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Review

Digital Competence in University Lecturers: A Meta-Analysis of Teaching Challenges

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Abstract: This meta-analysis (random effects) studies the self-perceived digital competence of university lecturers in university teaching, using 7470 lecturers from Europe and Latin America collected in K = 31 samples, with teaching experience of between 6 and 15 years. The effect size obtained from a moderate random effects model of r = −0.21 with a 99% confidence interval is significant, negative, and moderate, confirming the low competence level. The meta-regression results show that the area of knowledge plays an important role. The systematic review of the literature shows that the perception of ICTs is positive, while the level of competence is low, and there are institutional and training challenges to be solved.

Keywords: meta-analysis; ICTs; teaching; university

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1. Introduction

Society has been subjected to very important social, economic, and technological changes, which a university must address. One of the aspects in which the university must advance is in the development of the digital competence of its teaching staff, and in the use of applications with a didactic purpose through the introduction in its classrooms of new technologies as forms of communication and access to information, and as a motivation to generate an innovative culture in the university [1,2].

Information skills have become very important in recent years, especially with the arrival of the COVID pandemic in all parts of the world, and the need for the university system to move from face-to-face teaching to online teaching in a few days. It became clear that there was a gap in the training of university lecturers, making them unable to meet this challenge. Thus, they showed a much lower real information competence than the self-perceived information competence of the lecturers [3]. In this sense, it is necessary to clarify that informational competence is part of digital competence. Informational competence refers to the ability to navigate and search for digital information, to be able to evaluate such information critically and comparatively, and finally, to be able to manage digital data, information, and content with the ability to organize them in a structured educational environment [3]. The arrival of the pandemic and the need to use Information and Communication Technologies for teaching highlighted the lack of training that a significant proportion of university teaching staff had, making them unable to face this challenge.

Lecturers in today's university system must not only be able to use technology, but must also be digitally competent [4], because information technologies allow them to use more active and stimulating methodologies, and to get more involvement from students in their teaching–learning process [5]. Thus, we must improve the participation of university students in their learning [2], since the use of ICT in university lecturing improves the quality of learning processes [6].

To ensure that university students develop these generic competences, the university must support the implementation of teaching and learning strategies [7], and the use of these technologies can help in the development and acquisition of others [8]. The use of ICT in teaching and learning processes is not a necessary condition of high-quality and innovative teaching [9,10], but they promote the use of more active, attractive, and motivating methodologies [5].

In summary, social and educational changes are pushing universities towards adopting a digital nature. Therefore, university institutions must update and proliferate digital competencies among their faculty, and it is necessary to assess whether they have digital competencies, as well as to clarify which variables moderate this relationship.

As a result, a series of research questions arise: What is the digital competence of university lecturers? Do they feel competent? Do sociodemographic variables such as age or gender play an important role? Are there differences according to the academic specialty of the lecturer? Are there cultural differences?

The objective of this meta-analysis is to analyze the self-perceived digital competence of university professors in teaching activities, analyzing the influences of moderating variables such as age, gender, and subject discipline.

2. Background

This paper analyzes the digital competence of university lecturers, measured in terms of attitude, knowledge and perceived effectiveness through ICT, to improve the teaching–learning process and the use of technologies. This is because sometimes the levels of information competence do not match the self-perception of the teaching staff themselves [3]. It is therefore a challenge to reinforce the training of university lecturers in the development of these key competences when training future professionals.

2.1. Perception, Attitudes and Level of ICT Competence in Education

The 2017 Horizon Report on Higher Education [11] highlights the importance of improving university lecturers' competence in ICT, and the need for ongoing training to improve lecturers' skills and ensure the progressive implementation of different teaching models in universities (e-learning, m-learning, adaptive learning, among others).

Various studies confirm that the digital competence of university lecturers, measured in terms of attitude, knowledge, and use of technologies, reduces to information processing. This is demonstrated by research recently carried out at the University of Murcia on lecturers of Social Sciences and Law [6]. In the research [2], lecturers say that they do not feel qualified to use ICT for teaching purposes, or to be creators of ICT resources (websites, platforms, etc.) that they can then apply in their university teaching. Another study carried out on lecturers at the University of Malaga in Social Sciences and Law again recognized that lecturers lack the training, time, and resources to integrate ICT into daily university teaching [12]. In this sense, a series of aspects to consider beyond the permanent and structured training provided by universities is presented [12]. In this way, they point out the need to rethink the organization of sessions and the preparation of classes to optimize digital resources for the benefit of students, and they also emphasize the need to have up-to-date technologies [12]. Some lecturers in different countries recognise that their universities do not have the resources and technological means they need to improve their teaching [2]. Thus, this research, conducted at the Catholic University of Santiago de Guayaquil, Ecuador, explains the great interest of university lecturers in understanding and integrating digital competence in their teaching in such a way as to improve the teaching–learning process of students. While emphasizing the importance of generating an innovative culture in the use of ICTs, they also highlight the importance of evaluating these practices [2]. The research also looks at university lecturers in Spain, where most of the participants say they cannot use ICT in their music classes because they do not have the resources [13]. On the other hand, they pointed out difficulties in their pedagogical training, as well as the lack of

institutional support, noting the absence of public policies that would promote continuing education [13].

