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The influence that opening to change has on academic development in a public higher education institution

La influencia que tiene la apertura al cambio en el desarrollo académico en una institución de educación superior pública

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Abstract

Openness to change is the willingness of individuals to integrate into a process of change. In this work, the significant elements in the models of resistance to change are assumed as elements of openness to change and their influence on academic development in a Public Higher Education Institution (HEI) of the TecNM system is analyzed. The elements of change evaluated are: motivation, habits, professional projects and educational policies. A non-experimental, causal correlational quantitative research was carried out, with a cross-section generating contrasted explanations through descriptive and inferential statistics. The data collection instrument was the questionnaire with sociodemographic and analytical variables, which was applied to a sample of 55 teachers. Cronbach's alpha was used through the item variance method to verify the degree of reliability of the instrument. For the data analysis, the Pearson correlation coefficient and the Chi-square independence test were applied for the statistical significance of the results. Concluding that there is an influence between openness to change and academic development, determining that openness to change has a positive average correlation in the academic development of public HEI.

Openness to change, Academic Development, Higher education institution

Resumen

La apertura al cambio es la disposición de los individuos para integrarse en un proceso de cambio. En este trabajo los elementos significativos en los modelos de resistencia al cambio se asumen como elementos de apertura al cambio y se analiza su influencia en el desarrollo académico en una Institución de Educación Superior pública (IES) del sistema TecNM. Los elementos de cambio evaluados son: motivación, hábitos, proyectos profesionales y políticas educativas. Se realizó una investigación cuantitativa no experimental, correlacional causal, con corte transversal generando explicaciones contrastadas a través de estadística descriptiva e inferencial. El instrumento de recolección de datos fue el cuestionario con variables sociodemográficas y analíticas, que se aplicó a una muestra de 55 docentes. Se utilizó el alpha de Cronbach a través del método de varianza de los ítems para verificar el grado de confiabilidad del instrumento. Para el análisis de datos se aplicó el coeficiente de correlación de Pearson y la prueba de independencia de Chi cuadrada para la significación estadística de resultados. Concluyendo que existe una influencia entre la apertura al cambio y el desarrollo académico, determinando que la apertura al cambio tiene una correlación positiva media en el desarrollo académico de la IES pública.

Apertura al cambio, Desarrollo Académico, Institución de educación Superior

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Introduction

In Mexico, important efforts have been made to improve the quality of higher education. One of them is the implementation of public policy that directly impacts on teachers and contributes to the permanent improvement of academic staff Gordon (2009), recognise in the teaching staff the main actor in the change towards competences that give rise to the implementation of educational reform. However, a majority of teachers at various levels of education resist change, for a variety of reasons. This is where the openness to change that exists in the public higher education institutions (HEIs) of the TechNM system comes into play. While resistance to change is associated with power relations, openness to change is generated by the strategic orientation factors of companies (González and Hernández, 2007); this approach gives rise to the present work, in which some significant elements in the models of resistance to change are assumed as elements of openness to change and their influence on academic development is analysed.

As can be seen, academic work in public HEIs has changed substantially and has become more complex and holistic. Consequently, it is important to identify the performance of teachers in the face of these new challenges where activities such as teaching, research and networking activities are related in order to meet the objectives of quality education. These activities are coordinated by the academic development department.

On the other hand, it is presumed that the elements that are most repeated in the models of resistance to change and that could be detonators of openness, applying them to the teachers in the public IES of the TecNM system are: motivation, habits, the advantages of increasing their knowledge, skills and attitudes; because they are mixed and delimit their teaching performance.

This paper identifies the elements that promote openness to change and its relationship with academic development, as it is the triggering activity in the insertion of teachers in quality education in a public HEI.

As already mentioned, the teaching work in the federal and decentralised technological centres belonging to the Tecnológico Nacional de México is coordinated by the department of academic development, whose mission is to promote holistic integral development among teachers and students, fostering awareness that promotes openness to change and generates a commitment to self-improvement of their capacities and performance in relation to their environment, which allows them to achieve success in the development of their careers.

In turn, the academic development department aims to plan, coordinate, control and evaluate the activities that allow the academic development of teaching staff, in accordance with the rules and guidelines established by the Ministry of Public Education. In addition to disseminating the theoretical and methodological guidelines for curriculum planning, development and evaluation, established by the General Directorate of Technological Institutes and other competent bodies (TecNM, 2019).

In other words, the academic development department is in charge of initiating the processes of change to generate results in the development and updating of teaching staff, in accordance with the standards and guidelines established by the General Directorate of Technological Institutes, promoting among the staff programmes for academic improvement in line with the requirements of the technological institute in the different areas or disciplines it offers.

This work is of importance to promote openness to change in the Instituto Tecnológico Superior de Huatusco where it is developed through the reinforcement of habits in teachers that lead to exponential job growth, encouraged by motivation and the fulfilment of professional projects that reflect the performance and monitoring of the academic development department, limiting resistance to change and generating lines of action for the fulfilment of public policies in the education sector.

The general objective is to determine the relationship between openness to change and academic development in a public HEI.

And the specific objectives are:

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- To determine the relationship between motivation and academic development in a HEI.

- To determine the relationship between habits and the academic development of a HEI.

