

## E-LEARNING AND MODERN DIGITAL PROFESSIONAL SKILLS FOR MEXICO

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**Abstract:** *The article follows the deductive method, with a hermeneutic paradigm and a qualitative approach. Online learning has allowed students to have academic preparation without having to go to a traditional educational center, where there is already physical displacement and there are no pre-established schedules, in addition, they allow lowering travel and tuition costs. Permanent relearning, asynchronous models and self-learning are managing to train individuals who know how to search for adequate information and solve problems as they arise, increasing their sense of responsibility and achieving permanent updating of their knowledge. In the last decade, modern digital media have generated the appearance of new professional activities, among which they have stood out for generating higher income: Chief Digital Officer (CDO); Chief Technology Officer (CTO); Digital Business Manager. Artificial intelligence allows imitating the functions that humans perform constantly and repetitively, making its application trend grow exponentially in the future.*

**Keywords:** *online learning, self-learning, informal learning, professional status, artificial intelligence*

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### Introduction

Online education has been expanding and growing exponentially in recent years, where there are advantages such as not having to attend classes or physically pre-established places in schools, thus obtaining savings for people by not having to travel or use transportation, in the same way that they can take advantage of their free time to prepare and acquire knowledge, which previously could not do for lack of time or because in their geographical areas there were no educational centers that allowed them to do so.

Taking classes and lessons asynchronously, meaning that there are no pre-established schedules, nor is there any interconnection or direct communication between teacher and students, has made it possible to expand the knowledge or schooling of people who lack the time to take classes in a traditional school.

Self-learning has also allowed millions of people to acquire knowledge and education formally or informally, highlighting that self-learners require sufficient willpower to acquire discipline and permanence on their own. With the growing incorporation of new information and communication technologies (ITC), distance education has been strengthened in our country and in the whole world.

The application of new technologies in many economic activities, such as shopping, bank payments and multiple forms of sales that are made electronically, have been

incorporating professional services that companies or institutions need to respond to the current digital world. This requires digital skills that have been incorporated into new professions, which also tend to have considerable income.

Another issue that has become very important in the current digital environment is artificial intelligence (AI), which has been used by private or public organizations and companies, where the repetition of activities has become a daily occurrence, estimating that over the years the sectors and areas that use AI in the country and the world will grow.

### **1. Online learning (e-learning) and self-learning**

Virtual learning environments can correspond to formal or informal education, where anyone can use them to learn about a subject of their interest, Mendiola Medellín (2018: 7) gives us this definition on the subject: "By virtual environments we mean technological environments that allow distance learning, they are not determined platforms, rather they are a set of tools among which are the platforms, which are used to learn online".

Distance education seeks to fill the gap left by traditional or conventional education, seeking to meet the needs of a segment of the population: 1) To make education accessible to people who do not have time to go to a physical campus; 2) To make it possible for some people, who by regulation are over the age of school programs, to take them online; and 3) To have more in-depth or specialized knowledge of a subject, which may lead to better employment conditions. González García & Gómez Chiñas (2011: 54) point out that educational institutions have taken on the task of:

...to create technical and professional careers as well as postgraduate programs with an open and distance orientation, in order to respond to the educational needs of people who do not have the time, resources or age to attend an on-site program (that is, the three "neither"). In other words, in Mexico, as in the rest of the world, open and distance education responded to a well-determined logic and situation of lack of time, age and economic resources.

There are two basic forms or modalities of electronic or virtual education: 1) b-learning or blended learning; and 2) e-learning or electronic learning. The concept of b-learning (blended learning), is a flexible program that encompasses programs or education in face-to-face and virtual instances, combining both educational approaches. In my point of view, it becomes a kind of flipped classroom.

The term e-learning is the abbreviation of electronic learning, which consists of the teaching or learning process that takes place through electronic means, generally via the Internet, supported by technological tools and a totally virtual environment. For his part Julio Cabero (2006: 2; cited by Mendiola, 2018: 11) defines e-learning as: "...the training that uses the network as a technology of information distribution, whether this network is open (Internet) or closed (intranet)".

In e-learning Hotmart Company (2020) considers that teachers make available the content of the subjects and students access from any computer or mobile device, in this regard for online education is needed:

For this, it is enough to have someone willing to teach, an audience interested in learning, a platform for hosting the course and, of course, access to the Internet..... It is a more democratic format that allows more people to learn new things every day in a short time and transform their lives.