Research carried out in public and private universities in Venezuela shows that the ICT training those lecturers reported having that relates to ICT in support of academic activities is very deficient and, in some cases, null [14]. This research establishes a series of actions to improve specific training in the use of ICT, helping the user to make presentations of digital content, applications or platforms that can be used for educational purposes that promote the teaching–learning process in the classrooms, and an ethical and professional use of virtual environments as well as the management of possible difficulties or conflicts [14]. One study of Chilean university lecturers acknowledged that they have not received ICT training, and that their training has been self-taught [14], while other studies confirm the need for university lecturers to receive training, in this case referring to 1113 Chilean lecturers [15]. Thus, this study conducted in Chile not only highlights the importance of training in digital pedagogy, enabling lecturers to adapt to the technological needs of a postmodern society, but also puts the spotlight on universities as the institutions responsible for implementing digital training. It emphasizes that universities should make greater efforts to develop the digital culture of their lecturers, as well as an efficient system for digital evaluation and an effective digital educational environment [15].

Similarly, in Mexico, a study has recently been carried out in 20 public and private universities, and the results indicate a medium–low mastery of lecturers' digital competences related to ICT-supported research and professional development. The digital competences most effectively mastered by Mexican university lecturers are those linked to lecturers' commitment and social responsibility in the use of ICT. It concludes on the most prioritized training needs in line with the medium–low level of competence mastery [16].

Some research shows a high correlation between knowledge and the use of ICT by university lecturers. Regarding the digital competence of lecturers, according to the research carried out, it can be said that the greater the knowledge, the greater the use of information and communication technologies in the classroom [1,6,17]. However, the meta-analysis study [1] shows how simple tools such as applications focused on vocabulary acquisition are used for second language-learning in universities, but technological tools that could be of great interest, such as chatbots or virtual reality devices, are not used despite lecturers' knowledge of these tools. These results are similar than previous studies [18] This research highlights once again the importance of digital and pedagogical training to make correct and innovative use of the latest technologies [19]. In this sense, it is worth noting how lecturers frequently use traditional media such as PowerPoint, videos, audios, and email [19]. Moreover, a significant percentage of lecturers use more innovative resources such as blogs, wikis, and forums, which offer interactions between lecturers and students as well as amongst students, thus generating a learning environment [19].

The inclusion of information and communication technologies (ICT) in university classrooms is conditioned by the digital competence of the lecturers who implement them [6,18,19]. It is important to address the motivation of lectures in this process [19]. This research finds that all lecturers who use technological tools in their classrooms seek continuous training because they believe they should be updated according to social demands [19]. Similarly, it is necessary to address lecturers' insecurities [14], as a study carried out at the Miguel de Cervantes University (Chile) showed that lecturers do not work with technologies as much as they would like due to the insecurity generated by a lack of competence. Likewise, this study again points out that it is necessary for universities to generate institutional policies that allow the integration of technologies in the classroom, while guaranteeing continuous training [14].

Many studies show the importance of addressing digital competences in the university [6,18–20] and the need to improve the digital competences of university lecturers [10,17]. It is therefore necessary to provide training in the didactic use of different computer applications [2,14].

More training in ICT increases technological competence, and this is fundamentally related to self-efficacy and the perception of the impact of ICT in education [21]. Digital competence could be sought in order to bring university lecturers closer to coherently integrating ICT into their teaching activities [22].

2.2. Incorporation of ICT in University Teaching Activities

The inclusion of ICT in the university has presented great challenges in relation to the academic activities of university lecturers. Its great potential has affected the training of students through the application of new strategies for teaching and learning in different disciplines [23,24]. ICT has transformed the current learning environment from a traditional lecturer-centered model to a learner-centered one, with the lecturer becoming a guide or driver of learning, and the learner moving from being a passive recipient of information to an active participant in his or her own learning [25].

Many authors and researchers suggest that the influence of communication technologies brings clear advantages for lecturers, students, and universities as a whole [26], and that they support students and lecturers, thus improving communication in educational contexts. The positive impacts within the classroom and in the workplace are also highlighted [27]. The meta-analysis study [20] indicates that teaching spelling to students is equally effective when using computer programs as it is when using traditional teaching.

One of the advantages of the use of ICT in university teaching is the possibility of carrying out complementary activities, having reference and support materials or access to various educational resources, with the consequent enrichment of the teaching–learning process in accordance with the methodological systems envisaged in the EHEA [25].

Abarca Amador [19] reports that, with the help of ICT, many activities can be carried out to support thematic content. At the same time, as mentioned above, it increases the number of resources and means of communication by which students can communicate digitally with the lecturer and with other classmates. For the lecturer, carrying out all these activities requires them to keep constantly updating his or her knowledge on the efficient use of ICT. It also requires many more hours of teaching from lecturers. This is one of the factors that sometimes makes the use of these tools in the classroom unattractive for lecturers.

Another disadvantage related to the use of ICT that some authors suggest [25] is the time aspect, which is not valued as an advantage in some cases as it requires more dedication on the part of the university professor than conventional approaches, taking away from other important tasks, such as research [28]. En este sentido la pandemia por COVID-19 obligó a los docentes universitarios a transformar su docencia a un entorno digital (In this sense, the COVID-19 pandemic forced university lecturers to trans-form their teaching to a digital environment.) [28]. However, there is diversity in the evaluations of lecturers regarding this process. Thus, the perceived ease of use, the easy adjustment of sessions to an e-learning model, as well as intrinsic motivation, made this adaptation a positive and constructive one [29].

