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Teaching competencies in virtual learning environments

Competencias docentes en ambientes virtuales de aprendizaje

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Abstract

The COVID-19 pandemic accelerated the digital transformation of different areas and education was one of them. Face-to-face education was abruptly replaced by a virtual environment, however, teaching skills must be adapted and even perfected in this modality. In order to ensure a correct teaching-learning process in a virtual environment, the Autonomous University of Campeche (UAC) offered a training course for all teachers of its various schools and faculties. In this paper we will analyze the pedagogical and technological competencies possessed by 137 UAC teachers who participated in the 2020, 2021 and 2022 editions of the course called Virtual Learning Environments. The instrument used was a questionnaire consisting of 23 action questions with closed answers. The answers were multiple choice, which were estimated according to the Likert scale. The questionnaire was divided into 2 categories: Pedagogical and Technological, with 8 and 15 questions respectively. This analysis allows us to know the strengths and weaknesses of teachers in their pedagogical and technological competencies and thus generate the necessary strategies to ensure the success of the teaching-learning process in a virtual environment.

Technological, Pedagogical, Competencies, Strategies, Faculties

Resumen

La pandemia por la COVID-19 aceleró la transformación digital de diferentes áreas y la educación fue una de ellas. La educación presencial fue sustituida de manera abrupta por un entorno virtual, sin embargo, las habilidades docentes deben adecuarse e incluso perfeccionarse en esta modalidad. Con la finalidad de asegurar un correcto proceso de enseñanza-aprendizaje en un entorno virtual, la Universidad Autónoma de Campeche (UAC), ofertó un curso de capacitación para todos los docentes de sus diversas escuelas y facultades. En el presente trabajo analizaremos las competencias pedagógicas y tecnológicas que poseen 137 docentes de la UAC que participaron en las ediciones 2020, 2021 y 2022 del curso denominado Ambientes Virtuales de Aprendizaje. El instrumento utilizado fue un cuestionario conformado de 23 preguntas de acción con respuestas cerradas. Las respuestas, fueron de opción múltiple, las cuales, se estimaron conforme a la escala de Likert. El cuestionario se dividió en 2 categorías: Pedagógicas y Tecnológicas, con 8 y 15 preguntas respectivamente. Este análisis permite conocer las fortalezas y debilidades de los docentes en sus competencias pedagógicas y tecnológicas y con ello generar las estrategias necesarias para asegurar el éxito del proceso de enseñanza-aprendizaje en un entorno virtual.

Tecnológica, Pedagógica, Competencias, Estrategias, Facultades

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Introduction

The COVID-19 pandemic demanded the use of various technological and pedagogical tools that required the accelerated development of teaching competencies and experiences to provide continuity to the training process of students through online teaching. [8]

Virtual education is one of the encounters between education and technology, being this a teaching-learning scheme that together with technological resources is based on the conviction that properly motivated and oriented people can build knowledge and develop competences and skills in a context of guided self-management [5].

E-learning offers advantages that can justify its rapid expansion: the possibility of using multimedia materials, easy updating of contents, interactivity, access to the course from anywhere and at any time, the existence of immediate feedback, so that the teacher knows if the student responds to the method and achieves the objectives initially set [3].

On the other hand, each of the skills that a teacher possesses and manifests in a face-to-face environment does not guarantee success using virtual environments, i.e., what is learned in the face-to-face environment is a good basis, but when moving from face-to-face to virtual, sometimes the competences must be adapted or perfected or even learnt. This is the reason why the UAC considered it necessary to know the strengths and weaknesses of its teachers, in order to provide them with the necessary tools for teaching in this modality.

In less than ten years, in which the vertiginous pace of change and technological developments are proposing new crossroads and challenges, we are faced with educational scenarios full of innovation and a certain degree of complexity. As of March 2020, the educational context took place under uncertainty in the face of the progress of COVID-19. As Morin (2015) points out, "(...) uncertainties and doubt are linked (...) they allow us to break through scientific determinisms and reductionism (...) we must learn to navigate in an ocean of uncertainty through archipelagos of certainty" [2].

