

Digital Teaching Competencies Evaluation of Teachers in Saudi Arabia: A Systematic Review

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Abstract

Given the pivotal role of teachers in facilitating learning, it is necessary that they be equipped with digital competencies to be able to prepare the new generations to work and live in the digital age efficiently. There is a need to assess Digital Teaching Competencies and investigate the training needed in this area. The purpose of this review was to identify the Digital Teaching Competencies of Saudi teachers. Twelve reviewed studies show significant heterogeneity in the theoretical frameworks and tools used. Teachers indicate that they have basic digital skills. However, there has been a lack of a theoretical framework guiding the development of digital competencies in Saudi Arabia which could be a concern in the educational system.

Keywords: Digital Competencies, Saudi Arabia, Teachers.

DOI: 10.7176/JEP/13-21-01

Publication date: June 30th 2022

1. Introduction

The ease of use that made technologies accessible to everyone, led to the emergence of a new type of knowledge and thus new competencies. For example, the emergence of Web 2 tools and how they effected the privacy of users led to the need to know how to protect the privacy of the individual (Janssen, Stoyanov, Ferrari, Punie, Pannekeet, & Sloep, 2013). Many terms refer to the use of digital resources in teaching and learning effectively such as computer culture, Internet culture, and media culture (Grusczyńska & Pountney 2013). In the digital age, everyone needs to develop his or her digital competencies as they are key to lifelong learning, facilitating self-realization, personal development, employability, social integration and active citizenship (Council of the European Union, 2018) Digital competence is one of the eight competencies of lifelong learning (European Community, 2007) and associated with such aspects as work, leisure and communication, and thus, extends beyond knowledge and skills to include confidence and a critical attitude (Janssen et al., 2013). Moreover, it became a requirement for future skills to improve the economic performance of any country seeking to progress (Tsybmal, 2020)

Gilster (1997) defined digital literacy as a set of skills necessary to access the Internet, access and manage digital resources, and communicate and integrate with communication networks. digital literacy is not limited to knowing how to use devices and applications, but also includes the reasonable and healthy use of ICTs, special knowledge and attitudes regarding legal, ethical, privacy and security aspects, as well as an understanding of the role of ICT in society (Janssen et al., 2013).

Improving education and its outcomes comes through raising the quality of teachers' performance and their adequacy, as they have the greatest impact on student learning (Education Development Strategy, 2013). Educators not only need to support their students to make effective use of digital resources in their classrooms, but also must help them understand and develop interest in broader considerations about technology use and impacts (Falloon, 2020). Thus, it is important to measure digital competencies for teachers because it increases their awareness of what they need to do to develop of their competence. Digital competencies further support transformation in the culture and practices of the teaching process (Malach & Švrčinová, 2018)

Despite the need for clarity about digital competencies to enhance how they are perceived by researchers, educators, trainers and other decision-makers (Janssen et al., 2013), reaching a single definition of digital culture is a challenge; because continuous technological, cultural and social developments redefine what, when and how digital technologies are used in personal and professional activities (Helsper, 2008). There is a discussion in the literature regarding the exact definition and nature of teacher competencies in the digital age and how this aspect can be developed through teacher preparation programs (Falloon, 2020). Because of their importance, digital competencies have been included in national and international educational frameworks for teachers in many countries (Malach & Švrčinová, 2018). One example of this is the ICT competency framework for teachers which seeks to help countries develop comprehensive national teacher ICT competency standards and integrate them into education plans. It includes six components: 1) Understanding ICT in Education, 2) Curriculum and

Assessment, 3) Pedagogy, 4) Application of Digital Skills, 5) Organization and Administration, and 6) Teachers' Professional Learning (UNESCO, 2021). Another example is the ISTE Standards for Educators, 2021, that provides a comprehensive roadmap for the effective use of technology in education. It contains seven roles that educators play: 1) learner, 2) leader, 3) citizen, 4) collaborator, 5) designer, 6) facilitator, and 7) analyst (ISTE, 2021). A further example of international educational pursuits is the European Digital Competency Framework 2.0 (DigComp 2.0) that categorizes the key components of digital competencies in five areas: 1) Information and data literacy, 2) communication and collaboration, 3) digital content creation, 4) safety and 5) problem-solving (DigComp, 2021)

Saudi Arabia, like other countries, has been keen to bring about qualitative change in the education system, one which meets the requirements of the 21st Century and keeps pace with global developments, knowledge and technical revolution. In 2103, Saudi Arabia adopted Education Development Strategy, an ambitious plan for public education. It was meant to respond to the main priorities for Saudi Arabia to transform itself into a knowledge society. It included objectives to transform the educational system to be more effective in building qualified citizens capable of acquiring knowledge, skills, and values, and addressing digital literacy needs of citizens. This strategy emphasizes the need for digitally competent teachers (Education Development Strategy, 2013). In 2017, the Education Evaluation Commission in Saudi Arabia (ETEC) updated the professional standards for the teaching profession and developed tests for professional competencies based on scientific research and best local and international practices in this field. These professional standards for teachers in Saudi Arabia aim to raise the quality of teachers' performance, improve their abilities and skills, and ensure that they possess the adequacy required to teach. These competencies include ten main competencies and 32 sub-competencies including digital skills such as using technology to support learning, and utilizing digital resources in the learning process. (ETEC, 2021).