To conclude, there are many positive aspects to the use of ICT at the university that fundamentally benefit students, as they favor the use of more active, attractive, and motivating methodologies [2,5]. However, the use of ICT in teaching processes is not the only element that ensures quality and innovative teaching. Moreover, a great deal of training, updating and time on the part of university lecturers is required when integrating ICT into their daily teaching [9,10]. On the other hand, it is necessary to continue with the implementation of models such as TPACK (Technological, Pedagogical, and Content Knowledge), since it allows for the combination of technology, specific knowledge, and teaching pedagogy [10].

However, it is important to emphasize the importance of evaluating the use of ICT through theoretical models such as ICAP or ICAP-TS, a brief and reliable scale that allows for analyzing quality rather than just the quantity of devices used in the classroom [9].

Most studies conclude that understanding the didactic use of ICT in university teaching is very important and essential, and that the use of ICT resources improves the participation of university students [2]. Further, the use of ICT in university teaching improves the quality of learning processes [6].

2.3. The Role of Socio-Demographic Variables

Gender differences in the performance of technological skills are a widely studied topic, and the results have been contradictory in much of the research. However, most of the scientific evidence shows that men and women are currently equally competent in terms of their different digital skills [10]. In this regard, the meta-analysis study [18] shows that differences in ICT competency are small but significant. This study highlights how differences decrease in secondary education, although a notable difference between boys and girls is already clear in primary education [18]. Thus, it is found that in the younger generations, girls perform better in digital literacy assessments of ICT. However, these differences decrease as age increases [18]. Similarly, some research reports differences in terms of age, with younger people being more proficient in the use of ICT [8].

Some research indicates that this could be a bias, by which the youngest overvalue their skills, unlike senior lectures with more experience, who are more aware of the difficulties [3]. On the other hand, Kirschner and De Bruyckere [30] and Sumuer [31] exposed how these differences are not due to evolutionary changes but to generational issues, since younger lecturers are part of a more technological generation. In this sense, recent research indicates the low relevance of gender, age, and experience as explanatory variables for the use of ICTs [32–34].

3. Materials and Methods

To ensure rigorous adherence to the registration protocol, the quality standards of the PRISMA [35] declaration and Cochrane in Higgins and Green [36] regarding eligibility criteria and study selection have been followed. In addition, the specifications established by Rot [37] have been met.

Consequently, a set of inclusion criteria was established in carrying out this research:

- Publications were sought from the last 6 years (2015 to 2021), according to the indications of Borenstein et al. [38], so as to obtain a realistic sample in accordance with the latest technological changes;
- Articles whose methodology is experimental and quantitative;
- Articles wherein the study population is university professors of any age;
- Publications that are open and available for consultation, according to the quality criteria of Moreau and Gamble [39];
- Journals of recognized prestige published in databases with the greatest scientific impact in the social sciences [40]—Web Of Science (JCR), Scimago Journal & Country Rank (SJR) and Dialnet have been selected. Likewise, all the selected studies underwent a double blind assessment for publication. It should be noted that the Dialnet database has been included to attend to the research published in Spanish-speaking developing countries.

We excluded the following from the search:

- Those studies that evaluated non-university stages;
- Studies without quantitative data, theoretical studies or reviews, following the indications of Friese and Frankenbach [41];
- Publications with restricted access.

The search strategy followed the steps indicated by PRISMA (2020) [23] and the psychometric expert Cronbach, described in the work of Higgins and Green [36]. This was carried out for three databases: Web of Science, Scopus and Dialnet (these being the main research bases in the social sciences) [40].

To find the most suitable keywords, a first pilot search was carried out. In this way, keywords have been identified that make up the search field labels and that respond to the topic of the work, "digital competence of the university lecturer" and "attitudes before the use of ITCs in university teaching", classified into three large areas: (a) digital skills; (b) university lecturers and (c) attitudes towards the use of ICT in the classroom. These keywords were obtained following a previous review of specialized literature on the subject and the external validation of experts in the area. Once this pre-investigation work was completed, the search strategy was carried out following the indications of PRISMA [23].

Two Boolean searches have been carried out with different keywords (see Figure 1).

1. The first search was carried out by means of the rounded search actions of: <<competence OR attitude OR training AND digital OR tic OR technology AND university>>. All the articles obtained were manually screened by reading their title and abstract (Figure 1).
2. The second search was completed by entering other types of keywords, such as: <<competence OR behavior AND digital OR tic OR technology AND university>>.

