La educación disruptiva y el desarrollo de competencias universitarias

Disruptive Education and the Development of University Competencies

Educação disruptiva e o desenvolvimento de habilidades universitárias

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Resumen

El objetivo de investigación fue identificar los aspectos del modelo educativo que en mayor medida caracterizan a la educación disruptiva y valorar su incidencia en el desarrollo de las competencias universitarias. El método usado se sustentó en un enfoque cuantitativo y diseño transversal, dirigido a 2722 participantes: 2223 estudiantes de primero a cuarto semestre de licenciatura de diferentes facultades de la Universidad Autónoma de Chihuahua, así como a 499 docentes de esta universidad. El cuestionario diseñado para recabar la información estuvo conformado por seis dimensiones, y fue previamente validado a través de cuatro técnicas: juicio de expertos, alfa de Cronbach, análisis factorial exploratorio (AFE) y análisis factorial confirmatorio (AFC). El procesamiento y análisis de la información se realizó a través de tres análisis estadísticos: univariado, bivariado y multivariado, con pruebas paramétricas con un nivel de significancia de $p \leq 0.01$. En los resultados se identificaron aspectos que caracterizan al modelo educativo disruptivo como son: contribuir a la formación

humanista de los estudiantes, promover el uso de TAC (tecnologías del aprendizaje y la comunicación), favorecer el aprendizaje por diversos medios y modalidades, promover nuevas opciones formativas, propiciar el desarrollo de competencias digitales y motivar a identificar problemas del contexto real. Sin embargo, se observó que lo menos evaluado es formar a los estudiantes para que contribuyan al desarrollo sostenible, desplieguen todo su potencial creativo y para el desarrollo de competencias. Asimismo, se observó que los estudiantes prefieren un modelo menos disruptivo, aun cuando en este estudio resalta que existe correlación significativa entre el modelo educativo, las TAC y el desarrollo de competencias universitarias. De igual forma, se logró identificar dos modelos de educación disruptiva, donde se resalta que al promover el uso de las TAC se incrementa en 71 % la innovación y el emprendimiento en los estudiantes al solucionar problemas reales, lo que se favorece el pensamiento complejo, así como el desarrollo de competencias. También se identificaron áreas de oportunidad aplicables a universidades mexicanas para responder a las demandas del contexto actual.

Palabras clave: competencias, formación, modelo educativo, tecnología de la información y la comunicación.

Abstract

The objective of the research was to identify the aspects of the educational model that to a greater extent characterize disruptive education and to evaluate its incidence in the development of university competencies. The method used was based on a quantitative approach and cross-sectional design, directed to 2722 participants: 2223 students from the first to the fourth semester of bachelor's degree from different faculties of the University Autonomy of Chihuahua, as well as 499 teachers at this university. The questionnaire designed to collect the information consisted of six dimensions and was previously validated through four techniques: expert judgment, Cronbach's alpha, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA). The information was processed and analyzed through three statistical analyses: univariate, bivariate, and multivariate, with parametric tests with a significance level of $p \leq 0.01$. The results identified aspects that characterize the disruptive educational model, such as: contributing to the humanistic training of students, promoting the use of ICTs (learning and communication technologies), favoring learning through different media and modalities, promoting new training options, fostering the

development of digital competencies, and motivating the identification of problems in the real context. However, it was observed that the least evaluated is to train students to contribute to sustainable development, deploy all their creative potential, and develop competencies. Likewise, it was observed that students prefer a less disruptive model, even though this study highlights that there is a significant correlation between the educational model, the TAC, and the development of university competencies. Similarly, it was possible to identify two models of disruptive education, where it is highlighted that by promoting the use of ICTs, innovation and entrepreneurship increase by 71% in students when solving real problems, which favors complex thinking, as well as the development of competencies. Areas of opportunity applicable to Mexican universities to respond to the demands of the current context were also identified.

Keywords: Competencies, Educational Model, Formation, Information, and communication technology.