This research aims to synthesize the results of studies that attempt to assess the degree to which digital competencies exist among pre-K-12 teachers in Saudi Arabia. The plan is to set the starting point from which to influence the development and improvement of teacher digital competencies. This research can thereby help decision-makers to define their plans to develop digital teachers' competencies, and directing them towards teachers' training needs. This research deals with a contemporary issue that is considered a common language among countries that seek to raise the level of digital competencies of their teachers. It is hoped that the research will help in exchanging the experiences and best practices among countries.

2. Research Questions

The purpose of the study is to examine existing literature on teachers' digital competencies in Saudi Arabia. To examine what exists in the literature, the following questions were used:

- What teacher digital competencies does existing research in Saudi Arabia identify?
- What is the level of Saudi teachers' digital competencies according to the existing research in Saudi Arabia?

3. Methods

The research is characterized as a systematic review of the literature. It utilized the 27-item PRISMA checklist guidelines and flow chart for transparency in conducting literature reviews (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, & Moher, 2021).

3.1 Information Sources

An online search was conducted for articles in the following databases: EduSearch, EBSCO, E.Marefa, Humanindex, AskZad, and Shamaa because they are the leading providers of research databases in Saudi Arabia. The last search of these databases was conducted in October, 2021.

3.2 Search Strategy And Selection Process

The goal was to provide a comprehensive overview in this area. An exploratory preliminary search was conducted in the databases using the term "teacher competencies" to identify the terms used to refer to digital competencies. The search was performed on reference lists of articles found electronically. Date of publication was not used, to limit the results. The quoted descriptors were also linked with the logical operator "or," to direct the search to the searched terms. The goal was to obtain articles that sought to evaluate teachers' digital competencies among pre-K-12 teachers in Saudi Arabia. Articles that dealt with training programs, faculty members, student teachers, or school principals were excluded as were articles that measured the availability of digital competencies for teachers outside Saudi Arabia. The titles of some articles show obvious relevance while others required scanning abstracts or samples. The search result is presented in Table 1 and Figure 1. Searching Databases was conducted for the first time in August, 2021. The same search strategy was repeated in October to ensure that all research that met the conditions was covered in the same databases, and the result was identical.

3.3 Eligibility Criteria

The inclusion criteria for selecting relevant articles were: (1) be peer-reviewed and published in a scholarly journal. Trade journals, magazines, newspapers, e-books, theses and dissertations were excluded; (2) published in the Arabic language; (3) related to the field of education and social sciences; (4) addressed evaluating the digital competencies. Articles addressing other topic such as developing training programs for digital competence were excluded as were articles focused on specific competencies such as the use of augmented reality technology or the smart board; (5) be with pre-K-12 teachers, thus excluding articles evaluating the digital competencies with principals, faculty, student teachers were excluded; and (6) conducted among teachers in Saudi Arabia.

Table 1. Search Results

Database	Number of Articles Meeting the Following Conditions		Eligibility criteria
	Search terms Teacher's competencies AND technology OR Digital OR e-learning OR ICT		
EduSearch	54		10
EBSCOhost	11		2
E.Marefa	22		1
Humanindex	10		0
AskZad	9		0
Shamaa	28		9
Total	134		12
			10 duplicated articles

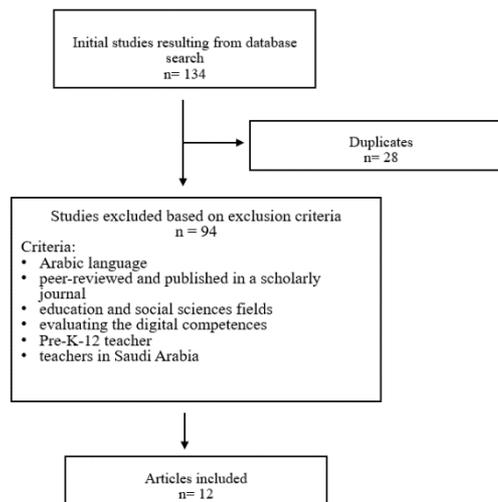


Figure 1. Search Results

3.4 Data Analysis

To address the research questions, the articles were read and data were extracted and summarized in tables. First the terminology used to describe the digital competencies, sample, and instruments was identified. Then a narrative synthesis was performed on the competencies and findings of the reviewed articles since they were different. This allowed study of similarities and differences among studies, investigation of relationships within the data and results in a summary of knowledge related to a specific review question (Lisy & Porritt, 2016).

