities and how young people learn, there is a safe connection between the teacher and the student; with this, emotions are recognized through the observation of behavior in difficult situations and problems in an empathetic way where the family atmosphere plays an important supportive role; the school-family duality impacts the academic performance of adolescents.

Conclusions

It is concluded that the outstanding grades obtained by the subjects have a positive relationship with mentally healthy adolescents. Continuous attendance to therapy strengthens social skills and in the long run will be a support for adolescents to control and manage their emotions and come to believe in themselves.

The healthy relationships that young people have with their families trigger a continuous communication between them, which is a way to improve their relationship with others.

It is essential for young people to have self-esteem and the support of their families so that their emotions are recognized and managed.

The dual school-family relationship has an impact on the academic performance of adolescents.

Therefore, it is important to create an educational policy that promotes a psycho-pedagogical department with a greater number of professionals to meet the demand of all young people in school, prioritizing students with different problems.

Also, encourage activities for parents to attend (socialization of the activities of the institution, school for parents, meetings, festivals) to be involved in the academic development of students.

Equally important, there should be a cross-cutting subject in the secondary school curriculum, where students are provided with strategies to communicate ideas, feelings, problems and disagreements in a timely and accurate manner, which will have an impact on their academic performance.

References

- Aguado, L. (2019). *Emoción, afecto y motivación: un enfoque de Procesos*. Psicología y Educación: Alianza Editorial, Madrid. https://www.academia.edu/44561842/Aguado_Luis_Emocion_Afecto_Y_Motivacion
- Barrio, N. (2018). *Inteligencia emocional: ¿por qué es tan importante entrenarla?* Revista digital INESEM: <https://revistadigital.inesem.es/educacion-sociedad/inteligencia-emocional/>
- Caballero, C., Abello, R. & Palacio, J. (2007). Relación de burnout y rendimiento académico con la satisfacción frente a los estudios en estudiantes universitarios. *Avances en Psicología Latinoamericana*, 25(2), 98-111. <http://www.scielo.org.co/pdf/apl/v25n2/v25n2a7.pdf>
- Da Dalt de Mangione, E., & Difabio de Anglat, H. (2002). Asertividad y su relación con los estilos educativos familiares. *Psicología y Ciencias Afines*, 119 – 140. <https://www.redalyc.org/pdf/180/18019201.pdf>
- Fernandez, S. (2018). Rendimiento academico en educacion superior. *Revista Científica de la URSA*, 2 - 9. https://ucsa.edu.py/yeah/wp-content/uploads/2018/12/7-TA-Fernandez-S_Rendimiento-Acad%C3%A9mico-en-Educaci%C3%B3n-Superior-55-63.pdf
- Hernández, R., Fernández, C. & Baptista, M. (2014). *Metodología de la investigación*. México: Mc-GRAW HILL/INTERAMERICANA EDITORES, S.A. DE C.V.p <https://www.uca.ac.cr/wp-content/uploads/2017/10/Investigacion.pdf>
- IMJ (2017). *Gobierno de México*. Obtenido de Intituto Mexicano de la Juventud: <https://www.gob.mx/imjuve/articulos/que-es-ser-joven>
- Quintero, M. T. (2013). El desempeño académico: una opción para la cualificación de las instituciones educativas. *Plumilla Educativa*, 93-115. <https://dialnet.unirioja.es/servlet/articulo?codigo=4756664>
- Truffino, J. C. (2022). *Frágiles: Desafíos en la salud mental y social* (Vol. 54). Ediciones Rialp, SA. <file:///Users/lily/Downloads/fragiles-desafios-en-la-salud-mental-y-social.pdf>
- Olvera, J. y Ángeles, Z. (2022). *Inteligencia emocional*. DIVULGARE Boletín Científico de la Escuela Superior de Actopan, Vol.9, No. 17 (2022) 17-25, ISSN: 2395-8596. <https://repository.uaeh.edu.mx/revistas/index.php/divulgare/issue/archive>
- Otero, M. (2006). *Emociones, Sentimientos y Razonamientos en Didáctica de las Ciencias*. Revista Electrónica de Investigación en Educación en Ciencias, 1 (1), 24-53 <file:///Users/lily/Downloads/Dialnet-EmocionesSentimientosYRazonamientosEnDidacticaDeLa-2882480.pdf>
- Regader, B. (2018). *Psicología y mente*. Obtenido de ¿Qué es la Inteligencia Emocional?: <https://psicologiymente.com/inteligencia/inteligencia-emocional>
- UPN. (2019). *La importancia del apoyo familiar en los estudiantes*. Obtenido de Universidad Privada del Norte: <https://blogs.upn.edu.pe/comienzo/2018/11/19/1a-importancia-del-apoyo-familiar-los-estudiantes/#:~:text=Un%20estudiante%20que%20cuenta%20con,acad%C3%A9mico%20y%20en%20la%20vida.>
- Willcox, M. del R. (2011). Factores de riesgo y protección para el rendimiento académico: Un estudio descriptivo en estudiantes de Psicología de una universidad privada. *Revista Iberoamericana de Educación*, 55(1), 1-9. <http://www.rioei.org/deloslectores/3878Wilcox.pdf>