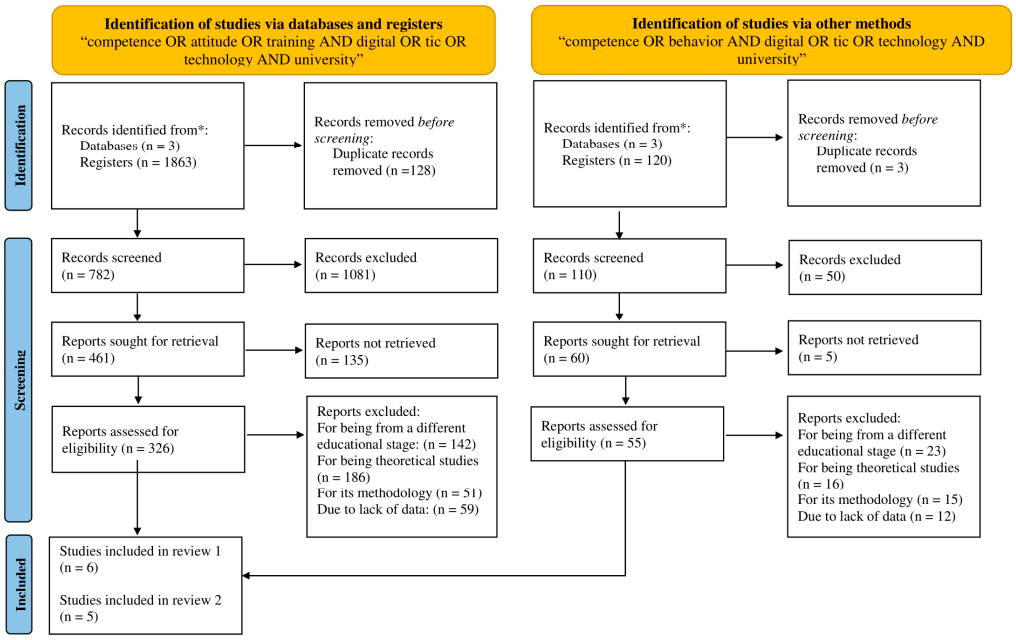

Figure 1. Flow diagram (Source: Own elaboration). * The research comes from 3 databases: Web of Science, Scopus and Dialnet.

Following the criteria of The Cochrane Handbook of Systematic Reviews [36] and PRISMA (2020) [35], regarding the eligibility and selection of studies, the following steps have been carried out.

The search strategy for obtaining the final sample gave an initial result in the first search of 929 articles in SCOPUS, 530 articles in WOS and 404 articles in DIALNET. In the second search, more specific results were obtained: 57 investigations in Scopus, 42 in WOS, and 21 articles in DIALNET. The treatment of the information followed different phases, including the review of all titles, abstracts, and keywords with the application of the inclusion and exclusion criteria. In this way, all the articles obtained have been manually screened by reading their title and abstract (Figure 1).

During this process, most of the investigations were discarded. One of the main reasons was non-adaptation to the stage of university teaching and the lack of rigor in methodological and statistical issues. The investigations presented statistical information relating to various types of indicators (means and standard deviations, percentiles, t-value, correlations, and chi 2). For this reason, to carry out the effect size analyses, and the comparison of models, meta-regressions and heterogeneity statistics, the data were

transformed using the CMA software to Fisher Z values [41–43]. The transformation of statistical data to Fisher Z-values is an essential procedure if one is to be able to compare data [41]. However, this process involves some risks, since x-values < 0.5 may lead to greater distortions. However, this procedure is accepted within the meta-analysis methodology, assuming that some data may have extreme values, and could fall outside of the funnel plot [41–43].

4. Results

4.1. Sample Description

The search for literature related to the use of ICT amongst university lectures and the perception they have of their digital competence in recent years (2015–2021) has returned some very interesting results.

Our meta-analysis comprises nine studies, with a total of 7470 lectures (as shown in Table 1) collected from Europe (31.25% from Spain) and Latin America (37.5% from Chile, 12.5% from Mexico, and 15.62% from other Latin American countries) across 31 samples (K) in five investigations. This allows for a comparison between Spanish-speaking countries.

Of the total sample, 60.60% are men (a total of 4527) and 39.40% are women (a total of 2937). Three of them do not provide the average age, but show a range of years of professional experience, while the rest report the average age of their participants. In short, the mean age of the sample is 46.90 years. The lectures concerned have 6 to 15 years of academic experience.

The presence of different countries makes it possible to show if there are differences between cultures. However, it should be noted that no study conducted in Africa, North America, Asia, or Oceania could be included. Likewise, it would have been interesting to have more representation from different European countries, since we only have valid studies from Spain. It would also have been very helpful to have greater representation from Asian countries.

Table 1. Sociodemographic information on the meta-analytical sample.

Year	Author	Sample	Males	Females	Medium Age	Country	Area of Knowledge	Geographic Area
2021	Calderon y Carrera a *	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera b	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera c	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera d	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera e	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera f	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera g	112	62	50	47.5	Spain	music	Europe
2021	Calderon y Carrera h	112	62	50	47.5	Spain	music	Europe
2021	De los Santos y Martínez a *	235	120	115	45.5	Latin America	general	Latin America
2021	De los Santos y Martínez b	235	120	115	45.5	Latin America	general	Latin America
2021	De los Santos y Martínez c	235	120	115	45.5	Latin America	general	Latin America
2021	De los Santos y Martínez d	235	120	115	45.5	Latin America	general	Latin America
2021	De los Santos y Martínez e	235	120	115	45.5	Latin America	general	Latin America
2020	Marin Díaz, Riquelme y Cabero a *	1113	767	345	45.5	Mexico	Pedagogy	Latin America
2020	Marin Díaz, Riquelme y Cabero b	1113	767	345	45.5	Mexico	Pedagogy	Latin America
2020	Marin Díaz, Riquelme y Cabero c	1113	767	345	45.5	Mexico	Pedagogy	Latin America
2020	Marin Díaz, Riquelme y Cabero c	1113	767	345	45.5	Mexico	Pedagogy	Latin America
2016	Mirete Ruiz	50	27	22	37	Spain	Pedagogy	Europe
2020	Venegas, Luzardo y Pereira a *	69	26	43	48.25	Spain	Pedagogy	Latin America
2020	Venegas, Luzardo y Pereira b	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira c	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira d	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira e	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira f	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira g	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira h	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira i	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira j	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira k	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira l	69	26	43	48.25	Chile	general	Latin America
2020	Venegas, Luzardo y Pereira m	69	26	43	48.25	Chile	general	Latin America