Resumo

O objectivo da investigação era identificar os aspectos do modelo educativo que mais caracterizam a educação disruptiva e avaliar o seu impacto no desenvolvimento das competências universitárias. O método utilizado baseou-se numa abordagem quantitativa e num desenho transversal, dirigido a 2722 participantes: 2223 estudantes do primeiro ao quarto semestre de estudos universitários de diferentes faculdades da Universidade Autónoma de Chihuahua, bem como 499 professores desta universidade. O questionário concebido para recolher a informação era constituído por seis dimensões, e foi previamente validado através de quatro técnicas: juízo pericial, alfa de Cronbach, análise de factores exploratórios (EFA) e análise de factores confirmatórios (CFA). O processamento e análise da informação foi efectuado através de três análises estatísticas: univariada, bivariada e multivariada, utilizando testes paramétricos com um nível de significância de $p \leq 0,01$. Os resultados identificaram aspectos que caracterizam o modelo educativo disruptivo, tais como: contribuir para a formação humanista dos estudantes, promover a utilização das TIC (tecnologias de aprendizagem e comunicação), favorecer a aprendizagem através de diferentes meios e modalidades, promover novas opções de formação, fomentar o desenvolvimento de competências digitais e motivar a identificação de problemas no contexto real. No entanto, observou-se que o menos avaliado é formar estudantes para

contribuírem para o desenvolvimento sustentável, para libertarem todo o seu potencial criativo e para desenvolverem competências. Do mesmo modo, observou-se que os estudantes preferem um modelo menos perturbador, embora este estudo saliente que existe uma correlação significativa entre o modelo educativo, os TAC e o desenvolvimento de competências universitárias. Do mesmo modo, foram identificados dois modelos de educação disruptiva, salientando que ao promover a utilização das TIC, a inovação e o empreendedorismo aumentam em 71% nos estudantes quando resolvem problemas reais, o que favorece o pensamento complexo, bem como o desenvolvimento de competências. Foram também identificadas áreas de oportunidade aplicáveis às universidades mexicanas, a fim de responder às exigências do contexto actual.

Introduction

Due to the digitalization of the training processes of university students, higher education faces multiple changes caused by the transition from one face-to-face education to another in which they try to break borders, innovate and develop divergent and disruptive curricula to respond to the challenges caused by the covid-19 pandemic (Economic Commission for Latin America and the Caribbean [ECLAC], 2020; León, 2021). In the words of Acosta (July 21, 2020), this health emergency has forced a complete reform of education, since the global impact has been so great that making superficial modifications is not enough.

These new transformations arise in the midst of the so-called fourth industrial revolution, in which massive technologies take center stage in numerous human activities that can now be globally interconnected (Álvarez et al., 2021). In this context, disruptive education emerges as a valuable opportunity to apply new educational models that address different ways of learning and teaching. This system, in other words, favors online learning and the development of skills to build glocal (global + local) talent, hence the challenge now lies in establishing innovative strategies that facilitate the application and digital understanding for the use and the generation of knowledge that guides development and transformation towards a more balanced society (Acero Ordóñez et al., 2021).

In disruptive education, the use of the internet, digital tools and social networks are a priority for teachers and students to guarantee everyone's right to training (León, 2021). An example of this is the MOOC (massive open online course; massive and open online course), where students do not need to be in person in a classroom or coincide at the same time in a virtual space to receive information about a matter, since with an internet connection they can access the contents of a course from anywhere and at the time they want (Acevedo Tarazona, 2015).

However, according to several authors, to guarantee the success of this type of innovation, the willingness of teachers to implement new techniques that allow students to develop skills is required, as well as the collaboration of the organizational area for the planning and financing of projects. those initiatives (Orozco, 2013; Pérez and García, 2015; Valles-Baca et al., 2019). In this sense, as explained by Ocaña-Fernández et al. (2020), education can only be considered disruptive when teachers have been instructed with alternative methods to traditional ones. In fact, a key factor for the "ideal" design of an educational model is to identify the general knowledge of students, as well as the situations and tools they use to solve situations of daily life (Rivera et al., 2021) .