Burnout and satisfaction in high-performance judo athletes

Burnout y satisfacción en deportistas de judo de alto rendimiento

PONCE-CARBAJAL, Nancy´, RAMÍREZ-NAVA, Rubén´, JAENES-SÁNCHEZ, José Carlos´´ and TRISTÁN-RODRÍGUEZ, José Leandro´

´Universidad Autónoma de Nuevo León, Facultad de Organización Deportiva, México.

´´Universidad Nacional Autónoma de México, Facultad de Estudios Superiores Zaragoza, México.

ID 1st Author: Nancy, Ponce-Carbaljal / ORC ID: 0000-0002-8370-9378, CVU CONACYT ID: 556867

ID 1st Co-author: Rubén, Ramírez-Nava / ORC ID: 0000-0002-3268-019X

ID 2nd Co-author: José Carlos, Jaenes-Sánchez / ORC ID: 0000-0002-8700-130X

ID 3rd Co-author: José Leandro, Tristán-Rodríguez / ORC ID: 0000-0002-6828-5896, CVU CONACYT ID: 260481

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Abstract

The objective of this research is to identify the relationship between burnout and satisfaction in high performance judo athletes, Method: The study design is non-experimental, cross-sectional and correlational, the sample is 53 athletes participating in the Judo Grand Prix 2018 who It was carried out in Cancún, Quintana Roo, Mexico, the age of the participants is in the range of 18 to 32 years, M = 23 SD = 3.37, 34 men (64%) and 19 women (35.8). There are 2 instruments, to measure the burnout syndrome is the Sports Burnout Questionnaire (Athlete Burnout Questionnaire; ABQ; Cantú, 2016) in the Mexican version, with 15 items and three variables: Reduced sense of achievement (RSL), Physical Exhaustion and Emotional (AFE) and Devaluation of Sports Practice (DPD). The second is the Satisfaction Scale by Castillo, Balaguer and Duda (2001), made up of 7 items and 2 variables, Satisfaction/Fun with 5 items and Boredom with 2 items. Results: Adequate internal consistency and correlations were found between the variables of burnout and satisfaction, specifically there are significant and positive correlations $r = .622^{**}$ between devaluation of sports practice and Boredom. Another positive and significant correlation was found $r = .468^{**}$ between reduced sense of achievement and boredom. A third relationship was found at $r = .576^{**}$ between physical and emotional exhaustion and boredom. Two significant but negative correlations $r = -.403^{**}$ were found between devaluation of sports practice and fun, and finally with a relationship of $r = -.302^*$. Conclusion: The existing relationships between the variables of burnout and satisfaction are confirmed, the higher the satisfaction, the lower the risk of burnout, and vice versa.