* The investigations are longitudinal and/or present differences in ICT skills and/or different samples of lectures.

4.2. Statistic Analysis

The objective of this meta-analysis is to study the digital competence of university lectures and their attitudes towards the use of ICT in the classroom (AUT), analyzing the influence of moderating variables such as age, gender, area of knowledge or culture.

In the execution of this, it was necessary to transform the statistical values of each sample to a Z Fisher measure [42]. Thus, Figure 2 (forest plot) shows a moderate effect size (random effects model) of r = −0.21 with a 99% confidence interval (−0.39, −0.02) for the different studies, establishing a negative relationship between attitude towards ICT competence and university teaching. In this graph (see Figure 2) you can see the conversions made to correlations in their entirety according to the "open materials" criteria of Moreau and Gamble [39].

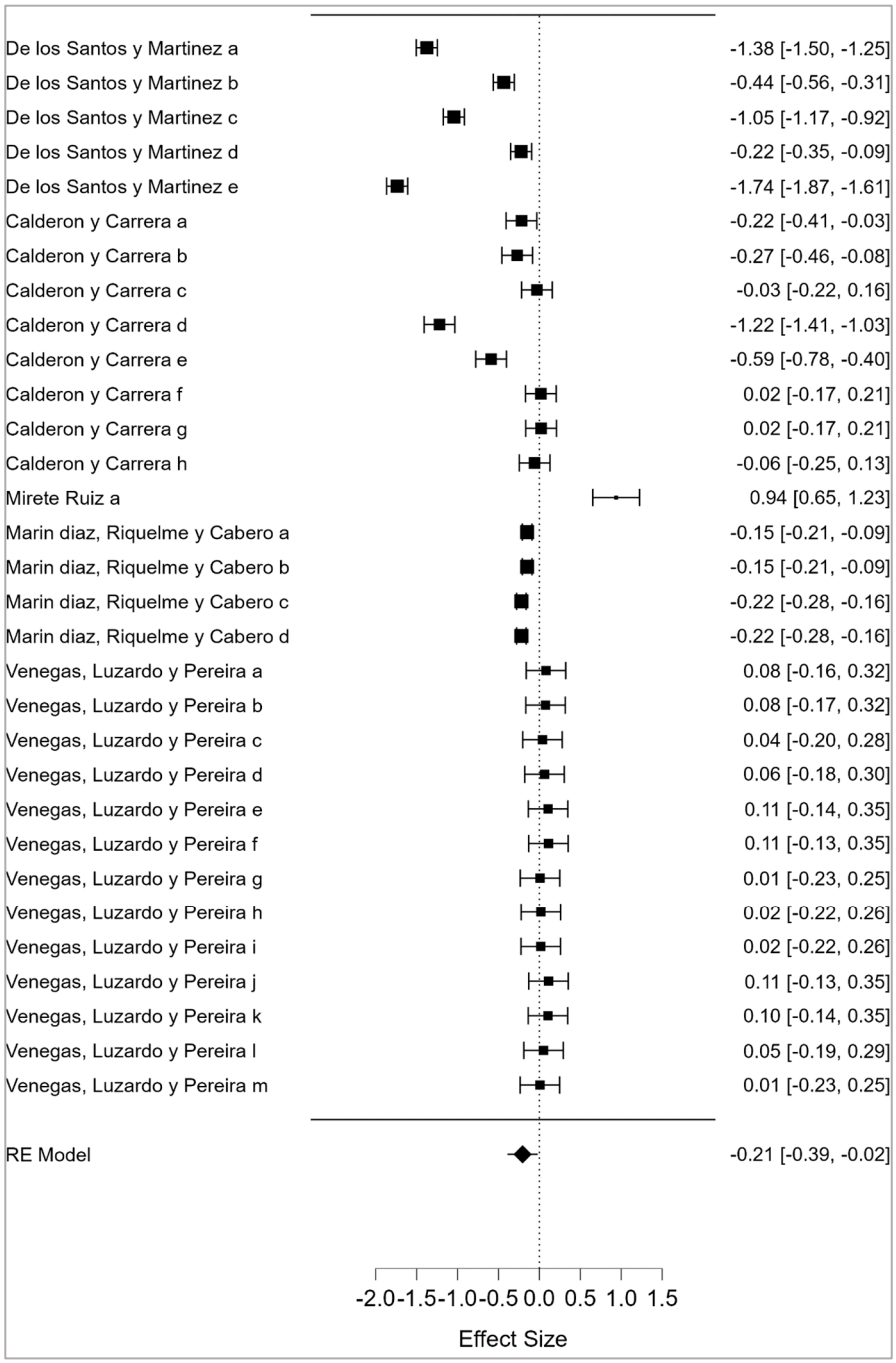

Figure 2. Forest plot.