García Peñalvo and Seoane (2015: 135; cited by Mendiola, 2018: 11) talk about that until 2015 there were three e-learning generations, while Arellano Calderón et al (2021: 43-44) mention that there are already four generations of online education, same that they link with the technological stages of the World Wide Web:

- ❖ Web 1.0 from 1990 to 2003: unidirectional education marked by the appearance on the scene of learning management systems (LMS), focused on platforms and educational content provided by the teacher only.
- ❖ Web 2.0 from 2004 to 2009: bidirectional education marked by the interaction and collaborative relationship between student and teacher, thus allowing the student's commitment and responsibility, allowing open knowledge. One of its first uses is Moodle, then came social networks and formats such as Prezi, Slideshare, Issuu and YouTube videos.
- ❖ Web 3.0 from 2010 to 2015: platforms for videoconferencing, audio-visual and chat are opened, which are in the cloud and run from mobile devices: such as Zoom, Google Meet, Microsoft Teams. It is a semantic web, where data and content are used in a more efficient way, based on information from user profiles. It breaks with the hegemony of the LMS, giving rise to formal and informal learning.
- ❖ Web 4.0 from 2016 onwards: it tries to process information in the same way as the human brain would, that is why it is called cognitive web, through platforms or browsers such as Google, Microsoft, Facebook and others.

The vision of lifelong e-learners, which is the education that takes place at the same time and after the academic degrees, requires the student to leave his classic position of being a mere receiver of knowledge and to take an active position to achieve learning at all times. In this sense, Alvin Toffler (quoted by Ganduxé, 2020) points out:

The illiterates of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn. An illiterate will be the one who does not know where to go to look for the information required at any given time to solve a specific problem.

With online education, another important point to consider is the cost, since not requiring classrooms or auditoriums for classes makes the courses cheaper, and since there is no need for teachers and students to travel, a fairer price is obtained for the educational content.

E-learning in Spanish has been called virtual teaching, online training, tele-training or distance learning, although for Martha Ganduxé (2020) these terms are not synonymous. In this regard, Moore et al. (2011; cited by Ramírez, 2019: 93) are more

explicit and point out that in a review of the different definitions used in the literature they have detected that the terms distance learning, online learning, and e-learning have been used without distinction.

	<b>Open learning</b>	<b>Online learning</b>	<b>Virtual learning</b>
<b>Calendar</b>	Calendar and flexible schedules. Open enrollment all year round.	Fixed calendar and with the possibility for students to communicate with their peers.	Allows students to study at any time and place, eliminating the territorial and geographic problem.
<b>Synchrony</b>	Asynchronous, students decide when and where to study.	Schedules established for meetings between teacher and students.	Asynchronous, since there is no interaction or coincidence in schedules.
<b>Connection</b>	Connection Internet connection is not necessary (but recommended).	Internet connection to enter an online classroom: Zoom, Google Meet, Skype.	Use of the internet on an educational platform. Cell phone or computer required.
<b>Classes</b>	Classes No set classes, radio and TV as support.	Classes are live and can be presented debate and discussion forums.	Communication between teacher and students via platform or e-mail.
<b>Advantages</b>	Allows to combine and alternate study with work. It can be self-taught.	Encourages collaborative work, critical thinking and discussion debate.	It is possible to study and have other activities, in addition to generating self-taught knowledge.
<b>Questions</b>	Through phone calls or text messages.	Online resolution of doubts and feedback online or by e-mail.	Phone calls, e-mail, help desk, counseling and tutoring.
<b>Materials</b>	Printed books and notes, or multimedia CDs delivered to the student in person or by certified mail.	The online university may or may not share bibliographic materials online, with licensing open to the public.	Teacher shares reference materials. Digital didactic resources with Creative Commons license.

Source: Own elaboration. I retake ideas from Arellano Calderón et al (2021: 44-45)

Important elements to consider within online education models are synchronous and asynchronous courses. In the synchronous model the instructor and students are present at the same time and with live classes, highlighting several Internet tools for this purpose: Zoom, Google Meet, Microsoft Team, Adobe Educa, among others. In the asynchronous model, the teacher prepares the class and leaves it recorded so that the students can watch it when they have time, so there is no live interaction during the class.

