Difference in levels of resilience in engineering students and university higher technician

Diferencia en los niveles de resiliencia en alumnos de ingenieria y técnico superior universitario

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Abstract

The objective of this quantitative study was to detect the levels of resilience in students of Higher University Technician (TSU) and Engineering (ING) to develop training strategies on the subject. A quantitative approach methodology was used. The sample chosen through a non-random sampling was made up of 274 men and 142 women, 80% studying TSU and 20% ING, aged between 18 and 30 years. The resilience scale of Wagnild and Young, 1988 was applied. The data were analyzed with the statistical program SPSS 23. The results revealed that university students achieved high resilience scores, in some engineering, compared to the TSU; In addition, there was variation in the levels of resilience, between TSU in Mechatronics (MA) and ING in Automation (ITA), TSU in Information and Communication Technologies (ICT) and ING in ICT. While in the TSU in Marketing (MKT) and ING in Business Innovation (LIN) programs, no alterations in resilience levels are shown. It concludes with the proposal to continue with research that allows detecting other factors inherent to the educational process and the passage through the university associated with resilience.

Students, Resilience, Technological universites

Resumen

El objetivo del presente estudio cuantitativo fue, detectar los niveles de resiliencia en estudiantes de Técnico Superior Universitario (TSU) e Ingeniería (ING) para elaborar estrategias de capacitación sobre el tema. Se empleó metodología de enfoque cuantitativo. La muestra escogida a través de un muestreo no aleatorio, quedó formada por 274 hombres y 142 mujeres, el 80% estudia TSU y el 20% ING, con edades entre 18 y 30 años. Se aplicó la escala de resiliencia de Wagnild y Young, 1988. Los datos se analizaron con el programa estadístico SPSS 23. Los resultados revelaron que los estudiantes universitarios alcanzaron puntajes altos de resiliencia, en algunas ingenierías, comparado con los TSU; además hubo variación en los niveles de resiliencia, entre TSU en Mecatrónica (MA) e ING en Automatización (ITA), TSU en Tecnologías de la Información y Comunicación (TIC) e ING en TIC. Mientras que en los programas de TSU en Mercadotecnia (MKT) e ING en Innovación Negocios (LIN), no se muestran alteraciones en los niveles de resiliencia. Se concluye con la propuesta de continuar con investigaciones que permitan detectar otros factores propios del proceso educativo y del paso por la universidad asociados a la resiliencia.

Estudiantes, Resiliencia, Universidades tecnológicas

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Introduction

The term resilience is defined by González and Valdez (2006, cited in Espinosa, et al, 2017) as the result of the combination or interaction between the attributes of the individual (internal) and their family, social and cultural environment (external) that enable overcome risk and adversity constructively.

According to Arratia, Medina & Borja, 2008, cited in Caldera, et al (2016), resilience is a dynamic process, which takes place over time, and is based on the existing interaction between the person and the environment, which includes family and social environment. It is the result of a balance between risk factors, protective factors and personality of each individual, functionality and family structure, but it can vary over time and with changes in context. It implies more than surviving the traumatic event or adverse circumstances, since it includes the ability to be transformed by them and even build on them, giving them meaning. Resilience is not only to continue living, but to be successful in some vital aspect and enjoy life in general.

Resilience can be approached from two different approaches. On the one hand, there is the "risk" perspective, which focuses on the aspects that can trigger psychological, biological or social damage; their interest is in the risk factors around the individual. On the other hand, there is the so-called "challenge model", which focuses on the aspects or protective shields that can generate a defense against the possible damage or threat of risk factors and that unleash the subject's ability or ability. to overcome these adversities (Polo, 2009).

That is, the protective factors help the person to tolerate or generate a change of all those negative and dangerous aspects that threaten the balance and development of it. These factors can have an internal or external origin. When resilience has been conceived as a trait, it is suggested that it represents a set of characteristics that allow the individual to adapt satisfactorily to certain external risk factors (Connor and Davidson, 2003; Wagnild and Guinn, 2011; Wagnild and Young, 1993, cited in Ramos, et al. 2017).

For his part, Polo (2009), affirms that risk factors are actions, whether passive or active, that involve danger to the well-being of the person or that produce negative effects on their health or expose aspects of their development.

These two approaches, when integrated, provide a clearer and more complementary vision of the phenomenon. In this sense, it is assumed, on the one hand, the identification of the variables that can negatively and considerably affect the subject, but, also, the existence of barriers that can contribute to cope with risky situations and, even, to get the most out of them profit from adversity, which will lead to development and a better quality of life for the person (Caldera et. al. 2016).

Resilience has become a research topic associated with mental health and the adaptation of the individual in his environment (Salgado, 2005 cited in Villegas, et al. 2017), and has been defined precisely as the potential of individuals to develop psychologically healthy and successful, despite being exposed to situations that threaten their integrity (Vanistendael and Lecomte, 2002, in Villegas, et al. 2017).