Fun, Boredom, Sport, High performance

Resumen

El objetivo en esta investigación es identificar la relación existente entre el burnout y la satisfacción en deportistas de judo de alto rendimiento, Método: El diseño del estudio es no experimental, transversal y correlacional, la muestra son 53 atletas participantes del Judo Grand Prix 2018 que se llevó a cabo en Cancún Quintana Roo, México, la edad de los participantes está en el rango de 18 a 32 años, M = 23 DT = 3.37, 34 hombres (64%) y 19 mujeres (35.8). Los instrumentos son 2, para medir el síndrome de burnout es el Sports Burnout Questionnaire (Athlete Burnout Questionnaire; ABQ; Cantú, 2016) en la versión mexicana, de 15 ítems y tres variables: Reducida sensación de logro (RSL), Agotamiento Físico y Emocional (AFE) y Devaluación de la Práctica Deportiva (DPD). El segundo es la Escala de Satisfacción de Castillo, Balaguer y Duda (2001), compuesta por 7 ítems y 2 variables, Satisfacción/Diversión con 5 ítems y Aburrimiento con 2 ítems. Resultados: Consistencia interna adecuada y, se encontraron correlaciones entre las variables del burnout y las de satisfacción, específicamente hay correlaciones significativas y positivas $r = .622^{**}$ entre devaluación de la práctica deportiva y Aburrimiento. Otra correlación se encontró positiva y significativa $r = .468^{**}$ entre reducida sensación del logro y aburrimiento. Una tercera relación se encontró en $r = .576^{**}$ entre agotamiento físico y emocional y el aburrimiento. Se encontraron dos correlaciones significativas pero negativas $r = -.403^{**}$ entre devaluación de la práctica deportiva y la diversión, y por ultimo con una relación de $r = -.302^*$. Conclusión: Se confirma las relaciones existentes entre las variables del burnout y la satisfacción, a mayor satisfacción menor riesgo de burnout, y viceversa

Diversión, Aburrimiento, Deporte, Alto rendimiento

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* Correspondence to the Author (E-mail: NANCY.PONCECRB@uanl.edu.mx)

† Researcher contributing as first author.

Introduction

The expectations for the masses to practice sport for the benefit of their health are high and one way to make them do so is to inspire them through massive national or international sporting events, which the population is aware of (Pappous, 2011; Pappous and Hayday, 2015). High-level sport inspires young people and children to integrate sport as a daily and systematic activity, resulting in a healthier community (Bauman, Bellew, and Craig, 2014). Sport brings various benefits to society and among them, it contributes to the improvement of quality of life and provides integral development to those who practice it (Romero, García-Mas, and Brustad, 2009).

In recent years, interest in burnout syndrome in sport has been on the rise, and researchers are increasingly drawn to this topic (Gustafsson, Hancock, & Côté, 2014; Cantú-Berrueto, 2015; Arbinaga (2019). Burnout syndrome or burnout syndrome is a concept with which the sports environment has been increasingly present in athletes and coaches, since the combination of high training loads, low recovery and continuous stress due to competitions increase the risk of athletes experiencing burnout, as Gould and Dieffenbach (2002) mentioned. In high-performance sports, there are athletes in training who are unmotivated, have lost interest or are no longer attracted by the activity, and it is likely that they are going through a period of mental fatigue which is causing these feelings of disinterest in their sport (Balaguer, et al 2009). Burnout is a syndrome that some athletes have been involved in, wishing to devote their time to other activities and abandon their sport.

The definition of this concept presented by Smith in 1986, and which is one of the most accepted by the profession, says that burnout syndrome is a chronic exposure to psychosocial stress, the consequences of which can be to withdraw psychologically, emotionally and sometimes physically from the activity that was previously fun and enjoyable, due to chronic stress and dissatisfaction, for Weinberg and Gould in 2007, describe that burnout is integrated by three variables, Reduced Sense of Achievement (RSL), Physical and Emotional Exhaustion (AFE) and Devaluation of Sport Practice (DPD) (Cantú-Berrueto, 2015).

The Intrinsic Satisfaction Scale (ISS) in sport (Duda and Nicholls, 1992; Castillo, Balaguer, and Duda, 2002), This instrument was developed with the intention of measuring satisfaction or interest with respect to sport contexts defining intrinsic satisfaction as the degree of fun or boredom experienced by the athlete when training or competing, the scale is composed of 7 items and 2 variables, Satisfaction/Fun with 5 items and Boredom with 2 items.

It is worth mentioning that both concepts have been little studied in the area of sport and no studies have been found that relate both concepts and much less in this level of sport since they are athletes who participate in a grand prix by invitation, because only the first 5 of the world ranking are invited and they are athletes of very high level of sport.