However, it should be noted that there are information gaps on the impact of disruptive education on the development of skills of university students. For this reason, the present study is significant, since it seeks to know the most important aspects that must be considered in the planning and innovation of an educational model that seeks to comprehensively train students. With the results obtained, a methodological guide could be structured for Mexican and foreign universities that seek the transition from a traditional model to one that implements disruption in education.

Having explained the above, in the present work the following research question has been formulated: what aspects of the educational model characterize disruptive education and how are they related to the development of university competencies?

Objectives
General objective

Identify the aspects of the educational model that most characterize disruptive education and assess its impact on the development of university skills.

Specific objectives

1. Identify the aspects of the educational model implemented through ICT and TAC that were best evaluated and that characterize disruptive education.
2. Show the university competencies that were developed to a greater extent with the implementation of technologies.
3. Determine the relationship between the implementation of the educational model using ICT and TAC and the development of university skills.
4. Establish significant differences between students and teachers regarding disruptive education.
5. Establish models of disruptive education.

Method

The present study had a quantitative approach and a cross-sectional design that was carried out with students and teachers from the first semesters (first to fourth) of the Autonomous University of Chihuahua in the January-June 2021 school year.

The total population was 15,552 students and 1,884 teachers, while the stratified sample was 384 for each of the groups with a 0.05 level of error applying the Willian G. Cochran formula and a corrected sample of 340 for each one. However, when sending the measurement instrument through digital means, a participation of 2223 students from the different faculties attached to the Autonomous University of Chihuahua was obtained, of which 63.3% were women and 36% men. Likewise, a participation of 499 teachers, of whom 51.5% were men and 48.5% women.

Inclusion criteria

Participating students had to be enrolled in the first, second, third and fourth semesters because the new educational model was being applied to them.

Study variables

They were organized into six dimensions according to the results of the exploratory and confirmatory factor analysis:

1. Educational model and TAC.

2. Competencies: Research and social and historical analysis; multiculturalism and society; aesthetic and interpretive appreciation and creativity, innovation and entrepreneurship.

3. Competition: Research and scientific analysis; research and social and historical analysis.

4. Perspectives on the use of learning and knowledge technology (TAC) and the application of technology to teach and learn.

5. Competence: Formal and quantitative reasoning.

6. Knowledge of the educational model.

Dimensions 1, 4 and 6 are independent variables, while dimensions 2, 3 and 5 correspond to dependent variables. Before its application to the selected sample, the instrument was validated through four techniques:

- Expert judgment using Aiken's V.

- Internal consistency analysis through Cronbach's alpha.

- Exploratory factor analysis.

- Confirmatory factor analysis.

Due to the above, there was a robust and validated instrument that allowed the retrieval of information in a reliable way through a Google Form that was sent to students and teachers through institutional emails.

Information processing and analysis

Parametric tests were applied because the variables presented a normal behavior.

1. Univariate analysis: A descriptive analysis was performed to establish normality limits at $X \pm 1\tilde{o}$, where the variables that presented an upper or lower outlier were identified.

2. 2. Bivariate analysis: Significant relationships were established between the independent variables (educational model, perspectives and application of TAC) and the dependent variables (competence development).

   The analysis was developed using the r statistic. of Pearson, with $p \leq 0.01$.

3. Multivariate analysis: Linear regression models were performed.

The processing of the information was carried out with the statistical program Statistical Package for the Social Sciences (SPSS, v. 22).

Ethical considerations

The questionnaire was solved by the participants voluntarily. Before starting, it was explained to them that they had the decision to carry out the survey freely. If there was any question that caused discomfort, they could stop answering even the entire survey, without being affected. It was also explained to them that the information provided would only be for research purposes, so it would be anonymous. Likewise, they were asked to give their informed and confidential consent.