- To determine the relationship between professional projects in the academic development of a HEI.

- To determine the relationship between educational policy and the academic development of a HEI.

- To determine which indicators of the openness to change dimension influence the indicators of the academic development dimension of a HEI.

The variables in this work are quantitative, discrete with integers, with complex variables. The variables are therefore defined as follows:

- Independent variable (X): Openness to change.

- Dependent variable (Y): Academic development.

To address the working hypothesis, the conceptualisation of the variables is presented in table 1. Conceptualisation of the independent variable, Openness to Change.

Conceptual definition	Chosen element
Openness to change is generated by the strategic orientation factors of companies. The need for change generally begins with the redefinition of the strategic direction, thereby affecting the organisational structure, processes and procedures, which in essence transcends to affect the basic values, beliefs, habits and system of meanings, i.e. the culture of the company (González and Hernández, 2007).	Habits
The challenges of higher education must be associated with the government policies of countries that are also subject to the determinations of state reform. This presupposes an attitude of openness to change on the part of the teacher. (Palencia, 2006).	Educational policies
Finkelstein and Hambrick's (1996) concept of openness to change has been discussed in the strategic literature, linked to cognitive elements such as expectations, performance patterns, professional and social projects.	Professional projects
Strategic change is more likely to be successful when people are motivated (empowered), that is, they are given a say in the change process, the assumptions that make it necessary and the possible outcomes (Lines, 2004).	Motivation

Table 1 Conceptualisation of the independent variable, Openness to Change
Source: Own elaboration

And the conceptualisation of the second hypothesis variable is presented in table 2. Dependent variable, Academic development.

Conceptual definition	Selected element
Academic development is the validity and professional updating in the various areas of academic work, with updating being seen as the renewal of knowledge or new topics inherent to the training profile of each teacher (Donoso, 2018).	Professional updating
The desirable academic profile of the teacher represents the level of academic development, i.e. an "integral academic" who develops, at the same time, teaching, student tutoring, research and liaison activities. Linking is a teaching support activity that allows collaboration between the higher education institution and the governmental, business and/or social sectors, benefiting both actors through the direction and collaboration of integrating projects (Urbano, Aguilar and Rubio, 2006).	Linking
Academic development is based on teacher training and development as a result of strategies aligned between national development policies, science and technology strategies and teacher training and development policies, under a continuous and permanent character. Teacher training is a continuous process of didactic-pedagogical learning (Donoso, 2018).	Training
Academic development in teachers requires a change, a significant adjustment in roles to follow the international trend, research-oriented teachers individually or collegially publishing and disseminating facts or knowledge (Goodlad and Holmes, 1995).	Research

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Tutoring is considered by Vázquez, García, and Oliver (2008), as an integral activity in academic development, a process of accompaniment during the training of students, which takes the form of personalised attention to a student or a small group of them by competent academics trained for this function, it can also be mentioned as a student follow-up or guidance related to the student's professional profile.	Mentoring

Table 2 Conceptualisation of the Dependent Variable, Academic Development
Source: Own elaboration

The operational concept in this work of the independent variable openness to change is handled as the willingness of the individuals who make up the organisation to join a process of change through constant motivation, to encourage habits in them that help to fulfil the professional projects derived from the educational policies.

However, strategic change is more likely to be successful when people are motivated (empowered), that is, when they are given a say in the change process, the assumptions that make it necessary and the possible outcomes (Lines, 2004).

On the other hand, the operational concept of the dependent variable academic development is considered as the response to a reality between national development policies and science and technology strategies to generate in teachers a desirable academic profile relating activities such as training, linking, research and tutoring, to raise personal growth and maintain a professional update that helps the evolution of Mexican higher education in the face of globalised challenges.

The structure of the work is integrated by the history of the decentralised technological institutes including at the end the Higher Technological Institute of Huatusco, where the research was carried out; continuing with the models of resistance to change to identify the elements that are assumed for the opening to change and closing with the elements that integrate the academic development in the public Institutions of Higher Education, specifically in the decentralised technological institutes that are part of the TecNM.

Afterwards, the methodology developed in the research work is presented in order to conclude with the results and conclusions obtained from this work.

Decentralised Technological Institutes

Higher education in Mexico is a set of public and private institutions, with different legal status, professional and postgraduate offers, age, size, research capacity, facilities and intellectual resources. In the general organisational manual of the Tecnológico Nacional de México, published in the Official Journal of the Federation (2015), Chapter II states that the Technological Institutes were born of a Federal Government project entrusted to the National Polytechnic Institute (IPN).
The first two technological institutes were founded in the country in 1948, with Durango and Chihuahua being the first to emerge. Given the importance and strength of the ITs over the years, in 1977, the General Directorate of Regional Technological Institutes was created. In 1978, the General Directorate changed its name from Technical Directorate to Academic Directorate. On 24 April 1981, it changed its name to Dirección General de Institutos Tecnológicos. In the same year, the name of the campuses was changed from Regional Technological Institute to Technological Institute, due to the fact that their federal character made them attend not only the local and regional demand, but also the national level. In 1990, the system of decentralised or state technological institutes was born in Mexico, under different schemes to those that operated in the federal Technological Institutes, as they also have the participation of the states and municipalities in which they are located (Gómez, Ávalos and Becerra 2016).

