

## Digital competence, engagement and role stress in Latin American teachers Competencia digital, engagement y estrés de rol en docentes universitarios latinoamericanos

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### ABSTRACT:

The covid-19 pandemic has generated transformations in the roles of university teachers in Latin America, demanding a new dynamic of life and adjustment to a work environment with emphasis on virtuality, which called for rethinking synchronous and asynchronous teaching-learning spaces. Consequently, the objective of the study was to evaluate the digital competencies (DC), engagement (ENG) and role stress (RS) of this professional. A mixed methodological approach, non-experimental, cross-sectional, correlational and explanatory design was used. 300 teachers from Brazil, Colombia, Chile, Ecuador, Mexico and Peru participated. Three questionnaires and one open-ended question were conducted. The results indicate a medium level of DC, high level of ENG and medium level of RS. A significant relationship was found between ENG and RS, the higher the level of RS, the lower the ENG or vice versa. There is a significant relationship between ENG and DC; the higher the level of ENG, the higher the DC or vice versa. No statistically significant relationship was found between RS and DC. The three variables are similar in public and private universities. However, DC and ENG are different in men and women, although RS is similar for both genders. The open-ended question revealed emerging categories such as ICT strategies for formative assessment in virtual environments, fostering teaching learning communities and positive mental health self-management. All this makes possible the projection of future routes of post-pandemic psychosocial intervention.

### Keywords:

Digital competence, engagement, role stress, university teacher.

### RESUMEN

La pandemia de la covid-19 ha generado transformaciones en los roles del docente universitario en Latinoamérica, exigiendo una nueva dinámica de vida y ajuste a un entorno laboral con énfasis en la virtualidad, que convocó a repensar espacios sincrónicos y asincrónicos de enseñanza-aprendizaje. En consecuencia, el objetivo del estudio fue evaluar las competencias digitales (CD), engagement (ENG) y estrés de rol (ER) de este profesional. Se desplegó un enfoque metodológico mixto, diseño no experimental,

transversal, correlacional y explicativo, participaron 300 docentes de Brasil, Colombia, Chile, Ecuador, México y Perú. Se aplicaron 3 cuestionarios y una pregunta abierta. Los resultados indican un nivel medio de CD, nivel alto de ENG y nivel medio de ER. Se encontró una relación significativa entre ENG y ER, a mayor nivel de ER, menor ENG o viceversa. Existe relación significativa entre ENG y CD; a mayor nivel de ENG, mayor CD o viceversa. No se encontró una relación estadísticamente significativa entre ER y CD. Las tres variables son semejantes en universidades públicas y privadas. No obstante, CD y ENG son diferentes en hombres y mujeres, aunque el ER es semejante para ambos géneros. La pregunta abierta reveló categorías emergentes como estrategias TIC para la evaluación formativa en entornos virtuales, fomento de comunidades docentes de aprendizaje y autogestión de salud mental positiva. Se posibilita con todo ello, la proyección de futuras rutas de intervención psicosocial postpandemia.

**PALABRAS CLAVE:** Competencia digital, engagement, estrés de rol, docente, universidad.

## 1. INTRODUCTION

When referring to the digital competence (DC) of the teacher, it emphasizes a performance culture of "know-how" from the use of ICT content. Thus, Rangel-Baca (2015) suggests the technological, informational and pedagogical areas (Area, 2019), the planning and management of face-to-face teaching situations with ICT, the design and development of didactic virtual environments, the selection and creation of digital learning objects and the tutoring and performance of continuous online assessment. From the European Framework (DigCompEdu), 22 competences on the use of ICT are proposed, organized into six areas of development and it is determined that "digital competence involves the critical and safe use of ICT for work, leisure and communication" (European Commission, 2006, cited in Tourón et al., 2018. p.7). Similarly, INTEF (2017) proposed dimensions such as information and information literacy, communication and collaboration, digital content creation, security and problem solving. Also, Tourón et al., (2018) proposed the knowledge scale and the use scale that include dimensions such as information and communication, communication and collaboration, digital creation, security and problem solving.

However, Fullan and Donnelly (2013, cited in Tourón et al., 2018, p.30) recognize that "teacher training should focus not only on the use of technology itself", but on its effective application as a pedagogical resource. Area (2019) raises emerging trends in Higher Education and considers an increase in digital competencies in teachers and students, however, very little has been addressed to teacher health and well-being, being relevant to integrate the management of their digital competence as a condition of physical, mental and emotional demand (Bordás, 2020). Precisely, the challenge of digital teaching, needs to be arranged as a successful, healthy and strengthening performance of knowing how to "do", "be" and "live" (Pelletier et al., 2021).