The instrument did not include personal data (name, address or contact). The information of the participants was handled with confidentiality, in accordance with the Mexican Law on Protection of Personal Data (DOF, 2017).

Results

Instrument validation results

The validation of the instrument through expert judgment with the Aiken V technique led to the elimination of five items that had values lower than 0.50 in their wording and relevance. In the reliability results, an alpha of 0.991 was reached, and in the internal consistency, most of the variables obtained item-test correlations greater than 0.30, which indicates a good relationship between the variables. The results of the exploratory factorial analysis reached 71.88% of total variance, and although the instrument had to be structured in eight dimensions, only six were confirmed. This rigorous validation process led to the achievement of a highly reliable, objective instrument.

Descriptive analysis

The descriptive analysis was performed from the dimensions or factors derived from the exploratory and confirmatory factorial. To do this, they were considered as a measure of tendency to the mean and as a measure of dispersion to the deviation to identify the variables that exceeded the established limits of normality with a value of the weighted mean ± one standard deviation.

Aspects of the educational model implemented through ICT and TAC that were better evaluated and characterize disruptive education

In the analysis of means, according to the superior atypical (X+1= 2.53), it was observed that the variables best evaluated by students and teachers regarding the implementation of the educational model based on ICTs and TACs were the following: contribute to humanistic training (2.54 ± 1.15), promote the use of TAC (2.67 ± 1.16), favor learning through various means and modalities (2.56 ± 1.17), promote new training options (2.55 ± 1.11), promote the development of digital skills (2.69 ± 1.15) and identify real context problems (2.59 ± 1.11). However, according to the lower outliers (X-1= 2.30), the least evaluated were training students to contribute to sustainable development (2.32 ± 1.16), helping students to unfold their full creative potential (2.29 ± 1.20), favor the development of skills by training cycles (2.31 ± 1.19), motivate students to learn through self-directed, autonomous and self-regulated learning processes (2.24 ± 1.26), emphasize the articulation of knowledge from interdisciplinarity and transdisciplinarity (2.30 ± 1.15), promote teaching development (2.34 ± 1.21), promote communication in another language (2.13 ± 1.24) and eliminate the barriers of space and time (2.31 ± 1.27).

University skills: social and historical research and analysis, multiculturalism and society, aesthetic and interpretive appreciation, creativity, innovation and entrepreneurship

According to the superior atypical (X+1= 2.60), the variables that stood out superior atypical and that, due to the values in the means, are considered better developed in the students were the following: they analyze social phenomena related to the past with the present of the social context (2.62 ± 1.10), experience creative thinking to pose new questions (2.62 ± 1.13), identify obstacles and propose innovative solutions (2.62 ± 1.13), identify, based on observation, the problems/challenges of their environment that require creative solutions in products and services with value for society (2.62 ± 1.13), are creative in solving problems/challenges and in the successful implementation of their ideas (2.62 ± 1.12).

On the other hand, the following variables were identified as lower outliers (X-1= 2.38): they identify the heuristic and hermeneutic methods for the analysis and synthesis of the historical context (2.28 ± 1.17), they develop concepts of art, where cultural diversity is recognized through products that manifest talent (2.38 ± 1.21), describe popular, indigenous,

emerging, traditional and contemporary arts to allow communication between individuals and cultures (2.29 ± 1.24), analyze cultural products from different frames of reference, historical and philosophical in various contexts to reach the conceptualization (2.36 ± 1.19), analyze theories or arguments about culture and its artistic expression (2.35 ± 1.21) and assume a humanistic posture before the various artistic-scientific-cultural manifestations and argue their posture from a frame of reference (2.38 ± 1.21).

Development of university skills: scientific research and analysis and social and historical research and analysis, with the UACH-DS educational model

According to the analysis of means, the variables that stood out as superior outliers —that is, they obtained values higher than ($X+1= 2.66$)— were the following: they identify problems of the natural world that affect their environment (2.78 ± 1.11) and critically select sources of information to support arguments (2.70 ± 1.10). However, the least valued —lower atypical variable ($X-1 = 2.57$)— was that students identify quantitative social research to describe or explain social phenomena (2.56 ± 1.11).