Advantages of synchronous education: 1) Direct contact with the teacher; 2) Students can get immediate answers to their questions; 3) Group discussions; 4) Team activities, which is ideal for those students who find it easier and more comfortable to work in a group.

Advantages of asynchronous education: 1) The student can access the course content whenever he/she has time; 2) The flexible schedule allows for daily and routine study; 3) The student progresses through the course according to his/her personal study pace; 4) Possibility of reviewing extra content in addition to the syllabus; and

5) The student becomes more responsible and self-taught; 6) He/she makes better use of his/her free time, without having to be subject to schedules.

The experience of the study carried out in professional training, in e-learning environments at postgraduate level and under the Project Based Learning (PBLy) method, conducted by Ramirez (2019: 91) allowed him to expose:

In undergraduate and Graduate courses has been widely documented the implementation of PBLy in engineering areas (Breiter, Fey, & Drechsler, 2005; Fernandes, 2016), being scarcer those focused on the social or educational area (Habók & Nagy, 2016; Márquez-Lepe & Jiménez-Rodrigo, 2014).

In addition, the author of reference (Ramírez, 2019: 94) concludes that the impact of project-based learning in graduate courses generates innovation in educational practice and a high commitment to collaborative work of master's degree students in education, who study in private educational centers.

In the practical application shared by Garduño Mendieta et al (2018: 5) on the problem-based learning model and self-management of learning, focused on competencies, which they carried out in the course 'Computer Organization' at the Unidad Profesional Interdisciplinaria de Ingeniería y Ciencias Sociales (UPIICSA) - Interdisciplinary Professional Unit of Engineering and Social and Administrative Sciences- of the IPN they embody:

Regarding the benefits that students perceive as something that their experience in the course brings them, the following responses are: greater participation in their own learning process (65%); greater learning (35%); greater commitment (20%). The negative part that they express is that they have to work harder (20%) especially at the beginning of the course to complete the assigned tasks.

In self-learning, learning is achieved through the individual effort of each person, where knowledge and skills are acquired through study or experience. In self-learning, the interested subject seeks information that is useful or valuable to him/her, where people who learn by themselves are considered self-learners. Self-learning is also called self-management, Garduño Mendieta et al (2018: 3) point out: "With respect to self-management, Knowles (1990) states that it promotes an active role of the student, participating as co-responsible for their own learning process. That is, they take the initiative and identify the resources for learning".

With the widespread use of the Internet in these times, the self-taught experience in aspects of education is becoming more and more common and used, and there are many different subjects that can be learned for free or with a payment system. Attempts to adapt education to the possibilities and pace of the students have now given way to the fact that the student himself wants to direct his learning in a personal way. In this sense Vargas Santillán (2018: 1) external:

Self-taught education or self-learning refers to the process of incorporating new knowledge by oneself...when we speak of self-taught learning we refer to the capacity that the human being has to acquire new knowledge by himself and leave it recorded in his memory, to then form a mental database.

The next step in the educational process is to incorporate the media or social networks such as Google, YouTube, and Twitter. In this sense, Manta and Ranieri (2016, cited by Baron et al, 2021: 125) show that in learning environments, information (formal or informal) can be used in pedagogical processes that are functional for the understanding of the objectives to be achieved in educational programs.

The role of the self-taught is not to seek instruction in the traditional way or in formal means such as school and typical teachers, but to seek new knowledge through self-management. In this regard, in an excellent way Vargas Santillán (2018: 3) notes:

In this sense, self-taught education improves your memory, increases your vocabulary, keeps you updated and opens up possibilities to study new subjects. At the same time one can pose problems oneself and evaluate alternative solutions and investigate and innovate on one's own. Therefore, it allows you to learn to discern between the main and the complementary and to create a sense of responsibility rather than obligation.

Self-learning arises from an individual's or student's own initiative, where he or she searches for information on his or her own until he or she is able to master the contents or topics that are to his or her liking or out of necessity for use in his or her work environment. It encompasses two great verbs: to want and to know.

Self-taught learning is presented as a personal commitment, so it is essential to establish beforehand the objectives to be achieved with self-learning, presenting these characteristics: 1) Students must be disciplined with their study schedules; 2) Generate projects where they put into practice what they have learned; 3) Learn a new subject or topic; 4) Make self-learning a habit of life; and 5) Meet goals and commitments that are generated in a personal way.