## 2.- Theoretical aspects of research

### 2.1. Digital competencies in teachers

The COVID-19 framework marked the rise of ICTs, but determined new needs of students, challenging higher

education institutions to focus on strategies to ensure continuity and sustainability of academic activities. It was unavoidable the development of digital competencies (DC) of teachers, integrated to their pedagogical practice.

Different international bodies establish foundations around teacher training and the incorporation of technologies for the transformation of educational contexts and the achievement of Education for All goals (United Nations, 2003, 2018, Organization of American States, 2000).

Knowing the state of progress of DC in university teachers, will allow the organization and projection of training spaces that enrich their pedagogical acquis, understanding that "competencies are concretized in professional performance" (Deroncele, 2015, p.85). To move in this direction, UNESCO (2017) proposes digital literacy, deepening and creation of knowledge. This seeks to advance in pedagogical innovation and provides a valuable opportunity to transform teaching-learning environments in Latin America.

This study assumes the theoretical-methodological proposal of DC by Sarango-Lapo, et al. (2020), with special emphasis on: 1.- Competence for the search, selection and evaluation of information, 2.- Competence for the storage and retrieval of information produced, 3.

### 2.2. Role stress in teachers

Although Scheib (2003) states that, for a long time, teachers' role stress has been the focus of interest in educational research, there is little publication on it. In the search equation "role stress" and "teacher" in Scopus, considering only the title of the paper, 11 documents are found in the period 2000-2020. In 2000, the first text appears (Conley & Woosley, 2000); and in 2020 the text by Washburn et al. (2020). With the same equation, the Web of Science offers 4 papers (Conley, & You, 2009; Smith, 2010; Richards et al., 2017; Yang et al., 2018).

Then, "role stress management is becoming an increasingly dominant issue in the professional lives of teachers due to the various roles these professionals must play in their work" (Hassan et al., 2019, p. 64).

Role stress is constituted by three essential factors: **role conflict, role ambiguity, and role overload** (Espinosa et al., 2020) specifically in teachers (Scheib, 2003; Conley & You, 2009; Smith, 2010; Richards et al., 2017; Yang et al., 2018; Hassan et al., 2019).

Mérida-López et al. (2017) posit that work-related stressor, including role ambiguity and role conflict, link psychological maladjustment and poor mental health, and call for addressing personal resources such as the ability to regulate emotions. Similarly, Deroncelle (2020), that emotional competencies have an impact on the effective management of role stress (prevention and mastery) and on occupational well-being.

Mérida-López et al. (2017) highlight the priority of teacher's health, due to the high incidence of job stress in these professionals. Role ambiguity and role conflict have shown consistent associations and decreased job performance, dissatisfaction, and poor mental health. But, emotional skills could modify ways of coping with the stressful event and improve teacher's productivity in the teaching learning process (Al-Kahtani et al., 2016; Allam, 2017).

Scientific evidence finds that teachers prone to stress are more likely to be unhappy, dissatisfied, less motivated, insecure in the workplace and less committed to organizations, so that role stress negatively affects engagement (Al-Kahtani et al., 2016). Conley & You (2009) posit that role stress has been a central concern in organizational behavior research, considering that it negatively impacts teachers' well-being, from aspects such as reduced self-esteem and increased anxiety, tension and dissatisfaction.

This agrees with Richards et al. (2017) when they argue that reducing teacher stress and emotional exhaustion from perceived importance is a key factor. Also, Richards & Sinelnikov (2020) state that perceived importance can reduce role stress and increase psychological need satisfaction.

The epistemological basis of role stress involves role socialization theory (Richards & Andrew, 2015). When individuals have incongruent expectations for social role performance, challenges arise in the form of role stress (Conley & You, 2009, cited in Richards et al., 2017). Therefore, the following precept is assumed:

...role stress manifests in the form of role conflict (incompatible role performance expectations), role overload (role expectations exceed available time or resources), and role ambiguity (unclear role expectations to guide behavior (Hindin, 2007, cited in Richards et al., 2017)).

### 2.3. Engagement in teachers

Although engagement is a recent topic, studies show an exponential growth in the last five years among teachers. Precisely since the beginning of the 21st century, there has been a growing trend towards positive psychology, with a shift in attention from ill health and discomfort to the promotion of health and well-being.

For this reason, work psychology has begun to focus its attention on the positive aspects of work and, among them, on engagement or work commitment (Tomás et al., 2018).

Teachers' work commitment conditions their teaching quality and classroom behavior. Hence the relevance of understanding this phenomenon and promoting the quality of educational work (Košir et al., 2020). From Bordás (2020), teaching is an occupation that constantly puts health and well-being at risk. But, when Rusu & Colomeischi's (2020) study demonstrates a relationship between positivity and well-being of teachers, engagement can be envisioned as a positive core of people. In that range, subjective happiness proves to have a total and direct effect on work engagement, from proactive strategies (De Stasio et al., 2020).