The changes that are taking place in society have an impact on the demand for a redefinition of the work of teachers and the teaching profession, their training and professional development. The roles that teachers have traditionally assumed in teaching a curriculum characterised by academic content are nowadays inadequate. Students receive information through multiple channels (television, radio, Internet, etc.) and teachers cannot ignore this reality.

A teacher in tune with our times.

The fact that, in virtual learning environments (VLE), the processes associated with teaching and learning are mediated by technology; that they do not take place in the same space and time; that they involve the use of asynchronous and synchronous communications, among other distinctive characteristics, makes it necessary for tutors to acquire new competences; to generate new ways of organising their teaching action; in short, to rethink their role.

The virtual world requires us to be creative; to dialogue and build in collaboration with those who, from the networks and from different environments, can contribute multiple perspectives, guidelines, ideas, activities and resources. The challenge is one of complexity. Not to reduce the face-to-face to the virtual; the didactic proposal to a repository of resources and tasks; multidimensionality to simple answers; and, especially, to deal with uncertainty.

As [9] argues, "it is necessary to teach principles of strategy that allow us to face risks, the unexpected and the uncertain, and to modify their development virtually based on information acquired along the way. Uncertainty is not eliminated: it is negotiated with it". [2].
Professional training requires a great process of acquisition, structuring and restoration of competences, knowledge, professional skills ranging from the perspective of pedagogical science, educational technology to social relations and values for a good performance. However, the training of educators in many occasions has not had a solid methodological preparation for the use of technologies, in the best of the cases they were trained for the use of ICT as tools of access and transmission of information, restricting the use of educational technologies to a traditional context of education [7].

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They must have the ability to combine these tools and the so-called traditional ones; to be critical, to always think about adapting technologies to teaching and not teaching to technologies; as well as to foster collaborative and cooperative learning spaces [4] that really provoke paradigmatic changes, that overcome the traditional style of teacher-centred pedagogy and encourage students to develop cognitive independence through the promotion of analytical, critical and reflective thinking. [11]. For these reasons, a training process is necessary to equip the tutor with the necessary skills to fulfil his or her role adequately.

Together with the ability to learn, an element that is also considered to be of great importance is the ability to respond to the current challenges of schools: the leadership capacity of teachers. A teacher is being asked to be understood as a "knowledge worker", a designer of learning environments, with the ability to make the most of the different spaces where knowledge is produced. And a teaching profession characterised by what [14] calls a community of practice through which individual experience can become collective. A profession that needs to change its professional culture, marked by isolation and difficulties in learning from and with others; where it is frowned upon to ask for help or acknowledge difficulties.

A virtual learning environment is understood as a technologically mediated space where students and teachers come together to interact in relation to certain content, using previously established methods and techniques with the intention of acquiring knowledge, developing skills, attitudes and, in general, increasing some kind of capacity or competence. [6].

Instructional designer

Achieving this literacy represents the creation of competences in teachers that allow them to recognise their information needs and to know how to satisfy them, in order to respond to the new roles imposed by the implementation of ICT in educational systems in the 21st century.

To be a knowledge worker, a designer of learning environments, rather than a mere transmitter of information [12].

An instructional designer (ID) is the specialist in methodologies, processes, strategies, and application of the different methods that must be considered during the design phase of an online course or programme. He or she acts as a consultant, designer, architect and often as an advisor when adopting and implementing the techniques necessary for the integration of technology into student learning [10].

Therefore, an instructional designer is a person who has a wide range of knowledge to analyse and visualise all the elements that make up an educational programme, providing solutions and strategies to each educational teaching process. Due to the above mentioned, it is important that professionals are prepared in the fields of virtual teaching environments and distance learning, etc…

Belloch proposes some competences that an instructional developer should have:

- Basic and VLE-specific computer skills that enable him/her to adapt content for distance and e-learning.
- Precise knowledge of the characteristics of materials in technology-mediated learning, their constituent elements, formats and typologies. With the ability to assess the advantages and disadvantages in the use of one or the other in each case.
- Knowledge of the implications in terms of time and work involved in the development of some materials compared to others, so that they can select the best solutions for each specific case.
- Ability to use and handle specific software for the design of materials in different formats (textual, hypertextual, multimedia, etc.).
- The necessary knowledge to implement different methodologies aimed at the construction of knowledge.
- Skills and knowledge on the evaluation of training processes [1].

