

## **Web 3.0 Application to Improve the Digital Skills of University Teachers**

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### **Abstract**

2020 was an atypical year for many sectors and especially for the education sector, face-to-face education in schools and higher education entities ceased to be applied, starting virtual education in the context of the health emergency caused by Covid-19. Teachers had to make changes and adapt to the new reality to acquire knowledge of web applications to develop digital skills, important elements, especially in the current context. The research had a non-experimental design, cross-sectional causal correlation. The sample consisted of 405 teachers from 4 public universities, selected by random non-probabilistic sampling. Questionnaires were used for both variables measured with a Likert scale from 1 to 4 points; 15 items were formulated to measure the web 3.0 variable and 21 items for the digital skills

variable; The first questionnaire has an acceptable reliability value (Cronbach's Alpha = 0.901, 95% CI) and the second, self-regulated learning with an acceptable reliability value (Cronbach's Alpha = 0.921, 95% CI). The results indicate that the use of Web 3.0 applications allows teachers to publish content, Cloud Computing tools or E-Learnig tools, managing to develop digital competence for collaborative communication with students. Finally, the Web 3.0 application has a significant influence on digital skills.

## **Keywords**

Web Applications, Digital Competence, Digital Literacy, Digital Content.

## **Introduction**

Today, sudden changes due to the COVID-19 pandemic have forced rapid technological evolution; the need to master digital tools such as web applications has allowed us to visualize the teaching practice in the 21st century and how prepared they are in relation to the use of information and communication (ICT) (Regalado, 2013). With regard to the above, in current times, ICTs have become a key and important piece for the evolution of a favorable environment for both teachers and students; there are new procedures to teach and learn equitably in a globalized world where web applications are of great importance in the teaching process (Pozuelo, 2014).

Adhered to this, the universalization of the internet has led to the appearance of various proposals: Smart or intelligent digital, wireless, cybernetics or knowledge; Of these terms, the “Smart” has had a tremendous development of which it cannot be alien to academic work at all levels and modalities(Aguirre and Ruiz, 2012). Thus, teachers, by making use of a clearly formative strategy that often even sounds soporific and does not help a good cognitive development for the training of each student, were forced to include digital competence beyond the benefits that provides long and short term as a recreational teaching method, which develops an innate learning of the student, since digital competence develops beneficial variables (Cabero et al., 2020).

Currently, universities have been forced to adopt new educational methodologies around ICT, methods that enhance collaborative work and help develop professional skills that are required (Cabero and Martínez, 2019). Even so, more and more, students prefer to use the virtual environments offered by the so-called social networks that also allow the performance of said skills; but that imply a decentralization of information and, with this, the work of continuous monitoring and evaluation by teachers is difficult (Zavala et al., 2016). In recent years, multiple LMS platforms have appeared where students take an active

role and can manage their own learning (Levano et al., 2019). Social networks are also used as LMS platforms, for example, Facebook, since it has already described functions typical of this type of systems. (Martínez and Garcés, 2020). Mortis et al. (2013) considered that the different types of social networks (social network sites, or SNS), videos, podcasts and wikis, among others, are tools with great potential for collaborative teaching-learning processes. In the educational context, this type of network allows, through the Internet, to put people with common interests in contact, leading them to jointly exploit resources of mutual interest by creating subgroups of public and private messaging, among others. (Pinto et al., 2016). In addition, these are closely related to the new participatory and active methodologies that are being adopted in the European Higher Education Area. (Ventosilla et al., 2021).

The teaching of information skills is the dynamization and improvement of information spaces in higher-level institutions: corners, classroom and school libraries, computer room and documentation classroom-workshop (Pozos and Tejada, 2018). The latter would serve for the study and elaboration of informative-documentary products, developing at the same time cognitive and metacognitive processes such as problem solving, decision-making, scientific inquiry and composition of texts, printed and electronic (Engen, 2019). The use of the web 3.0 application allows a change in the teacher's didactic procedures, leaving behind the textbook and the master class as the only sources of information (Tejada and Pozos, 2018).