Engagement is described by dedication, vigor and absorption, and can be measured through the Utrecht Work Engagement Scale (UWES), which links the engagement of any occupational group (Tomás et al., 2018; Schaufeli & Bakker, 2003). This trifactorial perspective applied in various contexts is summarized as follows:

Engagement has been defined as a positive attitude towards work, characterized by vigor, dedication and absorption. Vigor is illustrated by the presence of mental resilience and high levels of energy in the workplace, as well as the motivation to invest effort in one's work despite all opposition. Dedication relates to "being strongly involved in one's work and experiencing a sense of importance, enthusiasm, inspiration, pride, and challenge". Finally, absorption refers to the achievement of high levels of concentration and the feeling that time passes quickly while working, to the point that it is difficult to detach oneself from the work (Schaufeli et al., 2002; Schaufeli & Bakker, 2003; Schaufeli et al., 2008, cited in Tomás et al., 2018, p.89.).

### 3. Methodological aspects of the research

#### Approach and method

The study has a **mixed approach** and a **descriptive research level of substantive type**. Situations and events are focused, in their own nature of occurrence (Hernández and Mendoza, 2018).

The **correlational and explanatory design** is adopted, in which the data collected allow describing the reciprocity relationship between the variables and dimensions involved, supporting explanations that help to better understand the examined phenomenon (Hernández and Mendoza, 2018).

The qualitative approach allows evaluating the perception of the subjects, specifying that "research from the qualitative route focuses on understanding the phenomena, exploring them from the perspective of the participants in their natural environment and in relation to the context" (Hernández & Mendoza, 2018, p. 390).

#### Instrument and variables

The Likert-format instruments were: the DC questionnaire, with 10 items, the RE questionnaire, with 17 items and the engagement questionnaire with 9 items, each divided into three dimensions.

Its online application met the criteria of quality and research ethics. The purpose and scope of the research was made explicit, as well as its voluntary and confidential nature, inviting participants to freely

express their willingness through the "informed consent" form.

To check the behavior of the items, the reliability process was carried out through a pilot test applied to 34 subjects similar to the study sample. Since it is an ordinal scale, Cronbach's alpha was applied with the SPSS V-25 statistical package. In the three cases, the reliability is strong: .872, .809 and, .832 respectively.

**Table 1. Reliability statistics**

Instruments	Cronbach's alpha	N of elements
DC Diagnostic Questionnaire	.872	10
RS Questionnaire	.809	17
Engagement questionnaire	.832	9

The factor analysis according to the KMO and Bartlett's test of the instruments confirms a highly significant

result. The significance value observed in the three cases is  $p = .000$  which is lower than the theoretical value ( $p < .01$ ).

**Table 2. KMO and Bartlett's Test**

KMO and Bartlett's test		DC Diagnostic Questionnaire	RS Questionnaire	Engagement questionnaire
Kaiser-Meyer-Olkin measure of sampling adequacy		.810	.749	.804
Bartlett's test for sphericity	Approx. chi-square	216.974	196.913	196.913
	Gl			
	Sig.	.000	.000	.000

The complete sample presents reliability results that exceed the optimal standard of 0.8, which confirms the internal consistency of the scales and their dimensions. In addition, an open-ended question was asked, "Name three new teacher challenges in the face of digital teaching for successful and healthy performance."

### 3.2.1 DC Questionnaire

This variable was measured using the "CD-REA" questionnaire of Sarango-Lapo, Mena, Ramírez-Montoya, and Real (2020), broken down into two parts: DC "CD" and Open Educational Resources "OER".

i) Competence for the search, selection and evaluation of information (4 items), ii) Competence for the storage and retrieval of information produced (3 items), iii) Competence for the communication of information by

technological means (3 items), for a total of 3 dimensions evaluated through 10 items.

The questionnaire presents a 5-point Likert-type format, where "1: No mastery, 2-Little mastery, 3- Regular mastery, 4- Good mastery, 5- Excellent mastery".

### 3.2.2. RE Questionnaire

This variable was measured by means of the Rizzo et al. (1970) questionnaire, adapted for the University of Almeria by the Research Team of this project integrated in the "IPTORA" Unit. It includes 17 items in three dimensions: "Role ambiguity", "Role conflict", "Role overload" (cited in Espinosa et al., 2020).

The questionnaire presents a 5-point Likert-type format, where "1: Strongly disagree", "2: Somewhat disagree", "3: Indifferent", "4: Somewhat agree" and "5: Strongly agree".

**Role Ambiguity:** Composed of 6 items, the "role ambiguity" dimension measures the degree of

uncertainty that the worker who performs a job has about it.