In 2001, a new organic-functional structure was authorised, concluding an ambitious restructuring process of the General Directorate of Technological Institutes. When the National Education System was restructured by levels in 2005, all the Technological Institutes were integrated into a single unit, creating the General Directorate of Higher Technological Education (DGEST), which operated until 23 July 2014.

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On 23 July 2014, the Presidential Decree was published in the Official Journal of the Federation, creating the largest technological higher education institution in our country, the Tecnológico Nacional de México (TecNM).

At present, the Tecnológico Nacional de México is made up of 266 institutions, of which 126 are Federal Technological Institutes, 134 Decentralised Technological Institutes.

The Instituto Tecnológico Superior de Huatusco (ITS Huatusco) was created in 2001, by means of a coordination agreement between the federal and state governments, with the fundamental purpose of promoting the Integral Development of the different regions of the state, expanding the coverage of higher education services offered to young people in Veracruz in general and, in this case, in the region of Huatusco in particular. Its area of influence includes 17 municipalities in the centre of the State of Veracruz located in the Natural Region of the Great Mountains.

The teaching and administrative staff with which it began operations consisted of 8 professors, the Operational Coordinator, the Administrative Deputy Director and 3 Department Heads. The Decree officially creating the ITS Huatusco as a decentralised public body of the State Government, with its own legal personality and assets, was published on 13 April 2003 in the Official Gazette of the State Government. The H. Ayuntamiento de Huatusco, donated the 20 hectares of land currently occupied by the institution in the colonia Reserva Territorial No. 25 Poniente.

The Institute has promoted activities aimed at linking with the productive, public and social sectors of the region, through research and technological development projects, collaboration agreements with companies, educational and research institutions, civil society organisations, municipal and state authorities, in order to create the necessary conditions to participate in regional, state and national development (TecNM, 2018).

The Tecnológico de Huatusco stands out for the accreditations granted to 6 of its degree programmes by the Consejo de Acreditación de la Enseñanza de la Ingeniería, A.C. (CACEI) of the degree programmes of the TecNM. (CACEI) for Industrial Engineering, Electromechanical Engineering, Food Engineering and Business Management Engineering; and for Computer Systems Engineering by the National Council for Accreditation and Informatics and Computing A.C. (CONAIC). (CONAIC) and recently by the Council for the Accreditation of Education in Accounting and Administration (CACECA) for the Bachelor's Degree in Public Accountancy.

The teaching staff that interacts with the students in the teaching-learning process is currently made up of 70 professors. The Institute has had to respond to the demands of a demanding society. However, today it is not only an Institution that has grown, but has become stronger and stronger, experiencing a notable increase in enrolment and staff, acquiring ever greater relevance in the eyes of the federal and state educational authorities.

Models of Resistance to Change as Elements of Openness to Change.

First we address some models of resistance to change such as that of Kotter and Schlesinger (2008), which analyses resistance to change as part of the characteristics of people, which can manifest themselves in a direct or deferred form and has various causes: habits, insecurity, fear, poor communication, among others. Causes that probably limit openness to change in a public HEI of the decentralised technological system of the State of Veracruz.

On the other hand, Delgado, Pino and Gonzalez (2018) in their model mention:

> "That the motivation of teachers to get involved in processes of change and improvement in the school where they work is determined by several factors, among others: their previous training, the principal's leadership, the feeling of institutional support. Determining whether these factors are in place at the beginning of an innovation is crucial for its ultimate success". (p. 17)

The research work by Delgado et al. (2018) provides a classification of dimensions to assess resistance to change.

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Another study to consider is the one carried out at the Autonomous University of the State of Mexico by González and Carreto (2018), which revealed that the teaching profile of upper secondary education integrates knowledge, skills and attitudes that are mixed and delimit the performance of teachers mainly in the projects they carry out. In addition, he notes that most teachers, accustomed to the traditional way of teaching their classes, resist change, either due to lack of will, lack of time, lack of teaching resources and infrastructure.

In this case, openness or willingness to change is a cognitive, emotional and behavioural process that occurs when the forces that favour change are greater than those that discourage it. Understanding that motivations, expectations and attitudes are important factors in the investments that a person can make and that promote openness (De Gil and Lameda, 1999).

Openness to change is closely related to resilience in organisations. Seen from a humanistic point of view, openness involves the motivation and goals of each person as areas of particular interest at the beginning of change. Franco (2021) points out that motivation among higher education teachers is driven by intrinsic factors such as salary and pension. However, an individual's readiness to change may also be due to the experiences they have, being used to change, age, as well as how open and receptive they are to change. The reason why change is limited is because people are afraid of facing an uncertain future and of changing habits (De León, 2000).

Consequently, the openness to change addressed in this paper focuses on the individual characteristics of the members of the educational institutions, these characteristics being the attitudes that teachers manifest directly according to their perception and deferred by external events that affect them, a situation that delimits the processes of change.

Resistance to change among ITS Huatusco faculty was detected by the department of academic development when analysing the indicators of teacher development among the federal and decentralised technological institutions during 2016, 2017 and 2018.