The dispersion of values found in Figure 2 (forest plot) indicates a possible heterogeneity of studies. In this way, the heterogeneity statistics of the sample have been studied according to Cochrane in Higgins and Green [36] (see Table 2). More specifically, it is found that the Q statistic of DerSimonian and Laird [44] (Q = 1248.15, df = 31, p = 0.0013) presents a high variability. This allows for rejecting the homogeneity hypothesis. The statistic I2 = 97.58%, which explains the percentage of variability resulting from heterogeneity and not chance. In this case, again, there is very high heterogeneity [36].

In terms of coherence, the need to follow a random model or random effects model is ratified [42,45]. Despite the inclusion of criteria that ensure the quality and reliability of the data through the selection of databases of recognized prestige and journals that apply double blindness, it is considered necessary to carry out an Egg's test with 99% reliability in order to study the effect of bias [42]. This test shows the absence of publication bias with a confidence interval of 99% (p-value 1 tailed = 0.34; p-value 2 tailed = 0.69) [46] (see Table 3). On the other hand, the value of the standard error is not high (SE = 2.16), indicating proximity to the regression line and reaffirming the absence of publication bias [42].

Table 2. Heterogeneity statistics.

Model		Fixed	Random
Effect size and 95% interval	Point estimate	−0.27	−0.21
	Lower limit	−0.29	−0.39
	Upper limit	−0.25	−0.02
Test of null (2-Tailed)	Z-value	−24.19	−2.46
	p-value	<0.00	0.0013
Heterogeneity	Q-value	1284.15	
	Df(Q)	31	
	p-value	**<0.000**	
	I-squared	**97.58**	
Tau-squared	Tau squared	0.18	
	Standard Error	0.08	
	Variance	0.006	
	Tau	0.43	

Table 3. Egger and Begg regression test.

Intercept	**0.87**
Standard error	2.16
95% lower limit (2-tailed)	−3.54
95% upper limit (2-tailed)	5.28
T-value	0.40
DF	30
p-value (1 tailed)	0.34
p-value (2 tailed)	0.69
Confident Interval	99%

The variability evidenced in the statistics Q = 1284.15 and I2 = 97.58% (see Table 2) is indicative of extreme data, despite presenting an adjusted confidence interval (−0.39, −0.02). These data are consistent with the funnel plot graph (Figure 3) where the variability found previously is reaffirmed. This situation reiterates the diversity of studies [47]; as the Egger test concludes (Table 3), there is a high degree of heterogeneity within the nature of the studies themselves. This shows the need to carry out model comparison analyses and meta-regressions [47] that can explain the origin of this diversity.

In addition, it is necessary to point out that the transformation to Fisher Z values is not without risk, despite being accepted in the meta-analysis methodology [42]. Values x > 0.5 can be distorted away from the mean values, compared to the normal curve.

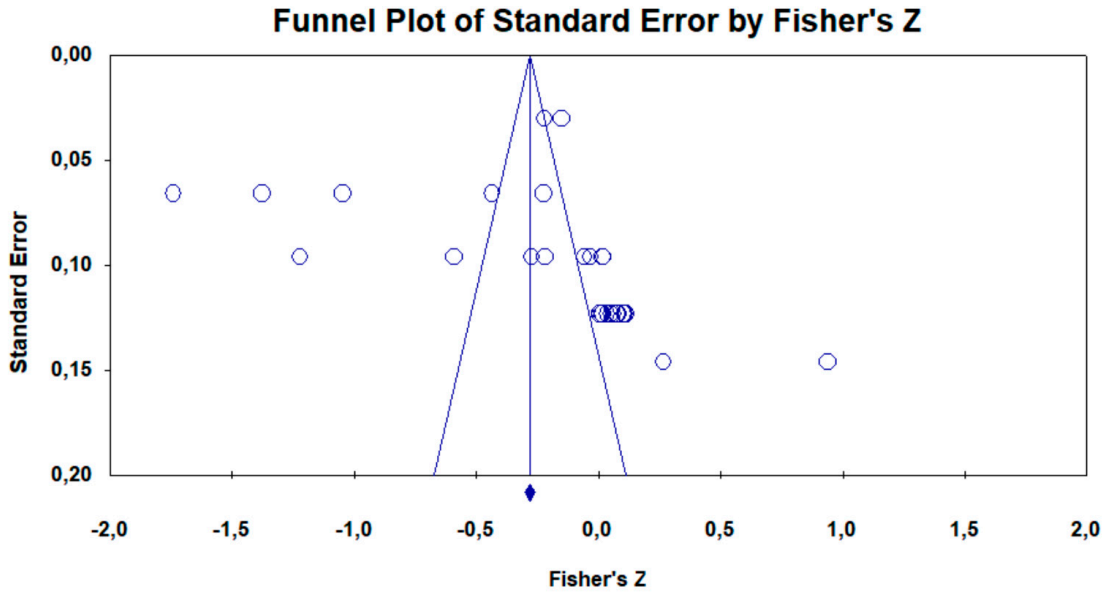

Figure 3. Funnel plot.