**Role Conflict:** Composed of 8 items, this dimension measures the degree of stress produced when the worker receives incompatible demands from other members of the organization.

**Role Overload:** Consisting of 3 items, this dimension measures the degree of stress produced when the worker is unable to meet the imposed work demands at the same time and feels that he/she has "too much work".

### 3.2.3. Engagement Questionnaire

The Utrecht Work Engagement Scale instrument was used to measure engagement (Schaufeli et al. 2002, cited in Schaufeli et al., 2006), the authors found, in a cross-national study in 10 countries, the original 17-item Utrecht Work Engagement Scale (UWES) can be shortened to 9 items (UWES-9).

Thus, the short 9-item version (in Spanish) was used, involving the trifactorial scale, represented by three

factors: vigor, dedication and absorption (Schaufeli & Bakker, 2003; Schaufeli et al., 2006).

The questionnaire presents a 5-point Likert-type format, where "1-: Never/Never 2.- Rarely, 3.- Rarely 4.- Many times 5.- Always/Everyday".

**Vigor:** This dimension measures the levels of energy and mental resilience while working, the awareness to invest effort in our work, and is composed of 3 items.

**Dedication:** With 3 items, this dimension measures involvement in the work and experiencing feelings related to the importance, enthusiasm, inspiration, pride and challenge of job.

**Absorption:** The 3 items of this dimension measure the concentration and self-absorption in the work and the difficulty of disconnecting from it.

### 3.3 Sample

The study sample consisted of 300 higher education teachers from 6 countries: Brazil, Colombia, Ecuador, Chile, Mexico and Peru, where 157 were female (52.3%) and 143 were male (47.7%).

**Table 3. Composition of the sample by type of institution and type of contracting**

Type of institution	n	%	Type of contract	N	%
Public	129	45.3	Hourly	103	34.3
Private	133	46.7	Part Time	53	17.7
Public and private	23	8.1	Full time	144	48
Total	300	100	Total	300	100

**Table 4. Composition of the sample according to the age and experience of the teachers expressed in years**

Age	n	%	Experience	n	%
23-32	29	9.7	1-10	118	39.3
33-42	97	3.3	11-20	124	41.3
43-52	109	36.3	21-30	38	12.7
53-62	48	16.0	31-40	15	5.0
63-75	17	5.7	41-50	5	1.7
Total	300	100		300	100

### 3.4 Treatment and processing of data

At the quantitative level, the data processing, which included non-parametric, descriptive and inferential statistics, began with a descriptive phase of the data



using the Statistical Package for Social Sciences (SPSS), version 25. This made it possible to visualize the absolute and relative frequencies of the variables, their dimensions and determinants of sex, age and type of hiring of the teachers. Three levels of measurement were established (low, medium and high) with the respective ranges. Inferential statistics were then applied through Spearman's Rho to establish correlations and contrast hypotheses.

At the qualitative level, the open-ended question was processed with Atlas.ti. Emerging cores related to the challenges faced by teachers in digital teaching were revealed. Content analysis was carried out to complement the interpretation of the teachers' professional training experiences (Deroncele, 2015).

#### 4.- Results

For the DC variable, the following levels and ranges were established: low level of 10-23, medium level of 24-37 and high of 38-50; for the dimension competence for the search, selection and evaluation of information, the levels and ranges were: Low level of 4-9, medium

level of 10-15 and high of 16-20; for the dimension competence for storing and retrieval of information it produces, low level of 3-6, medium level of 7-10 and high of 11-15 and for the dimension competence for the communication of information by technological means, low level of 3-6, medium level of 7-10 and high of 11-15.

For the RS variable, the levels and ranges were: low level of 17-39, medium of 40-62 and high of 63-85; for the ambiguity dimension, low level of 6-13, medium of 14-21 and high of 22-30; for conflict, low level of 8-18, medium of 19-29 and high of 30-40 and for the overload dimension, low level of 3-6, medium of 7-10 and high of 11-15.

Finally, for the engagement variable, the levels and ranges were: low level of 9-20, medium of 21-32 and high of 33-45, and for the dimensions absorption, dedication and vigor, low level of 3-6, medium of 7-10 and high of 11-15.

The descriptive results of the three variables and their respective dimensions are presented below.