Application of CT for teaching and learning

In the analysis of means, it stood out as a superior atypical; that is, it obtained a higher value than ($X+1 = 3.15$) the Google Meet application (3.37 ± 0.96). In contrast, the least used —lower atypical variable ($X-1 = 1.90$)— was to use Twitter (0.940 ± 1.30) and Facebook (1.67 ± 1.48) as a digital tool for teaching and learning. Likewise, it was striking as a minor variable evaluated to consider that even when the pandemic ended, they should continue with online education (1.98 ± 1.47). This indicates that the disruption in their training process through the application of technology for learning and knowledge is not viewed as an opportunity in their training process. In short, they want to return to face-to-face classes.

Formal and quantitative reasoning competence

In the analysis of means, no variable stands out as a superior atypical ($X+1 = 2.57$). However, the variable with the highest value was the use of quantitative and qualitative tools (2.53 ± 1.14). Instead, it stood out as a lower outlier ($X-1 = 2.35$) they analyze real problems through the use of mathematical models (2.46 ± 1.22).

Correlational analysis between the implementation of the educational model using ICT and TAC and the development of university skills

A high correlation index was observed between the simple variables of the independent variable The educational model and the technologies for learning and knowledge and the simple variables of the dependent variables Development of university competencies: scientific research and analysis and social research and analysis and historical. This means that the educational model implemented through ICT and TAC contributes to the development of skills (table 1).

Specifically, this analysis showed that the best valued simple variables of the Educational Model complex variable and the TACs (that is, Contribute to humanistic training, Promote the use of TACs, Promote learning through various means and modalities, Promote new options training, Promote the development of digital skills and Identify problems in the real context) are significantly related > 0.50 with the performance (variables) of the following skills:

Formal and quantitative reasoning: They apply empirical methods to solve specific problems; they model complex processes that refer to evaluating data, evaluating probabilities and evaluating risks for the resolution of problems in their environment; modify procedures for troubleshooting their environment; interpret and analyze results obtained in tables, graphs and figures that describe the solution of the problem.

Scientific investigation and analysis: Demonstrate curiosity about the natural world and the ways in which information is obtained, analyzed, and interpreted to generate knowledge; identify problems in the natural world that affect their environment, identify theories and evidence that support scientific concepts; They use inductive and deductive reasoning in scientific investigation.

Research and social and historical analysis: They identify quantitative social research to describe or explain social phenomena; they identify the qualitative methodology to delve into the causes, with information on the opinions, beliefs and values of society; they analyze social phenomena relating the past with the present of the social context; they pose questions relevant to research on human behavior; apply research methods from at least one social discipline to study the human experience; they use sources of information to argue explanations about social and historical phenomena, and they use basic quantitative and qualitative methods for data analysis.

The foregoing indicates that the more the application of the educational model is favored through the TAC, the more it contributes to the development of research skills and formal and quantitative reasoning.

Comparative analysis

The results of the comparative analysis between teachers and students through the t Student (with $p > 0.05$) showed that there are no significant differences in the perception of disruptive education, but in the application of digital tools such as Google Meet (students consider that it is used more), and WhatsApp (the teachers believe that it is applied more in the hybrid modality) (Table 1).