In the last decade, video tutorials have emerged as a very important and significant resource for self-learning. An educational video tutorial is understood as a compendium of audiovisual resources that fulfill a previously formulated didactic or educational objective.

There is a great variety for the classification of video tutorials. M. Schmidt (TECH, 2021: M2T8: 13) provides us with a classification that fits the school environment: 1) Instructional, its mission is that students master a content; 2) Cognitive, they make known different aspects with the subject treated; 3) Motivational, its purpose is to positively predispose the student to develop a task or project; 4) Archetypes, they present models to imitate; 5) Playful or expressive, they are used as a means of expression, highlighting skills and knowledge.

In tutorial videos, the profile and academic preparation of the users must be taken into account, according to the expressive potential of the educational videos there are three types:

- Low expressiveness: videos that only contain static images allusive to the topic and require the intervention of the instructor to give meaning to what is seen. They only serve as a means of support, since they do not generate learning on their own.

- Medium expressiveness: videos containing images and sounds that require explanation by the presenter, but to a lesser extent, thus generating learning.
- High expressiveness: videos with a didactic objective in which use is made of theories, examples and conclusive demonstrations, generating knowledge and skills in the student at the end of the transmission. The video itself conveys a complete content.

In the field of educational self-management, the Self-Access Centers (SAC) play a very important role worldwide, which are a feasible alternative for self-taught learning and support the processes of self-study with technical resources.

SACs aim to develop a self-learning process in any area of knowledge, according to Ruiz (2014; cited by Vargas, 2018: 5), the student can use certain spaces and didactic resources to acquire a given knowledge, in addition, he/she can acquire the responsibility to organize his/her own school work and make decisions that favor his/her learning, as well as work at his/her own pace and in a flexible schedule.

## **2. Digital skills in professionals and Artificial Intelligence**

The application of new Information and Communication Technologies (ICT) has led to the segmentation of products, changes in consumer habits and innovations that are made in order to have competitive businesses. This requires having new occupations or specialized professional profiles. The characteristics and nature of the new digital media, have led to the emergence of new professions or professional roles, which brings that companies and organizations are constantly trying to incorporate people who have skills and knowledge in the digital world. The key points of the information technology (IT) labor market, in the opinion of Olvera, E. (2022) present these characteristics for the year 2022:

- ❖ The supply of technology jobs grew by 88% in 2021.
- ❖ Java, .Net, Python, cloud servers and JavaScript are the IT most sought after by companies.
- ❖ Go or Golang is the technology that registered the highest growth in 2021 (424%), it is also the best paid programming language with an average salary of \$42,761 pesos. The second place goes to Kubernetes.
- ❖ In our country, Mexico City is home to 38.5% of IT vacancies.
- ❖ The average salary of an IT professional in Mexico is \$30,247 pesos per month (15% more than the previous year). Professionals with advanced English earn 3.9 times more than those who do not know English.

As background, the Colegio Oficial de Ingenieros en Telecomunicación (COIT) - Official College of Telecommunication Engineers- [12] reminds us that at the end of the last century, specifically in 1999, International College for Experience Learning (ICEL) points out the new digital professionals, which will be of interest for the then information and communication technologies (ICT), identifying 13 new profiles of professions:

1. Radio Frequency (RF) Engineering.
2. Digital Design.
3. Data Communications Engineering.

4. Digital Signal Processing.
5. Communications Network Design.
6. Software and applications development.
7. Software architecture and design.
8. Multimedia design.
9. IT business consulting.
10. Technical support.
11. Product design.
12. Integration & Test / Implementation & Test Engineering.
13. System specialist.