4.3. Moderating Variables and Meta-Regression Analysis

Previous literature shows the existence of moderating factors. That is why it is considered necessary to establish a study of six moderating variables: male gender, female gender, country, age, culture, and measurement instrument. Carrying out a meta-regression [48] and a comparison of models could explain such high variability in the results.

In this way, the meta-regression (see Table 4) generated six models: Model 1 simple, Model 2 age; Model 3 male; Model 4 female; Model 5 country, Model 6 area of knowledge and Model 7 years of experience.

The first model, in which no moderating variable is introduced, does not help us to understand the variance in any percentage, as occurs in the second (age), in the third (male), in the fourth (female), and in the seventh (years of experience). However, the fifth model (country) explains 49% (R^2 = 0.49), with a significance of p = 0.013. In this case, it is necessary to indicate how the results of the meta-regression (see Table 5) show significant differences with the populations originating from different Latin American countries (Coefficient = −1.02; Standard Error = 0.16; 95% Lower = −1.35; 95% Upper = −0.69; Z-value = −6.052; p-value < 0.00). In the same way, Model 6 subject discipline shows us how it explains 9% of the variance (R^2 = 0.09), with a significance of p = 0.04. However, being a variable with different categories, it is necessary to indicate that there are differences between the areas of knowledge. In this way, we find that it has a negative relationship with the categories of general, music and educational sciences, but with different significance capacities (see Table 6).

Table 4. Model comparison.

Model Name	Tau^2	R^2	Q	df	*p*-Value
Model 1 simply	0.18	0	1284.15	31	0.00
Model 2 age	0.19	0.02	1284.15	31	0.13
Model 3 male	0.19	0.03	1284.15	31	0.55
Model 4 female	0.18	0.05	1284.15	31	0.26
Model 5 Country	0.09	**0.49**	1284.15	31	**0.013**
Model 6 Subject discipline	0.16	**0.09**	1284.15	31	**0.04**
Model 7 Years of experience	0.19	**0.02**	1284.15	31	0.59

Table 5. Meta-regression according to Model 5 country.

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-Value	2-Sided *p*-Value	Q	df	*p*
Intercept	0.06	0.09	−0.12	0.24	0.66	0.51			
Spain	−0.19	0.13	−0.46	0.08	−1.37	0.17			
Latinoamérica	**−1.02**	**0.16**	**−1.35**	**−0.69**	**−6.05**	**<0.00**	37.45	3	**0.013**
México	−0.24	0.18	−0.60	0.10	−1.35	0.17			
Note: Chile it was excluded									

Table 6. Meta-regression according to Model 6 subject discipline.

Covariate	Coefficient	Standard Error	95% Lower	95% Upper	Z-Value	2-Sided *p*-Value	Q	df	*p*
intercept	0.60	0.30	−0.00	1.20	1.95	0.05			
General	**−0.83**	**0.32**	**−1.47**	**−0.20**	**−2.58**	**0.009**	7.27	3	**0.04**
Music	**−0.89**	**0.34**	**−1.56**	**−0.22**	**−2.61**	**0.009**			
Educational Sciences	**−0.78**	**0.37**	**−1.51**	**−2.12**	**−2.12**	**0.03**			

5. Discussion

There is a consensus within the research of the meta-analytical sample that lecturers do not feel trained to use ICT for didactic purposes, or to be creators of ICT resources (websites, platforms, etc.) that they can then apply in their university teaching. This is why we present a negative effect size r = −0.21 with a 99% confidence interval (−0.39, −0.02) moderated by the variables of nation and area of knowledge. The results on the incidence of gender and age agree with those from previous research, with little or no predictive power [32–34].

Regarding the perception and use of ICTs, we find that the studies in the sample present a positive perception, i.e., they consider ICTs to be relevant [3,6,12,14,15]. However, it is necessary to highlight that Mirete's research (2016) exposes how lecturers positively value the possibilities that ICTs offer in terms of making time and space more flexible, considering their incorporation into the university classroom as an essential element and that their use by lecturers will improve the quality of learning processes, this view being consistent with another study [49,50].

For their part, other authors [14] consider it convenient to train teachers in the didactic use of different computer applications so as to guarantee quality education regardless of the modality, be it face-to-face, blended, or virtual. Additionally, they qualify the importance of simplicity and free use in relation to the use of ICT resources in their classroom, this being coincident with previous studies [8,12]. The research by Marín-Díaz et al. [15] presents a positive predisposition, but this depends to a large extent on the willingness of lecturers. On the other hand, a certain degree of social desirability is found in lecturers' responses to ICTs, since initially they all demand more training, but subsequently do not follow continuous training.