Resilience in education

In education, the concept of resilience implies working with strength, that is, perseverance, the ability to undertake and resist, in order to face the problems of family, personal, professional and social life that influence academic performance (Villasmil , 2010, cited in Villegas et al 2017).

Using the words of (Yan Lee, et al, 2012, cited in Tipismana, 2019), academic resilience is the development of potential resources that the university student uses to solve problems and make decisions in typical situations of university life. This teaching includes processes and results, which are shown efficiently both in their cognitive and non-cognitive aspects.

Resilience is an educational intervention technique, in essence it is a new look at old man's problems. Risk has always been present and, from a preventive pedagogy, it is necessary to study all the protective factors that allow people to face risk and get out of it. For resilience processes to occur, the interaction of both the protection and risk factors mentioned above is unavoidable (Lugo, et al, 2016).

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Resilience improves the achievement of goals and achievements, poses demands to acquire new resources and allows the student to use them regularly in various situations and contexts where they participate. This interaction will be effective, to the extent that their achievement expectations are permanent, consistent and relevant (Becoña, 2006; Datu and Yuen, 2018, cited in Tipismana, 2019).

The same source comments that, by learning to perceive the possession of their resources, the student will promote their learning and facilitate the handling of uncertainties and the search for certainties to have control of the situation. The purpose is to be able to self-regulate continuously over time, as well as cognitively and emotionally sustainable.

In a study carried out by the Organization for Economic Cooperation and Development [OECD, (2011, cited in Dueñas, et al. 2019)] they find two factors strongly associated with resilience: the first one refers to a positive approach towards learning, shown through attitudes that indicate high levels of motivation, commitment and self-confidence, and the second, to the amount of time spent learning science during normal class hours.

Problem statement

Students develop a system of assumptions, opinions, imaginations of what the university system is like and the role they would play there. Cognitive social theory relies on the core of beliefs and expectations that is provided by its social context, to learn to interact in academic life. The style of how they learn it and develop their strategies will depend on the type of enriched environment or not to structure a personal profile that supports them in this process of academic performance at the university (Tadayon, 2012, cited in Tipismana, 2019). Young university students are in the process of training and they are supposed to be resilient, however, this is not always the case and they can fall into depressive states that even limit them to successfully complete their bachelor's degree. The university student is not exempt from living stressful situations and facing new challenges, so the university becomes an important space to determine resilience and, where appropriate, to favor activities that promote it (Campuzano & Jiménez, 2019).

Studies carried out in students show that there are significant differences with respect to resilience, so it is necessary to identify the resilience of their students in the various student populations in order to take preventive measures Montes & Sábado (2016). In addition, derived from the growth that higher education has had in our country, it has been necessary to consider the educational quality in an important way, which is why it has been necessary to reconfigure academic and management activities to an approach based on attention to needs. specific, including the education and comprehensive training of students, considering the processes associated with the teaching-learning system (Salas, 2013). A resilient student can better cope with stress and therefore be in a position to have significant learning (Campuzano & Jiménez, 2019).

Having expressed the above and considering the relevance that the study of resilience in education currently has, the following problem arises:

Is there a difference in the resilience levels of the Higher University Technician and Engineering students to establish possible training strategies on the subject?

Therefore, this work has the following objective:

Identify the levels of resilience in students of Higher University Technician and Engineering to develop training strategies on the subject.

Method

Shows

The present study was carried out at a University in the South of Sonora, Mexico, during the period from January to March 2020. We worked with a quantitative approach method, the sample was chosen for convenience through a non-random instrument, it was formed out of 416 participants, 80% (n = 331) study the second and fifth semester of Higher University Technician and 20% (n = 85) the eighth semester of Engineering. Of the TSU level, 36% belong to MKT, 32% to MA, and 12% TIC. In Engineering, 12% corresponds to the LIN career, 5% to ITA and 3% to ICT. Age ranges from 18 to 30 years.

Instrument

The Wagnild and Young, 1988 resilience scale was used, revised by the same authors in 1993. It is composed of 25 items, which score on a 7-point Likert-type scale, where 1 is in disagreement and a maximum of agreement is 7, all worded in a positive sense.

The total score of the scale was obtained by adding the individual results of each of the items and classifying them into three ranges of resilience: low level (25 to 75), medium (76 to 125) and high (126 to 175).

Process

The tests were applied in the classroom, with the prior authorization of the students. Each study lasted about 20 minutes. The reason for the work and its relevance were explained to the participants, in terms of the importance of knowing their level of resilience. Likewise, they were asked to carefully read each of the items and indicate the number of the answer that most closely matched their way of thinking and acting.

Data analysis

The data obtained were captured and analyzed using the statistical program SPSS version 23.