In 2006 Blanco Vásquez (2006:6) brings up that in the Proposal of Actions for the Training of Professionals in Electronics, Informatics and Telecommunications (PAFET) presents a list of 30 professions that he considers will be the future of the professions related to ICT, referring to the case of Spain, being these: 1) Software Systems Programmer; 2) System Designer/Integrator; 3) Signal processing specialist multimedia; 4) Systems consultant; 5) ICT solutions specialist; 6) Communications network designer; 7) Multi-media programmer; 8) WEB designer; 9) Application programmer; 10) Hardware maintenance specialist; 11) Software maintenance specialist; 12) Radio Frequency Engineer; 13) Tele-communications Consultant; 14) Hardware development engineer; 15) Telematics network architect; 16) Information manager; 17) Computer operator/installer; 18) Integration and testing specialist; 19) Telematics services analyst; 20) Telematics security specialist; 21) ICT products and services manager; 22) Development project manager; 23) Sales manager; 24) Research and Development Manager; 25) ICT security specialist; 26) ICT innovation manager; 27) ICT Infrastructure Operation and Maintenance Technician; 28) Content developer; 29) ICT Consultant in Public Administration; 30) Specialist in usability of services and applications.

In more recent times, in 2018 Apaza Paucara (2018: 66) mentions five of these new profiles, with their degree of responsibility: 1) Chief Data Officer (CDO); 2) Data Scientist; 3) Chief Revenue Officer; 4) Brand Manager; 5) Product Marketing Manager. Even more recent, in 2021 García Machado & León Santos (2021: 44-46) point out that as communication has expanded, digital marketing requires new professional profiles that provide solutions to the new needs posed by the market, these positions being:

- Community Manager or Virtual Community Manager: is responsible for analyzing and understanding the information produced in social networks, in addition to being the mediator of the company's relations with users in the digital environment.
- Social Media Manager: the person who executes the communication strategy of the social networks, in addition to coordinating the work of the Community Manager.
- Copywriter / Multimedia Journalist: a person must assume the tasks of writing, photography and editing that were previously performed by different professionals.



- Content Curator: detects content circulating on the Web, making content from other sites available to the community.
- Online Reputation Manager: in charge of brand image, acting in three areas: researching brand reputation; monitoring the brand with tracking techniques and tools; and managing the organization's image.
- Content Manager: analyzes web content, videos, podcasts and images, with knowledge of visual creation, document organization and content management.
- Web analyst: measures, collects, interprets and analyzes the information generated on the web.
- Record Manager: search, management and control of data and information about the brand or company, being a complementary figure to the Community Manager.
- Digital Information Architect: designing user interaction on the web, organizing and structuring the contents, as well as giving coherence to the web architecture.
- Web usability expert: must ensure that the navigation of the website is simple and meets the user's needs, and must have experience in market research, analytical mindset and knowledge of sociology.
- E-Commerce specialist: in charge of online sales, directing the sales strategy and making sure to resolve errors that arise in the purchasing process.

Among many others, two of the organizations that have addressed the issue of new digital professions are the Instituto de Innovación Digital de las Profesiones (INESDI) - Institute for Digital Innovation in the Professions - of Spain and Forbes magazine. According to a study conducted by INESDI Digital Business School (2020) conducted in 2019 in the cities of Madrid and Barcelona, they found extremely important data on the areas in which digital professions are developing.

I try to make a very tight summary of the excellent information provided by INESDI (2020: 9-78), first I place the nine areas or major divisions of digital jobs, then I list the 25 most important digital professions today, in the third column I place the name of the position as well as its year of creation, then give a job description, present the mission of each position and finally put the estimated salary band in thousands of euros per year:

**Table 1. The 25 New Digital Professions in Spain**

Scope	N.	Position	Description	Mission	Salary
<b>1.-Digital Strategy</b>	1	CDO (2014)	Chief Digital Officer, director of digital transformation and corporate hacker.	Define and implement the digital strategy in the company, in order to ensure the achievement of digital business objectives.	90 to 200
	2	CTO (2019)	Chief Technology Officer, director of digital transformation and technology.	Define and implement the technology strategy, ensuring architecture, transaction and	80 to 150