**Table 5. Levels of the DC variable in university professors and dimensions**

Dimensions and variable	$\bar{X}$	Ds	Under		Medium		High	
			$f_i$	%	$f_i$	%	$f_i$	%
Competence in the search, selection and evaluation of information.	2.5	.5	3	1%	117	39%	180	60%
Competence in the storage and retrieval of information that produces	2.2	.7	43	14.3%	151	50.3%	106	35.3%
Competence in the communication of information by technological means.	2.7	.5	3	1%	87	29%	210	70%
CD	2.5	.5	7	2.3%	147	49%	146	48.7%

Table 1 shows that, of the total of 300 respondents, 49% of the teachers have a medium level of development of the CDs, 2.3% have a low level and 48% reach a high level; similarly, 29% of the teachers have a medium level of development of the competency for communicating information through technological means; 50.3% of the teachers present a medium level of development of competence for the storage and retrieval

of the information they produce, and 14.3% present a low level; finally, 39% of the teachers present a medium level of development of competence for the search, selection and evaluation of information. It should be noted that the mean is 2.5 and the standard deviation is .5.

**Table 6. RS variable levels and dimensions**

Dimensions and variable	$\bar{X}$	Ds	Under		Medium		High	
			$f_i$	%	$f_i$	%	$f_i$	%

Ambiguity	1.1	.36	276	92%	18	6%	6	2%
Conflict	1.93	.69	82	27.3%	157	52.3%	61	20.3%
Overload	2.03	.83	100	33.3%	92	30.7%	108	36%
ER	1.59	.55	135	45%	156	52%	9	3%

Of the 300 teachers surveyed, 3% showed a high level of stress, 52% a medium level of stress and 45% a low level of stress; in terms of the dimensions, 36% of the teachers showed a high level of overload, 30.7% a medium level of overload; 20.3% of the teachers

showed a high level of conflict, 52.3% a medium level of conflict; 2% of the teachers showed a high level of ambiguity, 6% a medium level and the majority a low level. Likewise, the RS shows a mean of 1.59 and a standard deviation of .55.

**Table 7. Levels of the variable engagement and dimensions**

Dimensions and variable	Media	Standard deviation	Under		Medium		High	
			fi	%	fi	%	fi	%
Absorption	2.98	.13	0	0%	5	1.7%	295	98.3%
Dedication	2.83	.42	5	1.7%	41	13.7%	254	84.7%
Vigor	2.93	.28	2	.7%	16	5.3%	282	94%
Engagement	2.95	.23	1	.3%	13	4.3%	286	95.3%

The statistical results show that 3% of the teachers have a low level of engagement, 4.3% have a medium level and 95.3% have a high level; as for the dimensions, 7% of the teachers have a low level of vigor, 5.3% have a medium level and 94% have a high level; 1.7% of the teachers have a medium level of absorption and 98.3% have a high level. Likewise, the average is 2.95 and a standard deviation of .23.

### Hypothesis testing

In the hypothesis test, nonparametric statistics was performed, being the three qualitative variables and also the data of the three variables come from an ordinal scale and do not admit using the assumption of normality of distributions, they are distribution free (Sanchez and Pongo, 2014). In this study, the Spearman's Rho statistic was used, represented in the following expression:

$$r_s = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

Where D represents the difference between the corresponding x-y order statistics and N is the number of pairs. The values for the interpretation range from -1 to +1 indicating negative or positive associations respectively and the indices range from a perfect negative correlation to a perfect positive correlation.

**Hypothesis 1:** There is a relationship between engagement and RE in Latin American university teachers.

### Statistical hypothesis

Ho: There is no relationship between engagement and RE.

Ha: There is a relationship between engagement and RE.

### Significance level

The theoretical significance level  $\alpha = .05$  is considered, which corresponds to a reliability level of 95%.

### Decision rule

Reject Ho when the observed significance (p-value) is less than  $\alpha$  and accept Ho when the observed significance (p-value) is greater than  $\alpha$ .

Spearman's Rho correlation test between engagement and RS.				
			Engagement	ER
Spearman's Rho	Engagement	Correlation coefficient	1.000	-.217**
		Sig. (bilateral)	.	.000
		N	300	300
	RS	Correlation coefficient	-.217**	1.000
		Sig. (bilateral)	.000	.
		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

The results of Spearman's Rho correlation coefficient show a relationship  $r_s = -.217^{**}$  between the variables engagement and ER. There is a weak level of negative correlation. Also, the observed significance value  $p =$

.000 is less than the theoretical significance value  $\alpha = .05$ . There is a statistically significant relationship between the variables engagement and RS in Latin American university teachers.

Table 9. Test of the coefficients of the logistic regression model.

Symbol	Variable detail	B	gl	Sig.	Exp(B)
EDR	RS	.549	1	.018	.731
	Constant	3.314	1	.000	.500

$$\text{Log(Engagement)} = \frac{1}{1 + e^{-(3,314 + 0,549 \times \text{EDR})}}$$

The levels of the estimated model show observed significance (sig.) lower than the theoretical significance ( $\alpha = .05$ ). This affirms that the model exists and that RS influences engagement. Likewise, as  $\text{Exp}(B) < 1$ , the higher the level of RS, the lower the level of engagement or vice versa.