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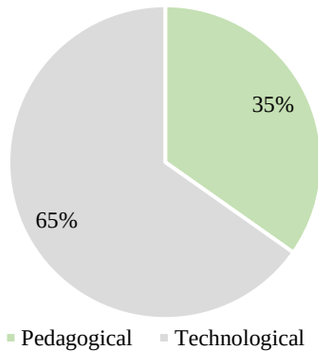
Methodology to be developed

1.- Construction of the instrument:

The instrument used was a questionnaire made up of 23 action questions with closed answers, Egg (1980, cited by [13].

The answers were multiple choice, which were estimated according to the Likert scale, their value is as follows: Strongly Agree (5); Agree (4); Indifferent (3); Disagree (2); and Strongly Disagree (1).

The questionnaire is divided into 2 categories:
Pedagogical and Technological, with 8 and 15 questions respectively.



Graphic 1 Percentage of question type
Source: Own elaboration

Each question is associated with an indicator that allows us to measure the various competences.

The table below shows the indicators, the identifying codes for each question and the questions formulated in the first person according to their classification:

Educational category		
Indicator	**Code**	**Question**
Knowledge of educational theories	PP1	I master educational theories
Design of activities according to the types of learning.	PP2	For my distance sessions, I design different activities considering the different types of learning (auditory, visual, kinaesthetic).
Generation of strategies for meaningful learning	PP3	I am able to generate strategies for meaningful learning.
Use of different methods of evaluation of distance learning.	PP4	I use different methods of evaluation of distance learning.
Development of contents integrating psycho-pedagogical and communicational elements.	PP5	Development of contents integrating psycho-pedagogical and communicational elements.
Elaboration of learning objects	PP6	I have developed learning objects in my area of knowledge.
Design and development of academic forums to promote group communication among students.	PP7	I design and develop academic forums to foster group communication among students.
Mastery of dialogic narrative, in virtual environments that generate critical thinking in students.	PP8	I consider that I have a good dialogic narrative, achieving with it reflection and critical thinking in my students.
TECHNOLOGY CATEGORY		
INDICATOR	**CODE**	**QUESTION**
Analysis and design of learning activities with the use of ICTs.	PT1	In order to generate my distance sessions, I analyse and design learning activities with the use of ICTs.
Planning of videoconference sessions.	PT2	I analyse and design the number of videoconference sessions, as well as the materials to be used and their duration.
Analysis and selection of technological resources according to the contents, according to the educational context.	PT3	I am able to analyse and select technological resources according to the contents and characteristics of the actors involved in the process.
Use of technological resources in different methods of the teaching-learning process.	PT4	I use different methods of the teaching-learning process with the use of technological resources.
Design and development of didactic materials with the use of ICT.	PT5	I design and develop teaching materials using ICT.
Use of technologies for distance counselling and/or feedback -group-.	PT6	I use different technologies for distance counselling and/or feedback (group).

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Use of technologies for distance -personalised- counselling and/or feedback.	PT7	Use of various technologies for counselling and/or feedback -personalised- at a distance.
use and promotion of the use of online libraries	PT8	I employ and promote the use of online libraries.
creation of hypertexts for the design of materials	PT9	I generate hypertexts for the design of materials.
Use of digital technologies for collaborative activities.	PT10	I encourage collaborative activities with the use of various digital technologies.
Use of technologies in didactics.	PT11	Use of various technologies in teaching strategies.
Use of audiovisual material.	PT12	Use of documentary capsules, videos or films as part of the learning process.
Use of podcasts.	PT13	Use of podcasts as didactic material in the teaching-learning process.
Use of technological simulators for the development of skills.	PT14	I use technological simulators to generate skills in the subject I teach.
Creación de material videográfico.	PT15	I have produced video material for my course.