				operation, security and innovation.	
<b>2.-Digital Marketig</b>	3	Digital Marketing Manager (2014)	Attraction marketing specialist.	Creation, definition and execution of the digital marketing plan; reporting of performance indicators and cross-cutting actions.	50 to 80
	4	Inbound Marketing Specialist (2015)	Attraction marketing specialist.	Design the funnel and strategy of the corporate marketing methodology to attract and retain loyal customers in a non-intrusive way.	35 to 45
	5	SEM & SEO (2015)	Search Engine Marketing Specialist (SEM) and Search Engine Optimization (SEO).	Define and create paid search engine campaigns based on keywords, oriented to conversion and achievement of web objectives.	25 to 38
	6	SEO Specialist (2014)	Search Engine Optimization Specialist.	Increase user visits and potential customers through organic search engine optimization.	25 to 38
	7	Trafficker Digital (2019)	Expert in campaign management and online traffic.	Design, planning, execution and measurement of advertising campaigns on different digital platforms, social networks and Google.	28 to 38
	8	Growth Hacker (2018)	Expert in viral developments.	Approach the market with a focus on innovation, scalability and user connectivity.	20 to 40
	9	CRO Specialist (2019)	Web conversion specialist.	Optimize the web conversion rate through the combination of different discipline and by measuring the user's buying process.	30 to 45
	<b>3.- Digital Communication &amp; Social Media</b>	10	Digital Communication & Brand Manager (2018)	Responsible for digital communication and brand development.	To make known and enhance the identity, image and brand of the organization in the market, through channels and

				relationships with managers, partners and customers.	
	11	SEO Content Manager (2014)	Responsible for multi-format digital content with SEO knowledge.	Definition and implementation of the strategy and content plan for the web, blogs, social networks or any other support.	25 to 40
	12	Social Media Manager (2014)	Responsible for the social media strategy.	Creation, development and implementation of the social media strategy, at brand, product and service level.	35 to 50
	13	Community Manager (2014)	Responsible for managing communities and social networks.	Manage the community of the brand, company or product on the Internet, acting as a liaison point.	25 to 45
<b>4.- Big Data &amp; Business Intelligence</b>	14	Digital Analyst (2014)	Digital Analyst.	Give meaning and significance to the data collected through online measurement tools (site centric and user centric).	35 to 65
	15	Big Data & AI Analyst (2015)	Big Data & Artificial Intelligence Analyst.	Give sense and meaning to the data collected in big data integration projects.	45 to 65
	16	Customer Intelligence & CRM Analyst (2014)	Customer Intelligence & Customer Relationship Management Analyst.	Use analytical methods and techniques to gain insight into the customer and their impact on the business.	35 to 60
<b>5.- Technocreativity</b>	17	Creative Tech & Digital Designer (2018)	Multi-platform digital designer.	Identify creative, communicative and usable solutions for the subsequent development of digital graphic products.	23 to 38
	18	UI / UX Designer (2017)	Interfaces & User Experience Designer.	Define the user experience (UX) in users' digital environments.	25 to 55
<b>6.- Customer Experience</b>	19	Customer Experience Manager (2019)	Customer Experience Manager.	Align customer expectations and perceptions with the value propositions	40 to 60

				offered by the brand. Analysis of their impact on the bottom line.	
<b>7.- Digital Bussines &amp; E-commerce</b>	20	Digital Bussines Manager (2019)	Digital Bussines Manager.	Creation, definition and execution of the company's digital business plan; management of digital business models (ROI).	70 to 120
	21	E-commerce Manager (2014)	E-commerce Manager.	Lead and manage the organization's e-commerce, with the objective of providing optimal service and the best possible ROI.	70 to 100
	22	Digital Account Manager (2017)	Digital Account Manager.	Account management in digital projects or digital business management.	45 to 60
<b>8.- HR &amp; Employee</b>	23	Digital HR Manager (2017)	Digital Human Resources Manager.	Lead, drive and accelerate the process of attracting and retaining human resources, promoting competitive ways.	50 to 90
<b>9.- Tech &amp; Bussines Innovation</b>	24	Al Bots Manager (2019)	Expert in Artificial Intelligence solutions for bots.	Identifying use cases of conversational technologies, creating and leading the promotion and implementation.	40 to 50
	25	Product Owner & Scrum Master(2019)	Expert in agile methodologies.	Conveying customer needs to teams to enable the development of products suitable for each case.	35 to 45

*Source: Own elaboration. With information from INESDI Digital Business School (2020). Top 25 digital professions 2020 [Top 25 digital professions 2020], pp. 9-78.*

INESDI (2020: 14-15) manages nine areas of digital professions in 2019, where it mentions that the three most demanded correspond to these:

Again in this edition, and as a pattern repeated since the first one, the most sought-after professionals are those with profiles associated with the field of Digital Marketing, which groups 38% of the analyzed job offers. This is followed, with 12 points less (26%) and, in second place, also consolidated, by

Digital Communication & Social Media. In third position, with 15%, we find Digital Business & E-commerce.