The objective of this research is to identify the relationship between burnout and satisfaction in high performance judo athletes.

Description of the method

The study design is non-experimental, cross-sectional and correlational, the sample is 53 athletes participants of the Judo Grand Prix 2018 that took place in Cancun Quintana Roo, Mexico, the age of the participants is in the range of 30 to 70 years, $M = 42.83$ $SD = 9.86$, where 34 are men (64%) and 19 women (35.8%).

The instruments are 2, the first is to measure burnout syndrome is the Sports Burnout Questionnaire (Athlete Burnout Questionnaire; ABQ; Cantú, 2016) in the Mexican version, of 15 items and three variables: Reduced Sense of Achievement (RSL), Physical and Emotional Exhaustion (AFE) and Devaluation of Sport Practice (DPD). This instrument has been used in several investigations presenting a usually adequate internal consistency ($\alpha > 0.7$). The second instrument is the Intrinsic Satisfaction in Sport Scale (Duda and Nicholls, 1992; Castillo, Balaguer, and Duda, 2002), composed of 7 items and 2 variables, Satisfaction/Fun with 5 items (1, 4, 5, 6, and 7) and Boredom with 2 items (1 and 5). The scale has presented adequate levels of reliability ($\alpha > 0.7$). Responses are collected on a 5-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5).

The procedure, which was applied in this research was first to request the support of the International Judo Federation, in order to obtain the pertinent permits to have an accreditation that would allow the most appropriate contact with the athletes in the facilities of the Judo Grand Prix 2018 event that took place in Cancun Quintana Roo, Mexico, then with the accreditation for access to all facilities, the approach to the coaches began with the purpose of helping us to make the athletes aware of the importance of participating in the research and the next day we proceeded to the boarding of the athletes in the hotel and in the training and competition facilities, where spaces were installed with table, chairs and material such as sheets, pencils, pencils and paper, chairs and material such as sheets of paper, pencils, erasers, so that the participants could use them and could dedicate 10 to 15 minutes to answer the instruments with prior informed consent, and the athletes were informed that their answers were completely anonymous, and it was also explained to them that they could withdraw from the study at any time.

The statistical analyses performed were descriptive, mean frequencies, standard deviation, Cronbach's alpha reliability (α) and bivariate correlations with Spearman's correlation coefficients, with the Statistical Package for the Social Sciences (SPSS) version 25.

Results

Table 1 describes the country frequencies of the participants.

Country	Frequency	%
United States	9	17.0
France	8	15.1
Brazil	8	15.1
Argentina	6	11.3
Mexico	5	9.4
Italy	4	7.5
Chile	2	3.8
Germany	1	1.9
Australia	1	1.9
Austria	1	1.9
Colombia	1	1.9
Spain	1	1.9
Japan	1	1.9
Norway	1	1.9
Netherlands	1	1.9
Poland	1	1.9
United Kingdom	1	1.9
Romania	1	1.9
Total	53	100.0

Table 1 Frequencies of the countries of the participating athletes

The results shown with respect to the reliability of the instruments evidenced values above the α of .70 see Table 2.

Variable		α
Burnout	Reduced sense of achievement	0.70
	Physical and Emotional Exhaustion	0.77
	Devaluation of Sports Practice	0.85
Intrinsic satisfaction in sport		
	Satisfaction/Fun	0.72
	Boredom	0.78

Table 2 Reliability of the variables of the burnout and intrinsic satisfaction questionnaires in sport

The results of Spearman's correlations showed the existence of positive and negative correlations and in both cases they were significant.

With the value of $r = .622$ ($p < .01$) between devaluation of sports practice and boredom. Another correlation was found to be positive and significant $r = .468$ ($p < .01$) between reduced sense of achievement and boredom. A third relationship was exposed with the value of $r = .576$ ($p < .01$) between physical and emotional exhaustion and boredom.

Two significant but negative correlations $r = -.403$ ($p < .01$) were found between devaluation of sports practice and fun, and finally with a relationship of $r = -.302$ ($p < .05$) between physical and emotional exhaustion and fun.

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To the Faculty of Sports Organization, to the Universidad Autónoma de Nuevo León, to CONACYT, and to REDDECA that, as far as possible, continues to support this type of research. Also, our thanks to the athletes and coaches.