The indicators showed the following: the majority of ITSH teachers did not qualify to be part of the national system of researchers, only 2% belonged to it; at the same time the teachers were not integrated into academic bodies or were only in academic bodies in formation; on the other hand only 25% of teachers were desirable profile, this indicator is one of the most important because it comprehensively evaluates activities such as teaching, tutoring, academic production, thesis direction and academic management among others (TecNM, 2018).

Therefore, resistance to change is detected on the part of teachers when they ignore the invitations that the department of academic development constantly promotes among the staff for their integration into different activities that support the aforementioned indicators and that although the invitations are given in time and form they do not manage to get the teachers out of their comfort zone and they only comply with one of their activities as stated in the ITSH manual of functions in article 5, which is to provide education, often omitting the other activities such as: Organising and carrying out research on problems of local, regional and national interest;

To develop activities aimed at extending the benefits of science, technology and culture, and To develop activities aimed at linking with the public, private and social sectors in the consolidation of the technological development of the community (ITSH, 2004).

Below, we can see that the concept of resistance to change has been addressed by different authors over the years and in each of them openness to change shows a renewing, positive and supportive movement, which if adopted would be an option to reduce the resistance to change that teachers at ITS Huatusco are presenting (table 3).

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Theory	Contribution to resistance to change	Openness to change
Scientific Theory Taylor F. - 1916	Main speaker of the administrative discipline tries to explain how organisations evolve according to their objectives and the presence of resistance to change for labour efficiency in the processes (Pardo, 2010).	Labour efficiency in processes.
Classical Theory Fayol H. -1916	Part of the organisational whole and its structure to ensure the efficiency of each of the parties involved, resistance to change is addressed by integrating either departments or individuals (occupants of positions and performers of functional areas).	Organisational efficiency.
Theory of Human Relations. Elton Mayo - 1925	A person's productivity is not only determined by his or her physical or mental abilities but also by the social norms and social expectations he or she has, consequently, resistance to change is determined by the degree of acceptance the individual has of the group to which he or she belongs.	Attitude towards the work group.
Bureaucratic Theory Weber M. - 1921	Authority is represented through institutionalised power and implies the likelihood of imposing one's will within a social relationship even against any kind of resistance. In other words, power is the arbitrary imposition by one person on the behaviour of others.	Attitude of the person in authority

Table 3 Openness to change in classical resilience theories
Source: Own elaboration

Following the classical theories came the modern theories, proposed by authors who also developed the event of resistance to change and where openness to change is reflected as a renewing event (see table 4).

Theory	Contribution to resistance to change	Openness to change
Behavioural Theory Mc. Gregor D. - 1947	He mentions that once the basic needs of individuals have been satisfied, the stimuli necessary to satisfy them cease to be motivating. New needs are generated, such as those of esteem and self-fulfilment, reasons that promote resistance to change and which most companies are not interested in meeting.	Motivation of individuals
Management Theory Drucker P. (1950)	The task of management is to make people capable of developing joint action by giving them common goals and motivating them to achieve them, and consequently to face change.	Motivation for professional projects
Institutional Theory. Meyer J. and Rowan B. P	Organisations whose structures become isomorphic to the myths of the institutional environment, in contrast to those structured primarily by the demands of technical production and exchange, diminish internal coordination and control in order to maintain legitimacy. It establishes that organisational behaviours are a product of the ideas, values and beliefs that originate in the institutional context, so that, in order to survive, organisations must conform to institutional expectations, even if these do not coincide with the technical aspects of obtaining and improving performance (Restrepo and Rosero, 2020).	Strategic orientation of companies.
Contingency Theory. Fred Fiedler -1964	It takes into account the environment, which generates uncertainty, caused by socio-cultural, technological, political, economic and other changes. All this has an impact on the administrative process. It also mentions that people are different, and these individual differences play an important role in the resistance to change, so the leader must make use of this to design the positions, and generate motivation techniques with an appropriate leadership style.	Motivation of the members of the organisation.

Table 4 Openness to change in Modern Resilience theories
Source: Own elaboration

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As mentioned in Table 3.1 and 3.2 of the classic and modern theories of resistance to change, openness to change is given as an initial event in order to confront and reduce the resistance to change experienced by individuals in organisations, consequently it is necessary to make a situational analysis and the forces that restrict it (to change), since given the complexity and speed of change of the organisational environment it is difficult to fully understand it, reducing the capacity to respond to the demands of the environment (Franco, 2013).

Academic development

In the higher education model for the 21st century, academic development is a specific process that prepares educational scenarios for teachers to develop their potential in a permanent evolutionary process.

The Decentralised Technological Institutes are part of a training and teaching scheme where the teaching staff is the actor of change because they must maintain a teaching profile that fulfils training, liaison, research and tutoring activities. (TecNM, 2018).

However, the university profession requires vocation and commitment to the academic environment (Seara, 2009). Currently, in public higher education institutions, teachers' curricula are channelled towards the acquisition of professional competences that favour the integration of knowledge and transdisciplinarity, which serve as an approach to professional reality.

Within the structure of the TecNM (2019), as mentioned above, there is the Academic Development Department, which among its main functions with teachers, is "to plan, coordinate, control and evaluate the activities that allow the academic development of teaching staff and their updating, according to the rules and guidelines established by the Directorate of Higher Technological Education" and "to schedule the activities of Integral teacher evaluation and teacher training courses-workshops" (para. 1).