In the case of Mexico in the year 2015, Forbes Mexico (2015) warns that new technology and sustainability are creating employment opportunities since the beginning of the last decade, following the OCC World portal, marked the new jobs that already stood out in 2015, pointing out the following with their respective salaries:

- Data scientist: Oracle and SQL database management. 20,000 to 50,000 pesos.
- App developer: C++, PHP, Java and HTML5 programming. 15,000 to 65,000 pesos.
- Digital marketing specialist: Google Analytics, SEO, SEM, AdWords. 67,000 pesos.
- IT security analyst: ISO 27001 certifications. 30 thousand pesos.
- E-commerce manager: between 63 thousand and 97 thousand pesos.
- Cloud services specialist: 80 thousand pesos (with 5 years of experience).
- Renewable energy engineer: 28 thousand pesos.
- 3-D printing specialist: small niche in expansion. More than 20,000 pesos.
- Content marketing expert: between 48 thousand and 78 thousand pesos.
- Architect of sustainable spaces: 60 thousand dollars a year.

In the update of its report Forbes Mexico (2020) notes: "You may not be familiar with the term Chief Digital Officer or CDO, but this will be the most demanded digital professional in 2021, according to the specialized employment portal Jobatus". Where ICTs are changing the future of work in a vertiginous way, Esther Román, the owner of Jobatus, says: "In fact, as time goes by, new job opportunities are emerging and the need for these workers in companies is accumulating" (Forbes México, 2020).

For 2021 Forbes Mexico (2020) points out these seven professions, makes its job description, but does not provide salaries: 1) Chief Digital Officer (Chief Digital Officer or CDO); 2) Artificial Intelligence Specialist; 3) Data Scientist; 4) IT Director; 5) Customer Success Manager; 6) Chief Information Security Officer; 7) Ecommerce manager.

According to the report to be released by CodersLink Agency (Vázquez, 2022) in 2022: "...revealed that the highest paid engineering roles in Mexico by 2022 are Solutions Architect and DevOps; while Chief Technology Officer (CTO) is the highest paid management position". With information from 2021, Vázquez, C. (2022) mentions the 15 information technology (IT) jobs, giving description and the monthly salary range they can receive in Mexico, which are the following:

1. Big Data Engineer: 47 thousand to 104 thousand pesos.
2. DevOps Engineer: 38 thousand to 82 thousand pesos.
3. Information systems security manager: 33,000 to 76,000 pesos.
4. Mobile application developer: 15 thousand to 49 thousand pesos.
5. Application architect (technology): 30,000 to 60,000 pesos.
6. Data architect: 24 thousand to 132 thousand pesos [sic].

7. Data Administrator: 19 thousand to 33 thousand pesos.
8. Data security analyst: 23 thousand to 47 thousand pesos.
9. Data Scientist: 18 thousand to 60 thousand pesos.
10. Network/cloud architect: 30 thousand to 71 thousand pesos.
11. Network/cloud engineer: 41 thousand to 90 thousand.
12. Senior web developer: 27 thousand to 55 thousand pesos.
13. Site Reliability Engineer: 20.5 thousand to 36 thousand pesos.
14. Systems Engineer: 23 thousand to 63 thousand pesos.
15. Software Engineer: 16,000 to 70,000 pesos.

To close this part of the interesting article by Olvera, E. (2022), I take up again the average salaries that are immersed in information technology (IT), applicable for Mexico in 2020:

- CEO Director: 84,911 pesos.
- CTO: 77,706.55 pesos.
- Artificial Intelligence Developer: 55,993.22 pesos.
- SAP Consultant: 49,419.65 pesos.
- Software Architect: 47,405.56 pesos.
- DevOps: 45,119.97 pesos.
- Business Intelligence: 40,528.17 pesos.
- Data Scientist: 40,147.06 pesos.
- Infrastructure Manager: 40,498.71 pesos.
- Scrum Master 38,380.95 pesos.
- Project Manager 38,337.08 pesos.
- IT Consultant: 34,894.85 pesos.
- Back End Programmer: 27,632.19 pesos.
- Sysadmin: 27,350.51 pesos.
- IT Sales: 26,978.87 pesos
- Teaching: 13,154.71 pesos.
- Technical Support: 13,065.62 pesos.