Table 1 Indicators and questions of the instrument.
Source: own elaboration.

A. Population to be observed

The population to be studied are 137 teachers of Secondary, Higher and Postgraduate Education in the different Schools and Faculties of the Autonomous University of Campeche, who are mostly professionals (engineers, graduates, accountants, etc...) who, in order to reinforce their teaching practice, are continuously trained in the field of Education and ICTs.

B. Variables

The variables to be observed are the 26 questions about the level of instructional designer in which the teachers of the UAC are.

C. Sampling procedure

To take the sample we go to the Google form and in the tab Answers, we select Open in spreadsheets. The data from the form are displayed in the spreadsheet where they can be exported or analysed.

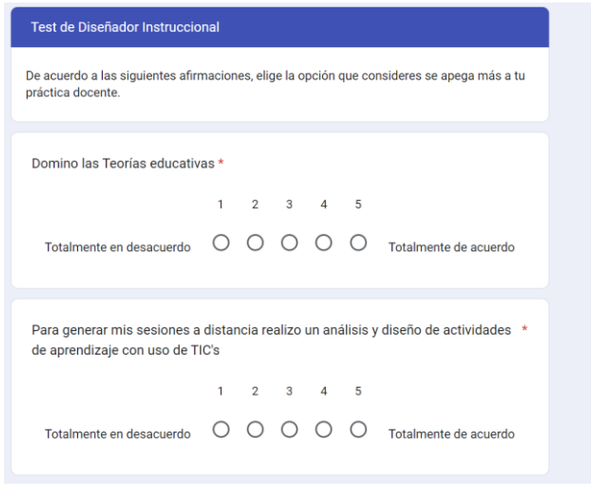

Figure 1 Form applied
Source: Own elaboration

Results

Out of a total of 137 teachers who took the course "Virtual Learning Environments" given at the UAC, 35 were from Higher Secondary Education and 102 from Higher and Postgraduate Education. Table 2 shows the distribution of teachers by educational level and by campus.

Educational Level	Plantel	Total number of teachers
Secondary Education	Lic. Ermilo Sandoval Campos	14
	Dr. Nazario Víctor Montejo Godoy	20
Higher and Postgraduate Education	Faculty of Engineering	19
	Faculty of Chemical and Biological Sciences	13
	Faculty of Social Sciences	7
	Faculty of Law	10
	Faculty of Humanities	13
	Faculty of Accounting and Administration	7
	Faculty of Nursing	25
	Faculty of Medicine	1
	Faculty of Dentistry	8
Higher Education	School of Agricultural Sciences	0
	TOTALES	**137**

Table 2 Total number of teachers by level of education and campus
Source: Own elaboration

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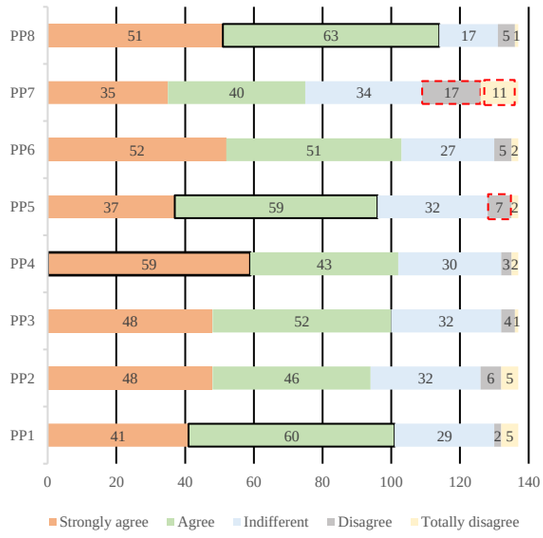
The answers to the pedagogical questions can be seen in graphic 2, where for each stacked bar the frequency of response for each Likert scale is shown.