4. Results

A total of 12 articles published between 2012 and 2021 were reviewed. The articles evaluated digital competencies of pre-K-12 teachers in Saudi Arabia. Various terms were utilized to refer to the teachers' digital competencies: *E-learning competencies* (Mohamed, 2017; Zho, 2016; Al-Salem, 2012), *Computer and Internet competencies* (Al-Amari, 2017), *Digital Technology Competencies* (Batout, 2018), *Blended Learning Competencies* (Al-Ajlan, 2019), *Educational Technology Competencies* (Beni-Hamd, 2019; Al-Mousa & Al-Rahili 2017; Al-Zahrani, 2019), *Information and Communication Technologies (ICT) Competencies* (Al-

Dogan&AbdulLatif, 2021), *Digital Age Competencies* (Al-Hilali and Al-Salahi, 2021), *Digital Competencies* (Al-Melhi, 2021).

The sample sizes ranged from 24 to 648 teachers. Eight of the studies had fewer than 100 participants. Only two studies did not use random sampling. Al-Ajlan (2019) used cluster samples of five regions in Saudi Arabia and Al-Salem (2012) surveyed a population that was all male teachers in the Kingdom’s private schools. Table 2 presents the sample’s gender, specialty, and regions.

Regarding the methodology used, eight articles used self-report questionnaires (Batout, 2018; Zho, 2016; Al-Salem, 2012; Al-Zahrani, 2019; Al-Amari, 2017; Al-Ajlan, 2019; Al-Hilali and Al-Salahi, 2021; Beni-Hamd, 2019) and two articles used more than one instrument, Mohamed (2017) used an achievement test to assess the knowledge, an observation checklist to assess the performance and a scale of attitude. Al-Mousa and Al-Rahili (2017) used two tools, an observation checklist for teachers and an attitude scale. Except for Al-Hilali and Al-Salahi, (2021) who evaluated the teachers’ digital competencies from the point of view of educational supervisors and principals, all articles assessed teachers’ digital competencies from the teachers’ point of view.

Only two articles adapted assessment tools from other studies (Al-Melhi, 2021; Al-Dogan & AbdulLatif, 2021). These two articles and the one by Al-Hilali and Al-Salahi, (2021) developed their studies based on existing frameworks for digital competence development in teacher education: DigCompEdu, TPACK and ISTE, respectively. The other nine articles reviewed in this study were ad hoc instruments.

In most of the studies reviewed, competencies were developed by the researchers based on previous studies and were peer-reviewed to ensure adequacy of competencies. Only three studies used existing digital competencies frameworks. Therefore, the competencies varied from one study to another in quantity and quality. In terms of quality, competencies ranged from 10 to 120. In terms of quantity, they varied from very simple competencies such as downloading and uploading documents (Al-Amari, 2017; Batout, 2018) to using advanced applications such as SPSS software (Al-Amari, 2017).

Studies that aimed to evaluate teachers’ digital competencies in a specific specialty classified the competencies into general (for all teachers) and specific (for specialty), for example, Mohamed (2017) and Beni-Hamd (2019). A sample of general competencies is using Microsoft Office software, while specific competencies included using applications for special education teachers to serve special-need students and advance art software for art teachers. Instead of categorizing them into general and specific competencies, Al-Ajlan (2019) classified them into different categories: technical environment, student, teacher, content, evaluation, and academic advising.

In general, most of the reviewed articles focused on technology skills. Important dimensions, such as digital citizenship, assessed in an Al-Melhi (2021) study that used a European framework for digital competencies. It is not surprising that findings of the reviewed studies varied from concluding the level of teachers’ competencies to be low to high because of the inconsistency of the competencies.