The 21<sup>st</sup> century is the century of information in which, through interactive and participatory technology, it is desired to offer positive individual learning; it is required to convert our students as stimuli for the advancement of our planet as a collective society. It follows, then, the importance of educational technological infrastructure that tele-teaching platforms represent, these have been consolidated as virtual representation on the Internet of the classrooms of university educational institutions (Agreda et al., 2016 and Kuster, 2013). There is a real demand to open the virtual walls of these systems to many of the services offered by the Internet today. (Alemany, 2010). It is necessary to integrate new functionalities that, in addition, allow students to acquire a greater role; Likewise, teachers, without technological barriers, can focus on their work as a guide and trainer (Fernández et al., 2017; Albuin and Clemente, 2008).

The ignorance on the part of teachers about the potential that Edumatics gives shows low performance as a teacher, education needs teachers who are prepared to respond to the demands of the current century; students are digital natives, that is, they handle and know technology, so they expect teachers to use web applications in class (Mayer and Leis, 2010;

Freire et al., 2018). So it is necessary for teachers to master and be empowered by digital tools such as web 3.0 applications; therefore, reach digital skills. The term competence, related to the world of work and, as has been seen, recently incorporated into the university world, has been shaping its meaning in recent years (Vásquez and Martinell, 2018; Guix, 2016).

According Morales (2013), the competence implies personal resources (knowledge, qualities and aptitudes) and environmental (relationships, documents and information) that are mobilized to achieve a performance (San et al., 2013 and Cobos et al., 2019). The term competence is related to the ability to extrapolate and apply knowledge to the circumstances experienced throughout life. Aguirre and Ruiz (2012). They expanded this definition by stating that competence is what is needed to respond to problems that arise throughout life. According to them, it has several components: what? For what? In what way? Where, through what and how? Therefore, competence would be at the intersection point between knowledge, attitude and ability (Cabero et al., 2020 and García et al., 2016). One of the main objectives of digital competence is to define the degree of failure in order to contrast perceptions and develop strategies for an improvement in student learning. Therefore, among one of the definitions, digital competence is understood as the safe use of society's technology in terms of information, whether for work, study and specific information. Both Regalado (2013) and Pérez and Rodríguez (2016) stated that one of the most important tasks of teachers is to motivate students to use material and technological resources by themselves in order, in this way, to become more independent in their learning. Learning, through technologies, allows teachers to be at the forefront of the globalized world, making their students autonomous as well as having access to more information over which the teacher has no control. (Latorre, 2017).

For all the above, the use of the web 3.0 application is a fundamental part of a strategy that allows progress in any field (Guix and Ruiz, 2018). This analysis leads to reflection and to the posing of the following question: how do web 3.0 applications influence digital competences in teachers of a public university? learners. Teachers have had to adapt to virtual education, so the acquisition of the management of web applications is essential in this context of remote education, achieving that they develop digital skills, being a need for an urgent solution, since teachers entered a state of stress, since most of them barely knew how to use the computer, not to mention that many of them are of scarce economic resources. The teaching and training in ICT, today, is relevant in the teaching process, teachers who have been updated in the management of web applications have achieved better results in their students (Codina, 2009).

**Method**

The research was under the quantitative approach, non-experimental design, correlational level. The sample consisted of 405 teachers from 4 public universities, said sample was non-probabilistic. The data collection technique was the survey and the instruments were Likert-type questionnaires with 15 items for the variable web applications 3.0 and 21 items for digital skills. The 3.0 web applications questionnaire had three dimensions: applications to publish content, cloud computing, and tools by E-Learning. The digital skills questionnaire had five dimensions: digital literacy, collaborative communication, creation of digital content, security and resolution of problems, show an internal reliability coefficient of 0.901 and 0.921 respectively, these results lead to appreciate the validity of the instrument.