Table 1. *t-test for mean differences*

Variables		Est. 2223	Doc. 499	T	gl	Sig. (bilateral)	Diferencia de medias
46. GoogleMeet	Se asumen varianzas iguales	3.38	3.37	0.205	2720	0.838	0.0098
	No se asumen varianzas iguales			0.184	665.05	0.854	0.0098
50. WhatsApp	Se asumen varianzas iguales	3.05	3.13	-1.274	2720	0.203	-0.0751
	No se asumen varianzas iguales			-1.208	699.48	0.227	-0.0751

Source: self made

Disruptive education models

Two linear regression models were identified that explain disruptive education: the first was analyzed with the independent variable Promotes the use of learning technologies and knowledge in teaching and learning processes, which predicts (with an R of 0.849, an R squared of 0.72, an adjusted R squared of 0.718 and a standard error of 0.615) that when using TACs in real situations, innovation and entrepreneurship of students increase by 71%; In addition, inclusive educational environments are created with learning opportunities for all; it helps students to unfold their full potential so that they face the problems and challenges

of their daily lives; stimulates humanistic training; the development of complex thought is favored; students are encouraged to develop a healthy lifestyle that enables the realization of all their potential as individuals in society; considers the human condition of people and recognizes their differences; promotes teacher development; promotes communication in another language; favors learning by various means and modalities; it favors that the evaluation is carried out by competencies; the evaluation is carried out with a socioformative approach, where self-assessment and co-assessment are favored, as well as continuous feedback; promotes new training options and contributes to the development of the competences proposed in the subjects (Table 2).

Table 2. *Model 1. Promotes the use of learning and knowledge technologies (TAC) in teaching and learning processes*

Modelo		Coeficientes no estandarizados		Coeficientes estandarizados	t	Sig.
		B	Desv. Error	Beta		
1	(Constante)	0.289	0.033		8.836	0.000
	7. Promueve la innovación y el emprendimiento en la solución de problemas reales.	0.043	0.019	0.045	2.232	0.026
	8. Genera ambientes educativos inclusivos con oportunidades de aprendizaje para todos los estudiantes.	0.043	0.019	0.044	2.195	0.028
	9. Contribuye a que los estudiantes desplieguen todo su potencial para que enfrenten los problemas y desafíos de su vida cotidiana.	-0.066	0.022	-0.068	-3.052	0.002
	14. Promueve la formación humanista.	0.077	0.021	0.076	3.605	0.000
	15. Contribuye a que los estudiantes desarrollen el pensamiento complejo.	0.066	0.022	0.066	2.979	0.003
	16. Contribuye a que los estudiantes desarrollen un estilo de vida saludable que posibilite la realización de todas sus potencialidades como individuo y en sociedad.	-0.052	0.020	-0.053	-2.584	0.010
	17. Considera la condición humana de las personas y reconoce sus diferencias.	0.065	0.021	0.065	3.064	0.002
	18. Propicia el desarrollo docente.	0.046	0.019	0.048	2.476	0.013
	19. Promueve la comunicación en otro idioma.	0.098	0.013	0.105	7.346	0.000
	21. Favorece el aprendizaje por diversos medios y modalidades.	0.394	0.020	0.399	20.191	0.000

22. Propicia que la evaluación se realice por competencias.	0.111	0.021	0.111	5.258	0.000
23. La evaluación se realiza con un enfoque socioformativo, en donde se favorece la autoevaluación y la coevaluación, así como la realimentación continua.	0.040	0.021	0.040	1.929	0.054
25. Promueve nuevas opciones formativas.	0.071	0.017	0.068	4.144	0.000
30. Contribuye al desarrollo de las competencias propuestas en las UDA.	0.044	0.020	0.044	2.159	0.031
37. Contribuye a la gestión del conocimiento.	0.043	0.022	0.044	1.962	0.050
39. Favorece el cumplimiento de las metas de aprendizaje.	-0.068	0.023	-0.069	-3.021	0.003

Source: self made

The second model (Favoring learning through various means and modalities) predicts with an R of 0.881, an R squared of 0.775, an adjusted R square of 0.773 and a standard error of 0.56 that by favoring learning through various means and modalities, increases by 77 %: innovation and entrepreneurship in students when solving real situations; motivates students to learn through self-directed, autonomous and self-regulated learning processes; emphasizes the articulation of knowledge from interdisciplinarity and transdisciplinarity; promotes humanistic training; helps students develop complex thinking; considers the human condition of people and recognizes their differences; promotes teacher development; promotes communication in another language; favors the use of TACs in teaching and learning processes; It encourages the evaluation to be carried out by competencies from a socio-formative approach, where self-assessment and co-assessment are favored, as well as continuous feedback; promotes new training options; seeks to train students in the knowledge society with a solid ethical life project, collaborative work, entrepreneurship and complex thinking to achieve quality of life; It helps students learn through multiple scenarios, in challenging and challenging situations, and helps students and teachers develop their ethical life project (Table 3).