Conclusion

The existing relationships between the variables of burnout and satisfaction are confirmed, the higher the satisfaction the lower the risk of burnout, and vice versa,

Specifically in the variables of devaluation of sports practice and reduced sense of achievement with boredom, which presumably shows that high-level athletes are tired and are not getting the expected results so they are at risk of abandoning their sport because they consider that they are no longer excited motivated as before falling into boredom.

In high performance sports, emotional and physical exhaustion, exposes the true motives of athletes in their performance in training and competitions, which could show vulnerability, fear, low tolerance, frustration and stress, fatigue, however it is true that athletes who have spent years behind a result that is not given, can lead them to feel that there is no longer any sense to continue or that they are perceived as unsuccessful, when the truth is that they are already national champions in their countries, some world medalists and others have been in the Olympic Games, but not all have reached the World and Olympic summit, and that can be emotionally exhausting if it prevails for a long time.

References

- Arbinaga, F., Fernández-Ozcorta, E., Herrera-Macías, P. P., y Vela-Calderón, D. (2019). Síndrome de burnout y resiliencia en árbitros de fútbol y baloncesto. *Revista de psicología del deporte*, 28(2), 0023-32. https://ddd.uab.cat/pub/revpsidep/revpsidep_a2019v28n2/revpsidep_a2019v28n2p23.pdf
- Balaguer, I., Duda, J. L., Castillo, I., Moreno, Y., y Crespo, M. (2009). Interacciones entre las perspectivas situacionales y disposicionales de meta y el burnout psicológico de los tenistas junior de la élite internacional. *Acción Psicológica*, 6 (2), 63-75. <https://www.proquest.com/docview/1268718296/fulltextPDF/2DAC7EF08A4149BCPQ/1?accountid=38018>
- Bauman, A., Bellew, B., y Craig, C. L. (2014). Did the 2000 Sydney Olympics increase physical activity among adult Australians?. *British Journal of Sports Medicine*, 49(4), 7-243. <http://dx.doi.org/10.1136/bjsports-2013-093149>
- Duda, J.L. y Nicholls, J.G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology*, 84, 1-10. <https://doi.org/10.1037/0022-0663.84.3.290>
- Cantú Berrueto, A. (2016). *Estilo interpersonal del entrenador, procesos psicológicos mediadores, bienestar y malestar en deportistas universitarios mexicanos* (Doctoral dissertation, Universidad Autónoma de Nuevo León). <http://eprints.uanl.mx/22853/7/22853.pdf>
- Cantú-Berrueto, A., López-Walle, J. M., Castillo, I., Ponce, N. Álvarez, O. y Tomás, I. (2015). Burnout en el deporte. López, J. M., Rodríguez, M. P., Ceballos, O. y Tristán, J. A. (Eds.), *Psicología del deporte: conceptos y aplicaciones e investigación* (pp.55-60). Nuevo León: Universidad Autónoma de Nuevo León. https://www.researchgate.net/profile/Jeanette-Lopez-Walle/publication/296462153_Psicologia_del_Deporte_Conceptos_Aplicaciones_e_Investigacion/links/56d581db08aeac05933345ea/Psicologia-del-Deporte-Conceptos-Aplicaciones-e-Investigacion.pdf#page=49
- Castillo, I., Balaguer, I., y Duda, J. (2002). Las perspectivas de meta de los adolescentes en el contexto deportivo. *Psicothema* (Oviedo), 14(2), 280-287. <https://redined.educacion.gob.es/xmlui/bitstream/handle/11162/5018/01720103009177.pdf?sequence=1>
- Duda, J.L. y Nicholls, J.G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology*, 84, 1-10. <https://doi.org/10.1037/0022-0663.84.3.290>
- Gould, D., y Dieffenbach, K. (2002). Overtraining, underrecovery, and burnout in sport. In M. Kellmann (Ed.), *Enhancing recovery: Preventing underperformance in athletes* (pp. 25-35). Champaign, IL: Human Kinetics. <https://doi.org/10.1016/B978-0-12-809324-5.05655-8>
- Gustafsson, H., Hancock, D. J., & Côté, J. (2014). Describing citation structures in sport burnout literature: A citation network analysis. *Psychology of Sport and Exercise*, 15(6), 620-626. <https://doi.org/10.1016/j.psychsport.2014.07.001>
- PONCE-CARBAJAL, Nancy, RAMÍREZ-NAVA, Rubén, JAENES-SÁNCHEZ, José Carlos and TRISTÁN-RODRÍGUEZ, José Leandro. Burnout and satisfaction in high-performance judo athletes. *Journal-Health Education and Welfare*. 2022