**Table 1 Scales of the variables**

<b>Variable / Dimension</b>	<b>Inadequate</b>	<b>Regular</b>	<b>Well</b>
<b>Web 3.0 Applications</b>	<b>19-44</b>	<b>45-70</b>	<b>71-95</b>
Applications to publish content	4-9	10-15	16-20
Cloud Computing Tools	3-7	8-11	12-15
E-Learning Tools a	4-9	10-15	16-20
<b>Digital competence</b>	<b>19-44</b>	<b>45-70</b>	<b>71-95</b>
Digital literacy	3-7	8-11	12-15
Collaborative communication	3-7	8-11	12-15
Creation of digital content	3-7	8-11	12-15
Security	3-7	8-11	12-15
Problem resolution.	3-7	8-11	12-15

Data was collected online, administered in both instruments; informed consent was made prior knowledge and acceptance, fulfilling the ethical criteria established in an investigation. Participants were made aware of the relevance of their participation, guaranteeing the confidentiality of the data. The statistical process was worked with the use of SPSS version 25 software. The exploratory factor analysis was taken into account to guarantee the validity of the constructs, estimation of the logistic regression models, for the determination of the determination coefficient, Nagelkerke and to the statistical value of Wald for the comparison greater than 4.00.

**Results**

**Table 2 Descriptive results of the web application 3.0 and its dimensions**

<b>Variables / Dimensions</b>	<b>Inadequate</b>		<b>Regular</b>		<b>Well</b>	
	<b>fi</b>	<b>po%</b>	<b>fi</b>	<b>po%</b>	<b>fi</b>	<b>po%</b>
<b>Web application 3.0</b>	249	61.5	37	9.1	119	29.4
Applications to publish content	263	64.9	113	27.9	29	7.2
Tools of Cloud Computing	246	60.7	145	35.8	14	3.5
E-Learning Tools	120	30	220	54	65	16

Regarding the percentage results of the 3.0 application, 61.5% of the teachers perceived an inadequate level of the 3.0 web application; while 9.1%, regular level and 29.4%, good level. The dimension that presented the highest inappropriate level is the applications to publish content with 64.9%, only 7.2% perceived a good level; Likewise, there is the Cloud Computing tools dimension with 60.7% of those surveyed who perceived an inappropriate level, followed by the E-Learning Tools dimension. These results, which were observed in the table, refer to the fact that the respondents perceive an inadequate level of the 3.0 web application and its dimensions.

**Table 3 Descriptive results of digital competences and their dimensions**

<b>Variables / Dimensions</b>	<b>Low</b>		<b>Moderate</b>		<b>High</b>	
	<b>fi</b>	<b>po%</b>	<b>fi</b>	<b>po%</b>	<b>fi</b>	<b>po%</b>
<b>Digital skills</b>	219	54.07	165	40.74	twenty-one	5,185
<b>Digital literacy</b>	276	68.15	112	27.65	17	4,198
<b>Collaborative communication</b>	283	69.88	105	25.93	17	4,198
<b>Creation of digital content</b>	271	66.91	120	29.63	14	3,457
<b>Security</b>	254	62.72	139	34.32	12	2,963
<b>Problem resolution</b>	271	66.91	118	29.14	16	3,951

In this table 3, it was observed that the highest percentage frequency is found at a low and moderate level. Regarding the results, 54.07% of those surveyed presented a low level and only 5.185%, a high level of digital skills; while the most representative dimension at the high level was digital literacy and collaborative communication with 4,198%, respectively; Likewise, the security dimension presented a poor level, since only 2,963% of the teachers reached a high level. In the percentage distribution, as a whole, there was a trend between moderate and low level of digital competences of university teachers.

**Table 4 Data fits for the logistic regression model between the Web 3.0 application and digital skills and their dimensions**

Fit information for models					
Variables / Dimensions	Model	Logarithm of likelihood -2	Chi squared	gl	S.I.G.
Web 3.0 application affects digital skills	Intersection only	144,565	115,467	2	0.000
	Final	29,098			
Web 3.0 application in digital literacy	Intersection only	117,937	89,242	2	0.000
	Final	28,695			
Web application 3.0 on the Communicationcollaborative	Intersection only	125,801	98,248	2	0.000
	Final	27,554			
Web application 3.0 on the Creation of digital content	Intersection only	92,098	62,288	2	0.000
	Final	29,809			
Web application 3.0 on the Security	Intersection only	103,278	74,775	2	0.000
	Final	28,502			
	Final	35,650			
Web application 3.0 on the Resolution from problems	Intersection only	124,103	98,803	2	0.000
	Final	25,300			
Link function: Logit.					