For academic development, teacher training is an essential strategy, but not the only one (Rodríguez, 2011). In other words, given the changes in which education has been immersed, teachers require new ways of applying tacit knowledge, adding research activities for the generation of articles, conferences, congresses, forums, patents, prototypes, etc. Consequently, the academic role has changed from teaching to research. Moreover, it is no longer enough to provide quality teaching, but it is now promoted and expected that the academic be strongly linked to the productive sectors of their environment through activities such as advice, consultancy or applied research.

The actions promoted by the department of academic training in public higher education institutions, in this case in the TecNM, are:

a) Teacher and disciplinary training and updating through a diagnosis of needs by the academic departments.

b) The management of support in the field of postgraduate studies.

c) The evaluation and feedback to teachers based on the results of the evaluation of teaching performance.

d) The management and support of educational research projects.

In relation to the aforementioned actions, teachers and higher education institutions have been immersed in a wave of evaluation that formally emerged in 1989 as part of Mexican educational policies.

Teacher evaluation became a means of identifying teachers' progress in order to provide feedback. Teacher evaluation is therefore a tool for understanding teaching practice.

On the other hand, the creation of teaching planning in public HEIs requires the inclusion of professional and teaching update programmes that guarantee the acquisition of the necessary competences for each teacher because most of them are not used to the development of this new type of teaching.

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For its part, the Instituto Tecnológico Superior de Huatusco (ITSH) has a department of Academic Development, according to the General Organisation Manual, which establishes its internal coordination with the Directorate of Planning and Liaison, the Sub-Directorate of Higher Studies, the Department of Basic Sciences and Division.

The department of academic development within the IT Huatusco contributes by participating in the registration of candidates for the entrance evaluation; it carries out studies to detect the training needs of the Institute's teaching staff in order to design proposals for attention that will be integrated into the training, updating and professionalisation programme for teachers; it participates in the integration of basic statistics and the Institute's information systems to generate reports on the behaviour of basic institutional indicators and develop projects for the improvement and updating of teaching staff, to maintain the quality of the educational service offered at the Institute.

Consequently, the academic development department of ITS Huatusco, in order to promote the professional growth of teachers, will seek to reinforce the elements that promote openness to change in order to comply with the public policies of the education sector.

Methodology to be developed

The type of research is quantitative because it is based on the study of the existing reality in the ITS Huatusco through procedures based on the measurement of the study variables, generating contrasted explanations based on the research hypothesis "Openness to change influences academic development". Descriptive statistics and inferential statistics were used to explain the variables under study (Pagano, 1999).

This research work has a non-experimental design. "The non-experimental research used is that which does not deliberately manipulate the variables to be studied" (Hernández, Fernández & Baptista, 2014 p.152), because no situation is constructed, but rather existing situations are observed in this case in the ITS Huatusco, i.e. it is a study that does not intentionally vary the independent variable in this case openness to change, to see its effect on other variables.

In non-experimental designs, the researcher observes the phenomena as they occur naturally, without intervening in their development. (Martínez and Benítez, 2016).

The design in non-experimental research studies is characterised by the observation and analysis of phenomena as they occur naturally, without intervening in their development.

The research design applicable in this work is cross-sectional. With the trans-sectional or cross-sectional research design, data were collected at a single point in time, only the application of the pilot and final test was carried out (Hernández et al., 2014).

In this work, the variables are analysed at a given point in time, that is, the event is evaluated at a single point in time, with a single data collection and with the purpose of describing the variables and analysing their incidence and interrelation.

The cross-sectional type of research focuses on the comparison of certain characteristics or situations in different subjects at a specific point in time, with all subjects sharing the same temporality (Hernández et al., 2014). Cross-sectional research is part of a non-experimental design.

The research is correlational-causal because "these designs describe relationships between two or more categories, concepts or variables at a given time". (Hernández et al., 2014, p. 157).

The data collection instrument is a questionnaire applied to teachers of the Higher Technological Institute with two sections, the first section includes socio-demographic data and the second section covers the analytical variables of the research (table 5):

Block	Number of dimensions	Likert scale items 1- 5	Number of optional items
1	5	-	5
2	8	57	

Table 5 Structure of the questionnaire applied to teachers
Source: Own elaboration

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To determine the degree of reliability of the instrument used, the Cronbach's Alpha test was used through the method of variance of the items (Andrew, Pedersen, and McEvoy, 2019).

There are 70 teachers working at the Instituto Tecnológico Superior, subdivided into 7 academies (see table 6).

No. teachers	Secondment Academy
13	Industrial Engineering
9	Electromechanical Engineering
10	Food Engineering
9	Computer Systems Engineering
8	Business Management Engineering
10	Public Accountant
4	Environmental Engineering
7	Basic Sciences
70	Total teaching staff

Table 6 Academic areas of affiliation
Source: Own elaboration

Therefore, we have a finite population. It was decided to use a confidence level of 95% and an expected proportion of 0.50 and an admissible error of 5%. Therefore, a sample of 55 teachers from the Instituto Tecnológico de Superior should be taken.