Table 3. *Model 2. Promote learning through various means and modalities*

	Coeficientes no estandarizados		Coeficientes estandarizados		
	B	Desv. Error	Beta	T	Sig.
(Constante)	-0.025	0.030		-0.820	0.412
7. Promueve la innovación y el emprendimiento en la solución de problemas reales.	0.038	0.016	0.038	2.316	0.021
11. Motiva a los estudiantes a aprender a través de procesos de aprendizaje autodirigido, autónomo y autorregulado.	0.036	0.016	0.039	2.316	0.021
12. Enfatiza en la articulación de saberes desde la interdisciplinariedad y transdisciplinariedad.	-0.074	0.020	-0.073	-3.732	0.000
14. Promueve la formación humanista.	0.041	0.019	0.040	2.109	0.035
15. Contribuye a que los estudiantes desarrollen el pensamiento complejo.	0.043	0.020	0.043	2.187	0.029
17. Considera la condición humana de las personas y reconoce sus diferencias.	0.082	0.018	0.081	4.443	0.000
18. Propicia el desarrollo docente.	0.035	0.017	0.036	2.048	0.041
19. Promueve la comunicación en otro idioma.	0.033	0.012	0.035	2.731	0.006
20. Promueve el uso de las tecnologías del aprendizaje y el conocimiento (TAC) en los procesos de enseñanza y de aprendizaje.	0.316	0.017	0.312	18.717	0.000
22. Propicia que la evaluación se realice por competencias.	0.251	0.018	0.248	13.555	0.000
23. La evaluación se realiza con un enfoque socioformativo, en donde se favorece la autoevaluación y la coevaluación, así como la realimentación continua.	0.067	0.019	0.066	3.564	0.000
25. Promueven nuevas opciones formativas.	0.060	0.016	0.057	3.858	0.000
32. Busca formar a los estudiantes en la sociedad del conocimiento con un proyecto ético de vida sólido, trabajo colaborativo, emprendimiento y pensamiento complejo para lograr la calidad de vida.	-0.058	0.020	-0.057	-2.910	0.004
33. Contribuye a que los estudiantes aprendan por escenarios múltiples.	0.077	0.019	0.076	3.975	0.000
36. Contribuye al desarrollo de competencias digitales.	0.059	0.017	0.058	3.494	0.000
38. Propicia que los estudiantes aprendan en situaciones retadoras y desafiantes.	0.049	0.018	0.049	2.772	0.006
40. Contribuye a que los estudiantes y docentes desarrollen su proyecto ético de vida.	-0.040	0.019	-0.040	-2.156	0.031

Source: self made

Discussion

This study highlights that disruptive education is mainly characterized by contributing to humanistic training, promoting the use of TACs, favoring learning through various means and modalities, promoting new training options, promoting the development of digital skills and identifying problems. of the real context, which —according to Acero Ordoñez et al. (2021)—is an opportunity to apply new educational models in accordance with the context of a more digital society.

However, it should also be noted that in this research it became clear that the disruption of university education is not assumed by all the teachers interviewed as an opportunity, since —according to the mean value— they are the ones who most want to return to classes. face-to-face, compared to students, although no significant differences were found. In other words, disruptive education is not a priority for teachers.