The statistics shown in the table refer to the adjustment for the logistic regression model due to the characteristics of the Likert-type instruments. With respect to 3.0 web application and digital skills, a likelihood of 29.098 was obtained with the association statistic of the Chi square of 115.467 with a statistical significance value of 0.000 compared to the level of confidence ( $p\_value < 0.05$ ), this comparison allowed to affirm the dependence between variables; Regarding the results of the dimension of the web 3.0 application in digital literacy, it was obtained with the Chi square dependency test of 89,242 and the value of  $p\_value < 0.05$ ; likewise, the web 3.0 application was used in collaborative communication with a Chi square value of 98.248 and  $p\_value < 0.05$ ; This same behavior occurred in the web 3.0 application in the creation of digital content with a Chi square of 62.288 and a  $p\_value$  of 0.00 compared to 0.05; This similar behavior was evidenced among the web 3.0 application in security with a Chi square of 74.775 compared with a  $p\_value$  of 0.00 less than 0.05. Finally, the value of the independent statistic of the Chi square between the web application 3.0 in problem solving with 98.803 versus the significance value of  $p\_value$  of 0.00  $< 0.05$ ; These comparisons made it possible to affirm that the data of the web 3.0 application are dependent on the data of digital competences and their dimensions. In

addition, it allowed to corroborate that the data fit for the presentation of logistic regression models. 0 in problem solving with 98.803 compared to the significance value of p\_value of 0.00 <0.05; These comparisons made it possible to affirm that the data of the web 3.0 application are dependent on the data of digital competences and their dimensions. In addition, it allowed to corroborate that the data fit for the presentation of logistic regression models. 0 in problem solving with 98.803 compared to the significance value of p\_value of 0.00 <0.05; These comparisons made it possible to affirm that the data of the web 3.0 application are dependent on the data of digital competences and their dimensions. In addition, it allowed to corroborate that the data fit for the presentation of logistic regression models.

**Table 5 Coefficients of the logistic regression models and the pseudo r of determination between digital competences with the web 3.0 application and its dimensions**

<b>Parameter estimates</b>						
		<b>Estimate</b>	<b>Dev. Error</b>	<b>Wald</b>	<b>gl</b>	<b>S.I.G.</b>
Digital skills	Low	-1,651	0.234	49,742	1	0.000
	Moderate	1,784	0.243	53,975	1	0.000
Web 3.0 application	Inadequate	-2,607	0.271	92,347	1	0.000
	Regular	-1,658	0.395	17,611	1	0.000
<i>Determination coefficient</i>		<i>Cox and Snell: 0.248 Nagelkerke: 0.303 McFadden: 0.167</i>				
Applications to publish content	Low	-0.616	0.188	10,751	1	0.001
	Moderate	-2,108	0.265	63,375	1	0.000
Web 3.0 application	Inadequate	-2,284	0.255	80,409	1	0.000
	Regular	-1,130	0.383	8,698	1	0.003
<i>Determination coefficient</i>		<i>Cox and Snell: 0.197 Nagelkerke: 0.255 McFadden: 0.147</i>				
Tools of Cloud Computing	Low	-0.581	0.187	9,630	1	0.002
	Moderate	-2,084	0.265	61,892	1	0.000
Web 3.0 application	Inadequate	-2,438	0.263	86,106	1	0.000
	Regular	-1,167	0.386	9,138	1	0.003
<i>Determination coefficient</i>		<i>Cox and Snell: 0.215 Nagelkerke: 0.280 McFadden: 0.165</i>				
E-Learning Tools	Low	-0.936	0.199	22,061	1	0.000
	Moderate	-2,492	0.307	65,686	1	0.000
Web 3.0 application	Inadequate	-2,352	0.255	85,326	1	0.000
	Regular	-0.996	0.378	6,920	1	0.009
<i>Determination coefficient</i>		<i>Cox and Snell: 0.216 Nagelkerke: 0.276 McFadden: 0.160</i>				
Link function: Logit.						
to. This parameter is set to zero because it is redundant.						