Regarding their competence in ICTs, we find a diversity of views. In the first instance, Mirete [6] explains how university lecturers are more competent in using basic programs and user tools, followed by communication systems such as e-mail or videoconferencing and web-based information search engines such as Google, Yahoo, etc. However, they are more insecure when it comes to using educational authoring programs or resources for the creation of digital materials for teaching and learning. In this sense, it is necessary to highlight how there is a correlation between the knowledge that university lecturers declared to have of the different technologies and their use in teaching [22,51]. Similarly, Venegas-Ramos, Luzardo Martínez and Pereira Santana [14] (2020) reported a correct competency level in relation to the use of word processors and discussion forums, followed by spreadsheets and virtual environments for online storage and/or document sharing

(Dropbox, Google Drive, SkyDrive, etc.). They also showed difficulties in the use of computer tools and applications for teaching purposes. The results are similar to those reported by Calderón-Garrido, Carrera and Gustems-Carnicer [13], suggesting the lecturers feel competent in using search tools as opposed to educational robotics and virtual worlds. Paradoxically, the wide knowledge of Smartphones stands out, although their use is very restricted. In this sense, it challenging to use the educational aspect of apps for academic learning, as pointed out by another study [24]. That is, university lecturers present difficulties in making pedagogical use of ICTs, and this exposes the need to train them in the TPACK model described [10,52,53]. Calderón-Garrido, et al. [13], discussed how lecturers perceive themselves as competent in computer skills, but present difficulties in motivating their students with ICTs. In this sense, lecturers with previous experience in online education presented better skills both in the generation of resources and methodological strategies, and in encouraging motivation and participation in the classroom. On the other hand, Marín-Díaz et al. (2020) described how university lecturers demand specific training to help them feel competent, this being consistent with previous studies [10,15,54]. On the other hand, their use of ICT as a teaching tool was very low. However, these results are opposed to those of other research, wherein a high use of ICT as a teaching tool is found [24,27,55]. Finally, the relationship between the levels of perceptual competence and teaching experience was revealed [3]. In general, lecturers with less experience overestimate their competencies, while senior lecturers tend to underestimate their abilities [30,31]. However, these results are in the minority in the scientific evidence [9,10,33,34].

The differences between the attitudes and competencies of university lecturers are evidence of the existence of difficulties when implementing ICTs in the classroom. Thus, there are challenges at the level of management and resources, and specific and ongoing training. The lack of state training policies, together with the scarcity of specialized programs, has hindered technological integration within university teaching practice [14]. Similarly, an absence of specialized personnel who can generate online educational materials and train lecturers is evident [14,56]. On the other hand, another paper [13] expounded the lack of ICT resources in the academy, agreeing with other research from other nations such as Australia, the USA, Spain, and Latin America [57–60]. However, in nations such as Taiwan and Borenstein, a series of educational policies and resource investments that have proven to be very effective has been implemented since the 1990s [61,62].

On the other hand, there is a generalized lack of training. In the first place, lectures indicate that they acquire technology competencies in a self-taught manner, with a very low percentage acquiring them through courses [12,14,60]. On the other hand, lecturers' own self-perception is not adjusted, and this highlights important training deficiencies in Latin American lecturers, especially in the Dominican Republic, Mexico and Colombia [3]. However, Marín-Díaz et al. [15] indicated that there is a high demand for lecturer training in the digital field, but the demand requested may not correspond with a real response from lecturers [55,63,64]. However, one of the biggest challenges is the one presented by Mirete [6], who points out how a greater knowledge of methodological strategies mediated by ICTs does not imply a direct use of them in the classroom, agreeing with other research.

This meta-analysis is not without limitations. To begin with, its sample is limited to the European and Latin American population, and it is necessary to ask: What is the reality in Asia, Africa, Oceania, or North America? This is why it is necessary to carry out international research that allows us to work on digital competence from a broader perspective. On the other hand, knowledge on ICT is still very new and changing, so it is necessary to review and update the theoretical conceptualization of its use. Additionally, limitations have been raised by the COVID-19 pandemic, relating to whether it has affected our digital competence or if we have become more digitally competent. Has online education been reinforced by the pandemic? Therefore, in years to come, it will be necessary to assess digital competence before, during and after, so as to see how it has affected education.

As a result, a series of practical applications of this study emerge. Firstly, we found hardly any samples from macro-areas such as engineering or health sciences. In this sense,

it is necessary to study at the institutional level the needs of university lecturers within each degree or department. Secondly, university institutions benefit from the incorporation of technologies in their classrooms, but their lecturers are not sufficiently competent. Although lecturers express the importance of being digitally competent, it is necessary to determine why this is the case. In short, modern society is governed by the principles of postmodernism and the liquidity of Bauman, making it necessary for the university to enact digital changes.

Finally, it is necessary to outline future lines of research. In this sense, research is proposed that will analyze the incidence of intra-personal variables such as self-esteem, self-concept, and motivation in the learning of ICT competencies amongst university lecturers. In addition, there is a need to develop training projects at the institutional level. That is why we ask ourselves: What do university lecturers need to feel digitally competent? Should we consider the differences between macro-areas such as humanities, social sciences, health sciences, etc.? How should the training of these university lecturers be undertaken? Do they need to learn specific digital handling competencies such as the use of videoconferencing, educational platforms, and video generation? Or do they need to learn how to innovate their university teaching with ICT? How can we transmit media pedagogy to university teaching?

6. Conclusions

In short, university lectures present a positive perception of the use of ICT, but they do not perceive themselves as competent. Nationality and subject discipline are very important variables.

Several challenges arise:

- Educational policies must be established that favor specific and continuous training, guaranteeing access to technological resources;
- Lecturers need specific digital skills;
- The greatest need is for the pedagogical application of ICT and classroom management in teaching.

In other words, it is vital to train university lecturers in the didactics of technology and the management of virtual classrooms, in order for them to adapt to the reality of a postmodern and liquid society.

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