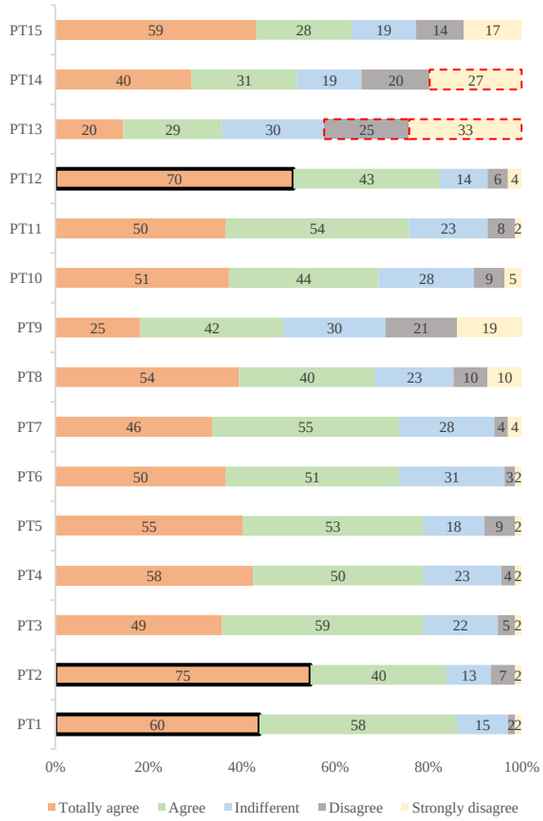


Graphic 2 Total responses to pedagogical questions
Source: Own elaboration

In graphic 2, four indicators stand out positively: PP8 in the "agree" category, where 63 teachers are identified with this level of competence, being the highest of all; in descending order, PP1 in the "agree" category is the next, with 60 teachers identified; then PP5 and PP4, in the "agree" and "strongly agree" categories respectively with 59 teachers.

On the other hand, the indicators that stand out in a negative way are those obtained in PP7, where 17 teachers identify themselves with the level "disagree" and 11 with the level "totally disagree", making a total of 27 teachers who consider that they do not have this pedagogical competence. This is followed by PP5, where 7 teachers chose the level "disagree".

The answers to the technological questions can be seen in graph 3, where for each stacked bar the frequency of response for each Likert scale is shown.



Graphic 3 Total responses to technology questions.
Source: Own elaboration.

Three indicators stand out positively in Figure 3. WP2 in the "strongly agree" category, where 75 teachers are identified with this level of competence, being the highest of all; in descending order, WP12 in the "strongly agree" category is the next, with 70 teachers identified; then the "strongly agree" question respectively with 60 teachers.

On the contrary, the indicators that stand out in a negative way are those obtained in WP13, where 33 teachers identify themselves with the level "totally disagree" and 25 with the level "disagree", making a total of 58 teachers who consider that they do not have this technological competence. This is followed by WP14, where 27 teachers chose the level "totally disagree".