Apaza Paucara (2018: 75) in his recommendations on the adaptation and orientation of new professional profiles in the area of digital marketing raises:

Knowing new profiles demanded by the global world in the area of digital marketing requires rigorous training, training with networked technologies for the labor supply, as much as the identification of the labor profiles and competencies that are currently required in the market.

As for Artificial Intelligence (AI), the trend in applications is that it will grow exponentially over the next few years. Andreas Kaplan and Michael Haenlein (INESDI, 2020: 87) define it as: "the ability of a system to correctly interpret external data, to learn from that data and to use that knowledge to achieve specific tasks and goals through flexible adaptation".

The so-called intelligent machines (robots) have been acquiring the capacity to imitate human reasoning in basic aspects through AI, which has progressively integrated them into different areas of domestic life and medicine, as in the case of

microsurgery based on robotic arms. Joana Sanchez (INESDI, 2020: 88) mentions that according to Business Insider there are four types of artificial intelligence:

- ❖ Level 1. AI in its most basic form: it starts from a database to perform its task, as well as knowledge to use that information. Deep Blue (IBM's supercomputer to defeat Gary Kasparov at chess) is an example of this level.
- ❖ Level 2. AI with limited memory: algorithms that have the capacity to record or 'remember' past experiences in order to predict or apply them in their decisions. This level has been applied in recent years in mobile devices, voice assistants, chatbots, and could also be used in the management of autonomous cars.
- ❖ Level 3. AI based on the theory of mind: the ability to process and show emotions is a desire in the next steps of AI, no longer as a mere device or algorithm. It is in the experimental phase, with the beginnings of capturing people's moods.
- ❖ Level 4. Self-aware AI: this would be the highest level of artificial intelligence and is currently at a merely theoretical stage.

For Pineda de Alcázar (2020: 42 and 44) there are three fields where robots learn more quickly: image and voice recognition, as well as automatic translation of human languages, adding: "And as in the future there will be more and more intelligent robots, first present on screens and smartphones and then in homes and everyday life, we will have to make decisions to face this not too distant future".

According to Joana Sanchez (INESDI, 2020: 90-91), artificial intelligence has presented these main applications during the last years: 1) Predictive analytics; 2) Chatbots; 3) Intelligent communication; 4) Digital twin. Artificial intelligence machines can make everyday activities easier, those that respond to repetition and automation tasks, therefore instead of displacing humans they complement them, highlighting that fundamental decisions will always be under human control at all times (Pineda, 2020: 49).

## CONCLUSIONS

1. Online education allows students and people in general to have academic preparation without having to make use of traditional or conventional education, where they no longer have to physically travel to school centers, nor attend classes at rigid or forced schedules, in addition to the possibility of lower tuition fees.

2. Learning, unlearning and relearning, as A. Toffler made it known, has lifelong application; the individual who does not submit himself to permanent relearning and who does not know how to search for information to solve the problems that arise, will be condemned to suffer from 'illiteracy' in this new century.

3. In the asynchronous teaching model, the teacher prepares his class and leaves it recorded, so that students can watch it when they have time, with no interaction between teachers and students. In asynchronous classes the student enjoys flexibility of schedule, evolves at his personal pace of study and at the same time becomes more responsible and self-taught.

4. Self-learning always arises from the student's own initiative, seeking by himself the information or the subject of his interest, it implies two powerful verbs: to want and to know. Self-taught education opens the mind and makes it possible to study

new subjects, thus creating a sense of responsibility that grows with time, as well as allowing the constant updating of informed individuals.

5. The characteristics and nature of the new digital media has led to the emergence of new professions or professional roles, among the top five that generate higher income according to INESDI: Chief Digital Officer (CDO); Chief Technology Officer (CTO); Digital Business Manager (Digital Business Manager); E-commerce Manager (E-commerce Manager); and Digital Communication & Brand Manager (Digital Communication & Brand Manager).

6. Artificial intelligence (AI) is capable of imitating the cognitive functions that humans perform constantly and repetitively, making it clear that the trend is that its applications will grow exponentially in the coming years. Of the four recognized levels of AI, the first two have current application in people's lives, from the computer that was programmed to defeat G. Kasparov at chess to the chatbots used today. The third level of AI is in an experimental state and tries to capture people's moods, while the fourth level is only in a theoretical state.

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