**Hypothesis 2:** There is a relationship between engagement and DC in Latin American university professors.

#### Statistical hypothesis

Ho: There is no relationship between engagement and CDs.

Ha: There is a relationship between engagement and DCs.

It was performed with the same significance level and decision rule of the previous hypothesis.

Table 10. Spearman's Rho correlation test between engagement and DC

Table 10. Spearman's Rho correlation test between engagement and DC		
	Engagement	DC



Spearman's Rho	Engagement	Correlation coefficient	1.000	.233**
		Sig. (bilateral)	.	.000
		N	300	300
	DC	Correlation coefficient	.233**	1.000
		Sig. (bilateral)	.000	.
		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

The results of Spearman's Rho correlation coefficient show a relationship  $r_s = .233^{**}$  between the variables engagement and CDs. There is a weak level of positive

correlation. Also, the observed significance value  $p = .000$  is lower than the theoretical significance value  $\alpha = .05$ . There is a statistically significant relationship between the variables engagement and DC in Latin American university teachers.

**Table 11. Test of the coefficients of the logistic regression model**

Symbol	Variable detail	B	gl	Sig.	Exp(B)
EGG	Engagement	-.790	1	.044	1.454
	Constant	1.707	1	.000	5.511

$$\text{Log(Digital Competences)} = \frac{1}{1 + e^{-(1.707 - 0.790 \times \text{EGG})}}$$

The levels of the estimated model show observed significance (sig.) lower than the theoretical significance ( $\alpha = .05$ ). Therefore, the model exists and, in addition, engagement influences DC. Likewise, as  $\text{Exp}(B) > 1$ , the higher the level of engagement, the higher the level of DC or vice versa.

**Hypothesis 3:** There is a relationship between RS and CDs in Latin American university professors.

### Statistical hypothesis

Ho: There is no relationship between RS and DC.

Ha: There is a relationship between RS and DCs.

As in the first hypothesis, the same significance level and decision rule were used.

**Table 12. Spearman's Rho correlation test between the RS and the DC**

		RS	DC
Spearman's Rho	RS	Correlation coefficient	1.000
		Sig. (bilateral)	.075
			.193

		N	300	300
	DC	Correlation coefficient	-.075	1.000
		Sig. (bilateral)	.193	.
		N	300	300

The results of Spearman's Rho correlation coefficient show a relationship  $r_s = -.217^{**}$  between the variables RS and the CD, which indicates a weak negative correlation level. Also, the observed significance value  $p = .193$  is greater than the theoretical significance value

$\alpha = .05$ - There is no statistically significant relationship between the variables RS and DC in Latin American university teachers.

**Table 13. Test of the coefficients of the logistic regression model.**

Symbol	Variable detail	B	gl	Sig.	Exp(B)
EDR	RS	.460	1	.017	.584
	Constant	1.322	1	.000	.750

$$\text{Log(Digital Competences)} = \frac{1}{1 + e^{-(1.322 + 0.460 \times \text{EDR})}}$$

The levels of the estimated model present observed significance (sig.) lower than the theoretical significance ( $\alpha = .05$ ). Therefore, it is affirmed that the model exists and also the RS influences the DCs. Likewise, as  $\text{Exp}(B) < 1$ , the higher the level of ER, the lower the level of DC or vice versa.

**Hypothesis 4:** There are significant differences in the levels of engagement, RS and DC between teachers from public and private universities.

**Ho:** There are no significant differences in the levels of engagement, RS and DC between teachers from public and private universities.

**Ha:** There are significant differences in the levels of engagement, RS and DC between teachers from public and private universities.

The study considers the theoretical significance level  $\alpha = .05$  corresponding to a reliability of 95% and the decision rule is to reject the  $H_0$  when the observed significance is less than the value of  $\alpha$  and not to reject the  $H_0$  when it is greater than the value of  $\alpha$ .

**Table 14. Median comparison test for independent samples**

Test statistics	CD	ER	Engagement
Mann-Whitney U	9347.500	8336.000	8274.000
W for Wilcoxon	18392.500	17381.000	17319.000
Z	-.252	-1.778	-1.878
Asymptotic sign (bilateral)	.801	.075	.060

The table shows that, for the variables engagement, RS and CD, the observed significance value  $p = .80$ ;  $.07$  and  $.06$  respectively is greater than the theoretical significance value  $\alpha = .05$ . Therefore, the null hypothesis is accepted, in which the level of engagement, RS and DC are similar in public and private universities.

**Hypothesis 5:** There are significant differences in the levels of engagement, RS and DC between male and female teachers.