Pappous, A. (2011). Do the Olympic Games Lead to a Sustainable Increase in Grassroots Sport Participation?. A secondary analysis of Athens 2004. En J. Savery, and K. Gilbert, (Eds.), *Sustainability and Sport*, (pp. 81-87). Champaign: Common Ground. <https://kar.kent.ac.uk/31622/1/Book%20chapter.pdf>

Smith, R. E. (1986). Toward a cognitive-affective model of athletic burnout. *Journal of Sport Psychology*, 8, 36-50. <https://doi.org/10.1123/jsp.8.1.36>

Weinberg, R. S., y Gould, D. (2007). *Foundations of sport and exercise psychology* (4th ed). Champaign, IL: Human Kinetics.

https://books.google.es/books?hl=es&lr=&id=ACBwDwAAQBAJ&oi=fnd&pg=PR1&dq=Foundations+of+sport+and+exercise+psychology++&ots=189wMkDQJF&sig=IF_lhHssBd5ItVxUtWSKMEEbSNA#v=onepage&q=Foundations%20of%20sport%20and%20exercise%20psychology&f=false

Pappous, A. S., y Camps, A. (2013). Evaluación de hábitos saludables en la población donde se desarrollan grandes eventos deportivos. En J. Tabares (Ed.), *Educación Física, Deporte, Recreación y Actividad Física: construcción de ciudadanías* (pp. 166-175). Colombia: Funámbulos. https://scholar.google.es/scholar?cluster=11994756160383805772&hl=es&as_sdt=0,5&scioq=Overtraining,+underrecovery,+and+burnout+in+sport.

Romero, A. E., García-Mas, A. y Brustad, R. J. (2009). Estado del arte, y perspectiva actual del concepto de bienestar psicológico en psicología del deporte. *Revista Latinoamericana de Psicología*, 41(2), 335-347. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-05342009000200012

Romero, A. E., Zapata, R., García-Mas, A., Brustad, R. J., Garrido, R., & Letelier, A. (2010). Estrategias de afrontamiento y bienestar psicológico en jóvenes tenistas de competición. *Revista de psicología del deporte*, 19(1), 117-133. <https://www.redalyc.org/pdf/2351/235116414008.pdf>

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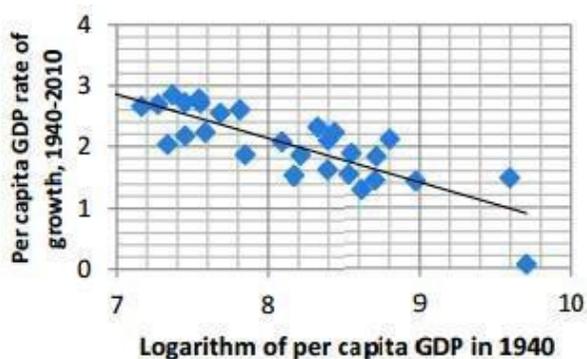
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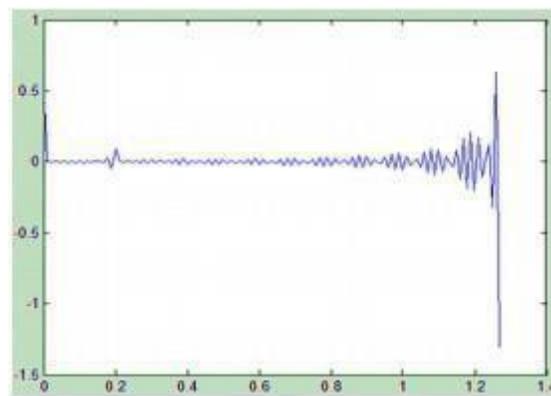


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