The data analysis was carried out by means of Pearson's coefficient in order to evaluate the hypotheses. Pearson's correlation coefficient is used to measure the magnitude of the linear relationship between two variables (see Figure 1), i.e. it indicates the strength or weakness of the linear relationship (Lind, Marchal and Whathen, 2012).

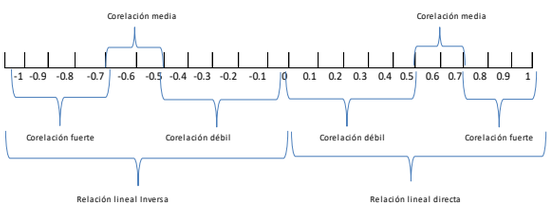

Figure 1 Pearson correlation coefficient values
Source: Gutiérrez B. (2012). Probability and Statistics Competency Approach. p. 199.

In addition, the chi-square test for independence was used to identify the relationship of the indicators of the analytical variables. A hypothesis test, such as the chi-square test for independence, assesses the statistical significance of the results of a research study.

Specifically, the intent of the test is to determine whether patterns or relationships observed in simple data may have occurred simply by chance; that is, without any corresponding pattern or relationship in the populations. (Anderson, Sweeney, Williams and Alvarez, 2001).

Results

The pilot test was carried out on 15 people using a 57-item questionnaire. (see table 7).

Cronbach's alpha	No. of items
0.955	57

Table 7. Reliability statistics
Source: Own elaboration

Parametric Test

Ho: The variable academic development (DV) in the population has a normal distribution.

H1: The variable academic development (DV) in the population is different from normal distribution.

	Kolmogorov-Smirnova				Shapiro-Wilk		
	Statistic	gl	Sig.		Statistician	gl	Sig.
Academic_development	0.091	55	.200*		0.983	55	0.613
Openness_change	0.077	55	.200*		0.977	55	0.365
*. This is a lower limit of true significance.							
a. Lilliefors significance correction.							

Table 8 Normality tests
Source: SPSS Statistics

Interpretation of Normality Test Results

As the significance level is greater than 0.05, the null hypothesis is not rejected; therefore, the variable academic development (VD) and the variable openness to change have a normally distributed population. (see table 8). Therefore, Pearson's test will be applied for the correlation analysis.

Hypothesis testing

General hypothesis H1= β openness to change ≠ 0

The correlation between the population is different from zero, i.e. openness to change influences academic development (see table 9).

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At this point it is important to comment on Figure 1 Pearson's correlation coefficient values because it shows a numerical measure of association between two variables and describes the apparent strength of the relationship. Where the medium correlation is represented by values from -0.5 to -0.7 and from 0.5 to 0.7. And the strong correlation is represented by the values -0.7 to -1 and 0.7 to 1. Passing through zero where there is no association between the variables.

		Motivacion	Habitos	Proy_ Profes	Polit_educat	Vinculación	Formación	Tutorías	Investigación	Apertura al Cambio	Desarrollo_academico
Motivacion	Correlacion de Pearson	1	0.564**	0.637**	0.719**	0.530**	0.476**	0.436**	0.672**	0.862**	0.719**
	Sig. (bilateral)		0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Habitos	Correlacion de Pearson	0.564**	1	0.536**	0.615**	0.454**	0.277*	0.346**	0.431**	0.717**	0.522**
	Sig. (bilateral)	0.000		0.000	0.000	0.000	0.041	0.010	0.001	0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Proy_ Profes	Correlacion de Pearson	0.637**	0.536**	1	0.811**	0.512**	0.188	0.180	0.508**	0.892**	0.490**
	Sig. (bilateral)	0.000	0.000		0.000	0.000	0.170	0.188	0.000	0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Polit_educat	Correlacion de Pearson	0.719**	0.615**	0.811**	1	0.615**	0.295*	0.279*	0.559**	0.936**	0.613**
	Sig. (bilateral)	0.000	0.000	0.000		0.000	0.029	0.039	0.000	0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Vinculación	Correlacion de Pearson	0.530**	0.454**	0.512**	0.615**	1	0.300*	0.283*	0.564**	0.619**	0.777**
	Sig. (bilateral)	0.000	0.000	0.000	0.000		0.026	0.036	0.000	0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Formación	Correlacion de Pearson	0.476**	0.277*	0.188	0.295*	0.300*	1	0.447**	0.354**	0.358**	0.676**
	Sig. (bilateral)	0.000	0.041	0.170	0.029	0.026		0.001	0.008	0.007	0.000
	N	55	55	55	55	55	55	55	55	55	55
Tutorías	Correlacion de Pearson	0.436**	0.346**	0.180	0.279*	0.283*	0.447**	1	0.365**	0.347**	0.695**
	Sig. (bilateral)	0.001	0.010	0.188	0.039	0.038	0.001		0.006	0.009	0.000
	N	55	55	55	55	55	55	55	55	55	55
Investigación	Correlacion de Pearson	0.672**	0.431**	0.508**	0.559**	0.564**	0.354**	0.365**	1	0.640**	0.781**
	Sig. (bilateral)	0.000	0.001	0.000	0.000	0.000	0.008	0.006		0.000	0.000
	N	55	55	55	55	55	55	55	55	55	55
Apertura al Cambio	Correlacion de Pearson	0.862**	0.717**	0.892**	0.936**	0.619**	0.358**	0.347**	0.640**	1	0.682**
	Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.007	0.009	0.000		0.000
	N	55	55	55	55	55	55	55	55	55	55
Desarrollo_academico	Correlacion de Pearson	0.719**	0.522**	0.490**	0.613**	0.777**	0.676**	0.695**	0.781**	0.682**	1
	Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	N	55	55	55	55	55	55	55	55	55	55
* La correlación es significante al nivel 0.05 (bilateral)											
** La correlación es significativa al nivel 0.01 (bilateral)											

Table 9 Correlations
Source: SPSS Statistics

Interpretation of the correlation table

There is a positive average relationship between openness to change and academic development, with a significance of 0.000 (table 9).