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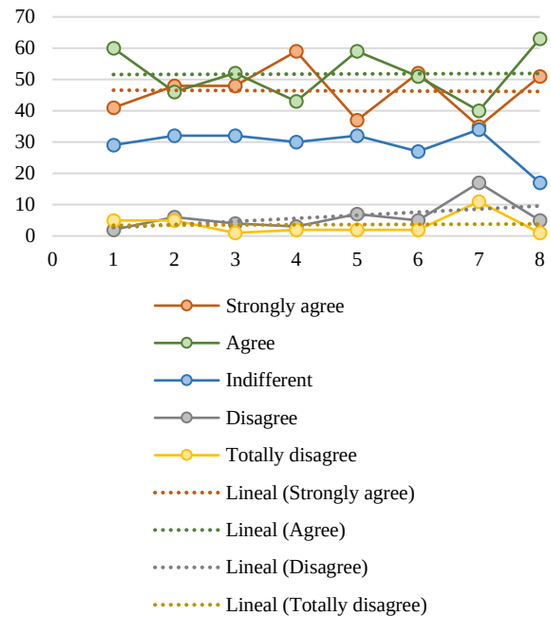
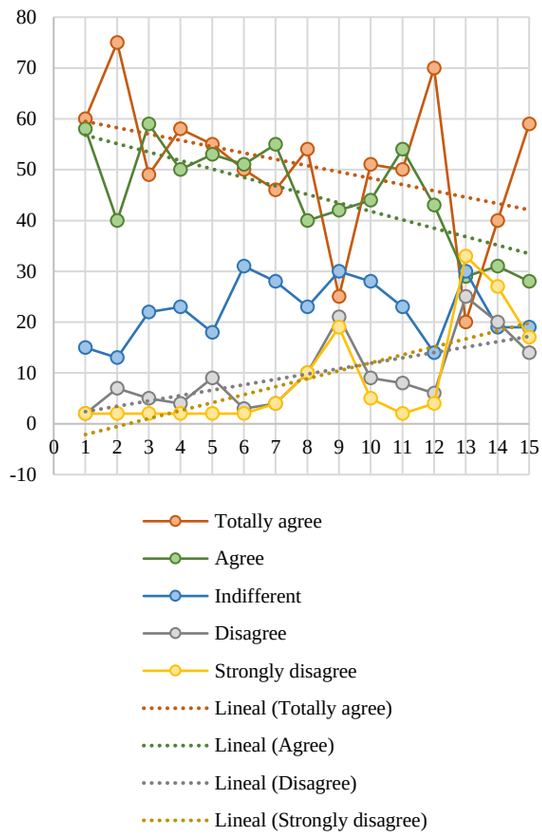
In graph 4, it can be seen that all the levels of the pedagogical competence indicators have a constant linear behaviour, as a reference to this, the trend lines of the "strongly agree" and "agree" levels are presented. The series that stands out in the graph is the "agree" level.



Graphic 4 Pedagogical competency indicators
Source: Own elaboration

In graphic 5, it can be seen that the levels of the technological competence indicators have an oscillatory behaviour, where the predominant level is "totally agree", followed by "agree". In this same graph, the tendency of the levels "disagree" and "strongly disagree" is noticeable, going upwards and reaching the highest point in WP13 and consequently the lowest level in the novel "strongly agree" of the same question.".



Graphic 5 Technological competency indicators
Source: Own elaboration

The above results can be corroborated in Table 3, where the values of the standard deviation of both categories by level are presented.

	NIVEL				
Category	I fully agree	Agreed.	Indifferent	Disagree	Strongly disagree
Pedagogical	10.95	7.66	6.48	5.05	4.62
Technological	12.79	9.84	6.64	6.47	8.98

Table 2 Total number of teachers by level of education and campus
Source: Own elaboration

It can be seen that in all levels of the technological category the standard deviation is higher than the standard deviation of the pedagogical category levels.

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Conclusions

From the data and trend graphs we can interpret that UAC teachers maintain a constant rate in the teaching competences, resulting in a strength in the teaching-learning process. The competence "Mastery of dialogic narrative in virtual environments that generate critical thinking in students" is the most predominant, which leads us to conclude that teachers develop critical thinking in students through their written arguments. The weakest competence in the academic community is "Design and development of academic forums to foster group communication among students", so it is proposed to train teachers in it as it is important to develop written group communication and the exchange of ideas in this type of environment in students.

From the data, trends and standard deviation, with regard to technological competences, we can interpret that the levels among UAC teachers are very diverse. It would be advisable to carry out research to identify the characteristics of the teachers who are less developed in these competences according to schools or faculties, in order to implement strategies to level out their development.

The competence "Use of audiovisual material" is the most predominant in the technology category, which leads us to conclude that teachers have developed materials for their respective subjects due to virtual classes. The weakest technological competence in the academic community is "Management of podcasts as didactic material in the teaching-learning process", so it is proposed to generate training in this auditory way of generating content, which can be available to students on various virtual platforms and thus strengthen their learning.

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