**Ho:** There are no significant differences in the levels of engagement, RS and DC between male and female teachers.

**Ha:** There are significant differences in the levels of engagement, RS and DC between male and female teachers.

We consider the theoretical significance level  $\alpha = .05$  corresponding to a reliability of 95% and the decision rule is to reject the  $H_0$  when the observed significance is less than the value of  $\alpha$  and not to reject the  $H_0$  when it is greater than the value of  $\alpha$ .

Table 15. Median comparison test for independent samples

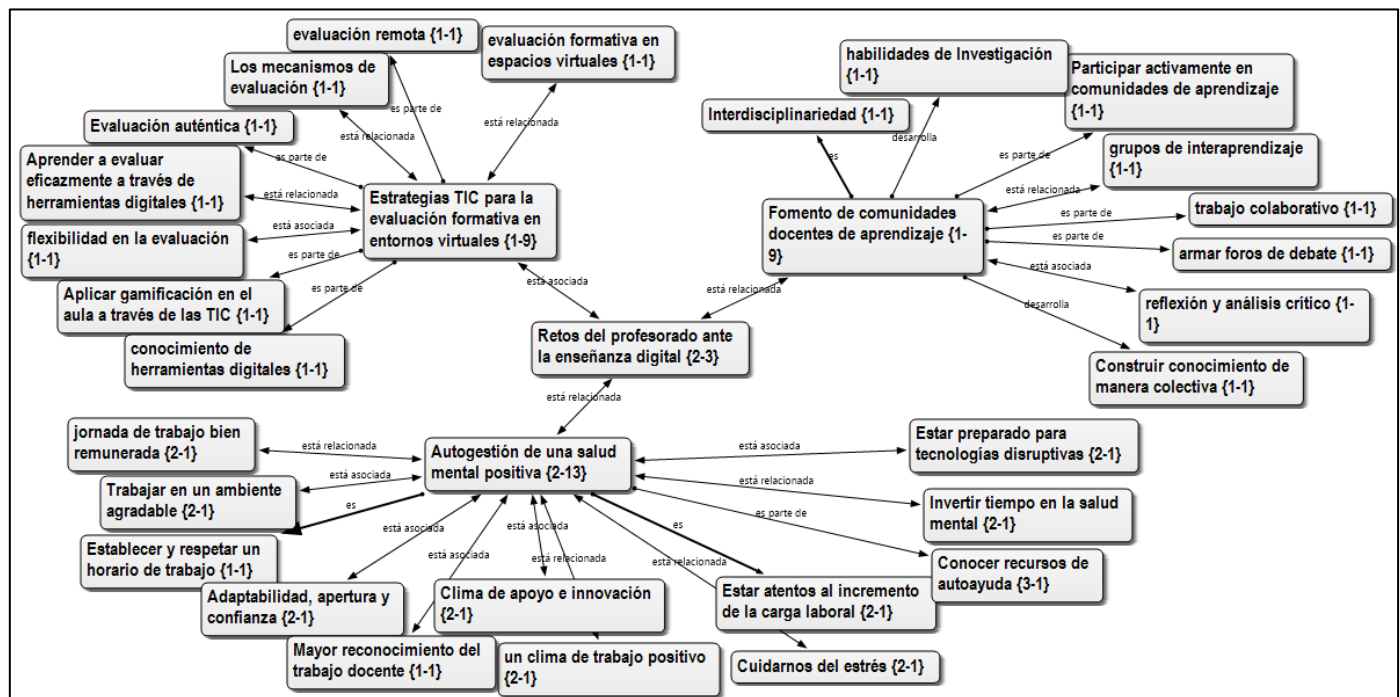
Test statistics	DC	RS	Engagement
Mann-Whitney U	9157.500	10746.000	9438.500
W for Wilcoxon	21560.500	21042.000	21841.500
Z	-2.759	-.639	-2.391
Asymptotic sign (bilateral)	.006	.523	.017

Table 17 shows that, for the variables DC and engagement, the observed significance value  $p = .006$  and  $.017$  respectively is lower than the theoretical value  $\alpha = .05$ . Therefore, the  $H_0$  is rejected, which means that the level of development of DC and engagement is different in men compared to women. On the other

hand, the RS is similar in men and women, since the observed significance value  $p = .52$  is greater than the theoretical value  $\alpha = .05$ .

As for the qualitative results, four emerging categories were obtained as a result of the process of coding, categorization and triangulation of data from the open-ended question, which are detailed below in a network resulting from Atlas.ti. (Figure 1).

Figure 1. Codification, categorization and triangulation process using Atlas.ti.



Source: Own elaboration

The following emerging categories were identified: i) ICT strategies for formative assessment in virtual environments, ii) promotion of learning communities in university teachers and iii) self-management of positive mental health, which constitute challenges for teachers in the face of digital teaching.