Even so, it is possible to approach it as an opportunity if teachers are willing to do so, that is, to implement new techniques that allow students to develop skills according to the demands of the current context of higher education (Pérez and García, 2015). In this sense, it is important to carry out a deeper analysis of the disposition of teachers, since disruption usually offers multiple benefits. For example, identify its impact on the development of formal and quantitative reasoning skills with respect to applying empirical methods, modeling complex processes, modifying procedures and interpreting and analyzing results to solve problems. Likewise, research and scientific analysis in relation to identifying problems and being curious about the ways in which information is obtained, analyzed and interpreted to generate knowledge, detect theories and evidence that support scientific concepts and use inductive and deductive reasoning in scientific research. In addition, in the social and historical research and analysis competence in the following performances: explain social phenomena, identify and apply quantitative and qualitative research methods to analyze the causes and social and historical phenomena related to human behavior and human experience.

These results coincide with those reported by Orozco (2013), who points out that the implementation of technologies should contribute not only to generating knowledge, but also to developing skills to take advantage of them in solving problems.

Likewise, this research represents an important contribution to the state of knowledge by identifying two models of disruptive education: Model 1. Promote the use of learning

technologies and knowledge in teaching and learning processes and Model 2. Promote learning by various means and modalities, which have variables in common that explain the significance of taking advantage of disruption to contribute to the innovation of university education. As Sharron McPherson mentions (quoted by Acosta, July 21, 2020), the covid-19 pandemic must serve to transform education, instead of just reforming it, so it is not enough to make changes.

Now, although these models of disruptive education motivate innovation, it is important to highlight the orientation that each one has, that is, their contributions. The first model is characterized by focusing on the student as a person, by contributing to the deployment of all your potential so that they face the problems and challenges that arise in their daily lives and so that they develop a healthy lifestyle that makes it possible to carry out full potential as an individual and in society. This —according to Rivera et al. (2021)—is a key factor for the ideal design of an educational model that allows identifying the general knowledge of students, as well as situations they face in their daily lives and the tools they use to solve problems.

The second model, on the other hand, is more related to the students' training process, since it motivates them to learn through self-directed, autonomous and self-regulated learning processes. It seeks to train them in the knowledge society with a solid ethical life project, collaborative work, entrepreneurship and complex thinking to achieve quality of life and promote the development of digital skills so that they learn in challenging situations.

Conclusions

The aspects that best characterize disruptive models are those that contribute to the humanistic education of students, promote the use of TACs, favor learning through various means and modalities, generate new training options, foster the development of digital skills and motivate to identify real context problems.

However, according to the results of the application of the TACs to teach and to learn, it was observed that students and especially teachers do not consider it pertinent to continue with online education when the pandemic passes. This indicates that the benefits of a disruptive education are not seen by everyone.

Even so, it should be noted that the implementation of models that take advantage of disruptive education in higher education institutions is essential to provide better preparation

for students according to the needs of the current context. In this research, it was observed that the more the TACs are applied, the more it contributes to the development of scientific, social and historical analysis research skills.

As observed, students who are trained in congruence with the knowledge society, globalization and the digital age are more aware of the importance of implementing disruptive models, since they recognize that it prepares them not only in empirical knowledge and academics, but also in the development of skills that allow them to adapt to the adversities that may occur in their personal and professional lives.

Likewise, the results of this research identify two models of disruptive education that motivate the innovation of professional training in all universities, especially in Mexico. A model that focuses on the student as a person to favor the deployment of their creative potential in solving problems in their daily lives, and another that motivates them to continuous learning through self-regulated and autonomous learning processes. Both models apply disruptive strategies and tools not only in the classroom, but throughout the training process and in the preparation of the teaching and work team of the institutions so that innovating and going beyond the traditional constitutes one of the guiding axes. of educational systems in general.

Future lines of research

The identification of disruptive education models, one focused on the student as a person to favor the deployment of their creative potential in solving problems in their daily lives, and another that motivates them to continuous learning through self-regulated and autonomous learning processes; contribute to the development of new lines of research such as: Disruptive education for human development. Which could provide relevant information on the elements that favor the creative potential of students to respond to the challenges of sustainable development.

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