Results and discussion

The statistical results reveal that there are differences in the levels of resilience between university students of TSU and engineering, in table 1 it is shown that most of the participants who study TSU show a high level of resilience (89%), average resilience the 10% and 1% report a low level. In relation to Engineering there is an increase in the levels of resilience, 91% and 9% show the high and medium level respectively. In the opinion of Lavado (2019), resilience in university life contributes as a factor of self-protection against adverse situations and is the capacity that an individual has developed in an unfavorable environment. Likewise, adaptation to university life includes: adapting to the bachelor's degree, the educational program and the demands that the study implies, in addition, the adaptation is used as a reference to a person who is involved with his environment.

Resilience levels	TSU Frequency	%	engineering Frequency	%
Baja	4	1	-	-
Media	32	10	7	9
Alta	395	89	78	91
Total	331	100	85	100

Table 1 Resilience Levels at TSU and Engineering level

On the other hand, it was also found that the levels of resilience are different among students from different educational programs, these levels were compared and it was found that there are changes between TSU in MA 89% and 95% in ITA, a slight variation of 76 % in TSU in ICT and 75% in ING in ICT. While in the TSU programs in MKT and LIN, no differences are shown in the levels of resilience (Table 2).

Caldera, et al (2016), highlight that when university students obtain high resilience scores, at the higher level, this scenario may be due to the very demand of higher education studies, considering that the mandatory path for these disciples to access At the higher level, it implies 12 years of previous study, in which they faced many complex and sometimes problematic contexts such as stress, evaluations, group conflicts and the demands of teachers and parents, among others, that demand the acquisition, sometimes forced, of behaviors and cognitions with a certain degree of resilience. Regarding not finding statistically significant differences in MKT and LIN, Hernández, et al (2020), refer that more empirical research is required to demonstrate that students in these educational programs lack adverse situations before which they have to show resilient behaviors.

Resilience levels	MKT (TSU) %	LIN (ING) %	MA (TSU) %	ITA (ING) %	TIC (TSU) %	TIC (ING) %
Short	-	-	2	-	2	-
Half	6	6	9	5	22	25
high	94	94	89	95	76	75
Total	100	100	100	100	100	100

Table 2 Resilience levels in educational programs

In addition, the ANOVA comparison test was carried out between the resilience scale and the career studied by the participants. Table 3 shows the results, which showed that the students who are studying the Bachelor's Degree in Business Innovation and Engineering in Automation Technology present higher scores in all the variables with respect to the average. In relation to the analysis between the six educational programs evaluated (Marketing (TSU), Business Innovation, Mechatronics (TSU), Automation (ING), Information Technologies (TSU) and Information Technologies (ING), they show a significant difference with the scale resilience (Table 3).

Variables	MKT (TSU) M	LIN (ING) M	MA (TSU) M	ITA (ING) M	TIC (TSU) M	TIC (ING) M	ANOVA F(410)	p
Total Resilience	4.81	**4.97**	4.71	**4.85**	4.46	4.17	5.22	.00

Table 3 Simple variance analysis. Variable career

Conclusion

The objective of this work was fulfilled: Identify the levels of resilience in university students of Higher University Technician and Engineering to develop training strategies on the subject.

The results obtained set the tone to continue in the investigation of this very relevant issue, Barcelata (2015) affirms that resilience is not permanent, in longitudinal studies, they show that non-resilient adolescents became resilient in adulthood and showed success in important domains such as employment, housing and social activity; For this reason, it is suggested to carry out a longitudinal study that allows observing the behavior of emerging adults classified as low and high resilience, during their time at university and after graduation, in the work context (León et al. 2019).

Resilience, specifies the achievement of goals and achievements, designs demands for the construction of new resources, allows the student to use them regularly in various situations and contexts where he interacts. The interaction will be effective, as long as your expectations of achievement are consistent, congruent and relevant. That is, perceiving the possession of their resources will promote learning and facilitate the handling of uncertainties and the search for certainties to have control of the situation.

The goal is to achieve permanent self-regulation over time, cognitively and emotionally (Becoña, 2006; Datu and Yuen, 2018).

Villegas et al (2017) state that it is necessary to implement strategies that allow students to invigorate their resilience, considering that every day there are more media in which adolescents are immersed and paradoxically "feel alone".

A limitation of this study is that it was necessary to extend this research to all the educational programs of the University at the TSU and ING levels.

It is also recommended to continue with studies that allow detecting other factors inherent to the educational process and the passage through the university associated with resilience, so that the resilience-higher education relationship can be characterized more precisely since having a higher university level, it can be a protective factor against adversity; Therefore, it is desirable that both at a personal, family and institutional level, greater efforts be made to increase the educational level of people (Hernández, et al, 2020).

Finally, it is proposed to create intervention programs, workshops or courses with the aim of promoting and developing resilience in university students, in such a way that they can help them establish resilient protective factors and thus manage to cope with various adversities that arise in their lives. (Villegas et al, 2017).

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