Individual hypotheses

1. Motivation influences academic development

2. Habits influence academic development

3. Professional projects influence academic development

4. Educational policies influence academic development (see table 10).

		Academic_development	Motivation	Habits	Professional_Projects	Politi_educat
Academic_development	Pearson correlation	1	0.719**	.522**	.490**	.613**
	Sig. (bilateral)		0.000	0.000	0.000	0.000
	N	55	55	55	55	55
Motivation	Pearson correlation	0.719**	1	.564**	.637**	.719**
	Sig. (bilateral)	0.000		0.000	0.000	0.000
	N	55	55	55	55	55
Habits	Pearson correlation	.522**	.564**	1	.536**	.615**
	Sig. (bilateral)	0.000	0.000		0.000	0.000
	N	55	55	55	55	55
Professional_projects	Pearson correlation	.490**	.637**	.536**	1	.811**
	Sig. (bilateral)	0.000	0.000	0.000		0.000
	N	55	55	55	55	55
Education_policy	Pearson correlation	.613**	.719**	.615**	.811**	1
	Sig. (bilateral)	0.000	0.000	0.000	0.000	
	N	55	55	55	55	55
	**Correlation is significant at the 0.01 level (bilateral).					

Table 10 Correlations 2
Source: SPSS Statistics

The explanation of the results of the individual hypotheses is presented below (see table 11).

Hypothesis	Interpretation of results
Ho= βMotivation = 0	r= 0.719
Motivation does not influence openness to change	Significance level = 0.000
	Motivation has a strong positive relationship with academic development.
H1= βMotivation ≠ 0	As the significance value is 0.000 < 0.05 we reject the null hypothesis and the alternative hypothesis is not rejected.

Table 11 Table interpreting results of individual research hypotheses
Source: Own elaboration.

The result of the bilateral significance of the Pearson correlation values is shown graphically in figure 2.

The predictors account for 55% of the variance in significance in the academic development scores (see table 12).

Model	R	R-squared	R-squared corrected	Standard error of estimation
1	.742ᵃ	.551	.515	8.69410
a. Predictor variables: (Constant), Motivation, Project_Professional_Habits, Polit_educat.				

Table 12 Summary of the model
Source: Own elaboration

The overall regression of the model with the predictors of motivation, habits, professional projects and educational policies is significant, with a p-value of less than 0.05 (see table 13).

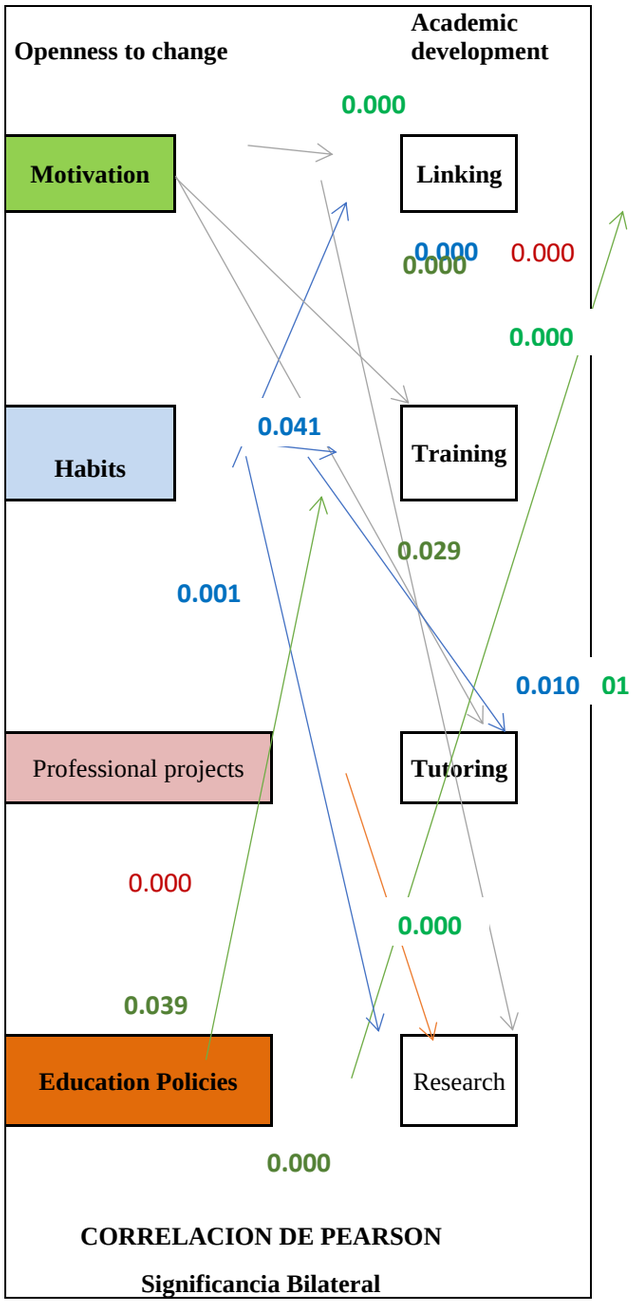

Figure 2 Pearson correlation values. Bilateral significance
Source: Own elaboration