### Discussion and conclusion

The results reveal new perspectives on the professional practice of teachers in terms of aligning their performance to positive indicators of well-being and health. Diagnosing the level of development of the CDs (concretized in their performance), in relation to RS and engagement, has been essential in the current context of covid-19, as prevention measures must be integrated to the specific work level. Policies and tools are foreseen to assess and intervene psychosocial aspects in the organization (Souto et al., 2019).

There is a statistically significant relationship between the variables engagement and RS in teachers. The higher the level of RS, the lower the level of engagement or vice versa. From the studies of Garrosa, Moreno-Jiménez, Rodríguez-Muñoz, Rodríguez-Carvajal (2011), RS is an important predictor of engagement. García (2017) reports that RS is significantly and negatively correlated with engagement. Han, Han, An & Lim, (2015) show that role ambiguity reduces organizational commitment and Orgambidez and Benítez (2021) highlight the hindering effect of role conflict on work engagement and argue that an adequate definition of roles in the organization

helps to reduce the levels of role conflict, increasing the emotional bond with the organization.

Role Stressors (ambiguity, conflict and overload) are found to negatively impact job satisfaction (Conley & You, 2009, cited in Richards et al., 2017); but it is recognized that teachers can adopt proactive strategies to cope with demanding situations and cover effects of job stress (De Stasio et al., 2020). Therefore, it is important to provide teachers with coping strategies and styles; seeking to energize elements such as psychological empowerment, creative self-efficacy, motivation for learning in the workplace and self-confidence (Deroncele et al., 2021).

Therefore, it is important to differentiate between the perspective of deficit-based change and positive change, precisely, the study by Yang et al. (2018) articulates the disease model (with emphasis on role stress) and the positive psychology model (with emphasis on subjective well-being), providing the term positive education in a comprehensive proposal, consistent with the projections of the present study.

The study also shows that the higher the level of RD, the lower the level of CD. Therefore, it is necessary to offer alternatives for the effective management of RS from its prevention and mastery (Espinosa et al., 2020). Mérida-López et al. (2017) demonstrate that role ambiguity and role conflict are positively related to symptoms of depression, anxiety, and stress. In Jackson and Schuler's meta-analysis (1985, cited in Conley & You, 2009), the RS dimensions of role ambiguity and

role conflict were positively associated with quitting intentions.

Taking into account that stress activation is often unconscious, education in self-awareness and Mindfulness should be provided. This will allow to identify socio-emotional expressions, to be aware of stress and to recognize possible stressors, avoiding its triggering. Thus, there will be a better health management, which will emplace positive aspects such as organizational trust, ethical leadership and the teachers' own work commitment (Zeng, Xu, 2020). This boosts satisfaction, commitment and motivation, which are of strategic importance for the organizational subject. While satisfaction represents an affective response to specific aspects of the job, commitment is an affective response to the organization as a whole (Conley & You, 2009).

Another important result supports that there is a statistically significant relationship between engagement and DC. The higher the level of engagement, the higher the level of DC or vice versa. This is consistent with the study by Heidari, Mehrvarz, Marzooghi & Stoyanov (2021), in which DC was positively and significantly correlated with engagement. This lays specific and direct foundations for the empowerment of teachers' DC and the need for a psychosocial intervention pathway to boost engagement and its relevance in educational institutions.

The study also recognizes that the level of engagement, RS and DC are similar in public and private universities, so that an educational psychosocial intervention model can be generalized to both types of institutions, considering male and female teachers, since RS was similar in men and women. However, the level of development of CDs and engagement is different from a gender perspective. This perspective should be emphasized in future studies.

As part of the challenges for teachers in the face of digital teaching, the element of self-management of positive mental health is striking. This network was the most extensive. Although the elements highlighted account for positive mental health from the assumptions of Lluich-Canut (1999): personal satisfaction, prosocial attitude, self-control, autonomy, problem solving and self-actualization and relationship skills, there are many others that transcend this factorial model, which calls for a future analysis focused on the identification of positive psychosocial factors. Elements of resilience and self-motivation (Deroncele et al., 2021), proactive strategies and adjustment to the work environment (De Stasio et al., 2020), subjective well-being (Rusu & Colomeischi, 2020), among others, with "meta-reflexivity for resilience" being considered an essential resource in this self-management of positive mental health (Golob et al., 2021).

The participation of six Latin American countries is welcomed and it is planned to continue integrating other countries in the region. In addition, longitudinal studies will be conducted, covering the post-pandemic stage and multi-source and multi-level studies that take into account teachers, students and administrative personnel of educational institutions.

The study found a teaching profile with a medium level of CD, which needs to be further enhanced, for which a crucial strength is high commitment (engagement), however, noting that the RD has a tendency from medium to high level, is a warning and the need to generate proposals for self-care of the teacher's health.

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