The results in Table 5 indicated favorable estimators for digital skills, since their signs are protective for the variable and dimensions. In this regard, the behavior or variability or the level of behavior of digital skills is due to 0.248 (24.8%) of the web application 3.0; These results were corroborated by the Wald statistic  $> 4.00$ , in addition to the  $p\_value < 0.05$ . Likewise, the variability of the levels of the applications to publish content is due to the 25.2% of the web 3.0 application in the surveyed teachers, a similar condition evidenced that the variability or the levels of behavior of Cloud Computing tools is due to 21.5% the levels of the web application 3.0; in the same way, Regarding the behavior of the level of E-Learning tools, it is a reference for 21.6.3% of the web 3.0 application; These results as a whole are significant, that the statistical value of Wald is greater than 4.00 in addition to the value of statistical significance  $p\_value < 0.05$  which allowed its description and the incidence that the levels of digital competences and their dimensions are explained by the levels of the web 3.0 application according to the data obtained in the sample.

### **Discussion of the Results**

The findings found and their analysis provided evidence of the web 3.0 application in digital skills and supported the results of this research:

The analysis carried out by Gifted (2013) demonstrated that digital competence has an implicit relationship with the knowledge, qualities and skills that allow the mobilization of performances in the learning process, these results differed from the results of this research where teachers have an inadequate level of web 3.0 applications due to what is determined that the digital competence is of medium level; For its part, Pozuelo et al. (2014) they proved that ICTs are necessary for the evolution of education for both teachers and students; Regarding our results, the teachers showed a trend between moderate and low in relation to the management of digital skills. For Aguirre and Ruiz (2012), teachers must have the ability and strategies to train students and allow them to develop skills; But, for this to happen, the teacher must be prepared in the digitized world; With respect to our study, teachers present an inadequate level in web applications. So too, Cabero and Martínez (2019) they demonstrated the influence of new educational technologies around ICT; In our research, teachers had an inadequate level in handling E-Learning tools.(Zavala et al., 2016); the use of tele-teaching platforms allows teachers to interact with students through social networks and allows the development of educational activities by making appropriate use of Cloud tools; In our study, teachers demonstrated an inadequate level of Cloud computing tools.

Among the most relevant theoretical contributions in this research is that of Engen (2019), is that the use of the web 3.0 application allowed a change in the teaching procedures of the teacher, leaving behind the textbook and the master class as the only sources of information.

The descriptive results indicated that the respondents perceive an inadequate level of the web 3.0 application and its dimensions. In this regard, both Mayer and Leis (2010) What Freire et al. (2018) stated that ignorance on the part of teachers about the potential that Edumatics gives shows poor performance as a teacher. Education needs teachers who are prepared to respond to the demands of the current century, let's not forget that students are digital natives and know about technology; they expect teachers to use web applications in class. On the other hand, teachers perceive a moderate and low level of digital skills; In relation to this, some teachers had difficulties, since they did not have internet and cell phones for virtual classes and did not have mastery of digital tools; in the same way, Cabero et al. (2020) and García et al. (2016) they expressed that competence would be found at the intersection point between knowledge, attitude and ability.

## **Conclusions**

The public universities must have the vision of providing educational services according to the contexts that may arise; that is, remote, blended and face-to-face teaching, in addition to ensuring educational quality, promoting a virtualized education making use of digital tools with the firm purpose of training competitive students in this globalized world so that they respond to the demands of both national markets as international. As is to indicate that the use of Web 3.0 applications allows teachers to publish content, Cloud Computing tools or E-Learnig tools, managing to develop digital competence for collaborative communication with students. Finally, the Web 3.0 application has a significant influence on digital skills.

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