Model		Sum of squares	Gl	Root mean square	F	Sig.
1	Regression	4638.163	4	1159.541	15.340	.000[b]
	Residual	3779.365	50	75.587		
	Total	8417.527	54			

a. Dependent variable: Academic development
b. Predictor variables: (Constant), Polit_educat, Habits, Motivation, Proy_Professional.

Table 13 ANOVA
Source: SPSS Statistics

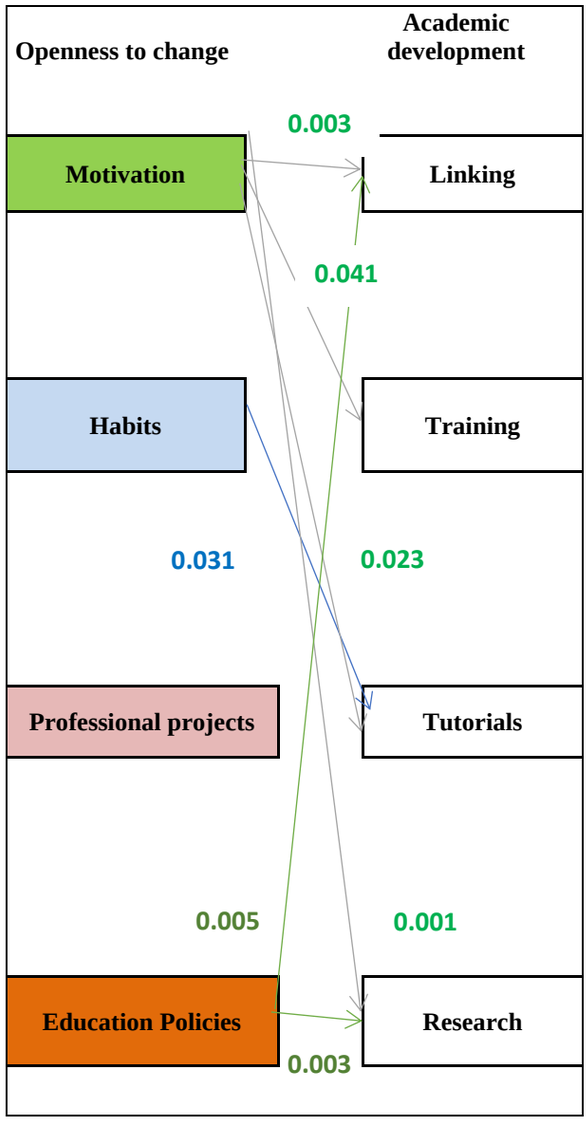

Figure 3 Chi-square test for independence
Source: Epropia: Own elaboration

Findings both in the λ2 test of independence and Pearson's correlation, there is no relationship between vocational projects and training, as well as vocational projects and tutoring.

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Conclusions

It was identified that with a probability of error of 0.00 there is an influence between openness to change and academic development, and it was also determined that openness to change has a positive correlation with academic development in the public HEI.

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Motivation was found to have a strong positive relationship with academic development, since the significance value is 0.00 less than 0.05, and there is a relationship between motivation and openness to change.

Motivation is the factor most sensitive to academic development, with its indicators of: multidisciplinary work, public recognition, promotion of family integration, generation of confidence, enjoyment of teaching, achievement of goals and personal improvement, having a high influence on the dimension of linkage and research. Motivation generates a motive and drives the activity towards the achievement of its object-goal (Newstrom, 2011). The motivation of an individual is due to the search for satisfaction of three needs: the need for achievement, the need for power and the need for affiliation (Chiavenato, 2016).

Likewise, the dimensions of educational policies (institutional objectives, planning, resources, dissemination, concordance and efficiency) are related to academic development mainly in linkage and research. Teacher training and development are results that should be part of a strategy aligned with national development policies, the challenges of higher education should be associated with research and innovation activities that are linked to the business sector (Palencia, 2006).

However, the habits (use of IT, adaptation to change, commitment to continuous improvement, comfort with change and paradigm shift) had the greatest impact on the mentoring dimension. Mentoring is about providing students with more than academic or professional knowledge, and should focus on the individual and their training (Narro and Arredondo 2013).

On the other hand, professional projects with their dimensions (teaching skills, teachers' values, professional knowledge, compatible projects, adaptation to the labour market, professional growth, institutional and professional performance) have an impact on linking and research.

The factors with the highest sensitivity to openness to change were outreach and research. Research and outreach are integral elements of a teacher with a desirable profile, i.e. an integral academic (Urbano, Aguilar and Rubio, 2006).

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