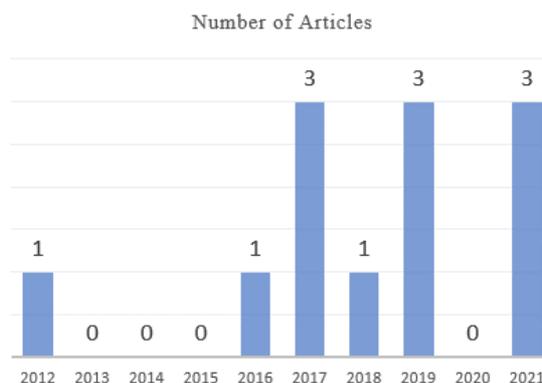


Figure 2 Distribution of Articles Among Years

Table 2. Samples by Gender, Specialty, and Region

	Categories	#Articles	Articles
Gender	Female	3	Mohamed. 2017; Batout, 2018; Zho, 2016
	Male	6	Al-Mousa and Al-Rahili 2017; Al-Salem, 2012; Al-Zahrani, 2019; Al-Amari, 2017; Al-Ajlan, 2019; Al-Hilali and Al-Salahi, 2021
	Both	3	Beni-Hamd, 2019; Al-Melhi, 2021; Al-Dogan&AbdulLatif, 2021
Specialization	Physics	1	Mohamed. 2017
	Special Education	1	Beni-Hamd, 2019
	Social Studies	1	Al-Mousa & Al-Rahili 2017
	Art Education	1	Batout, 2018 t
	Arabic Language	1	Al-Dogan&AbdulLatif, 2021
	Physical Education	1	Al-Zahrani, 2019
	Did Not Specify	4	Zho, 2016; Al-Salem, 2012; Al-Ajlan, 2019; Al-Hilali and Al-Salahi, 2021
	Specialties		
Regions	Different Specialties	2	Almelhi, 2021; Al-Amari, 2017
	Riyadh	1	Al-Salem, 2012;
	Makah	1	Al-Hilali and Al-Salahi, 2021
	Medina	2	Al-Mousa and Al-Rahili 2017; Batout, 2018
	Tabouk	1	Al-Amari, 2017
	Asir	2	Mohamed. 2017; Beni-Hamd, 2019
	Al-Baha	2	Zho, 2016; Al-Zahrani, 2019
	Al-Shargeah	1	Al-Dogan&AbdulLatif, 2021
	Across regions	2	Al-Melhi, 2021; Al-Ajlan, 2019

Table 3. Summary of Included Articles

Authors	Terms	Sample	instrument	Competencies	Conclusion
Mohamed (2017)	E-learning competencies	N= 26 physics female teachers in secondary schools in Abha, Asir region- random sample	3 tools <ul style="list-style-type: none"> •achievement test in knowledge related to e-learning •observation checklist to assess performance of e-learning skills •scale of attitude towards e-learning- 3-Likert Scale (important, somewhat important, unimportant) 	120 competencies were derived from previous studies and categorized into two components: <ul style="list-style-type: none"> • general competencies for e-learning (knowledge, skills and attitudes) • specific competencies for teaching physics: consist of 5 constructs: <ul style="list-style-type: none"> • working with networks, • planning e-lessons of physics, • presenting and designing e-lessons of physics, • implementing e-activities of physics, • e-evaluating of physics 	The level of knowledge, skills and attitudes of e-learning competencies teachers had was low. The accepting level of competencies is to obtain at least 75% in each one of 3 tools.
Beni-Hamd (2019)	Educational technology competencies	N=92 teachers (62 males and 30 females), specializ-ing in special education, Southern region- random sample	5- Likert questionnaire consists of 3 constructs <ul style="list-style-type: none"> • General technology competencies •technology competencies for special education •performance related to educational technology competencies 	26 competencies were derived from previous studies were categorized into 2 components: <ul style="list-style-type: none"> • general competencies for all teachers dealt with basic skills of using computers, Microsoft office software, smart device applications, using search engines, forums, digital libraries, educational websites, designing web pages, using applications for statistical analysis of results, multimedia applications, social media tools in education, and using the smart board. • specific competencies for special education teachers such as the use of applications for blind, deaf and gifted students. 	In general, the degree to which teachers possessed competencies was large, However, the level of some general competencies was average while the level of some of the special ones were average.
Al-Mousa and Al-Rahili(2017)	Educational technology competencies	N=37 male social studies teachers Medina region - random sample	2 tools <ul style="list-style-type: none"> •5- Likert questionnaire for the 5 constructs of competencies •Observation checklist for teachers to be observed by supervisor 	They developed teaching competencies from previous studies, and peer-reviewed was conducted to ensure the suitability of the competencies. They were categorized in 5 areas: instructional design, teaching, class management, evaluation. The one that was related to this study is: <ul style="list-style-type: none"> • Educational technology competencies, which included 10 competencies, examples are: using Microsoft office software, designing e-lessons, using emails, implementing web application in teaching, using multimedia in teaching, and producing figures using computer application. 	The degree to which teachers possessed competencies was low.
Batout (2018)	Digital Technology Competencies	N=51 female Art Education Teachers - intermed-ate school Medina- random sample	Ad hoc 5- Likert questionnaire consists of 3 constructs of competencies	27 competencies were developed and peer-reviewed. They were categorized into 3 dimensions: <ul style="list-style-type: none"> • use and applications of digital technologies in teaching art, including the use of web applications, video conferencing, e-portfolio, digital assessment tools, creating educational films, implementing social media and virtual classes in teaching art, and designing websites. • use of arts digital applications such as advanced drawing applications. • use of computers and the information network, includes use of Microsoft Office applications and other basic skills such as uploading and downloading files, and using search engines. 	The level of using applications of digital teachers had ranged from medium to weak while the level of using computer and network was high.

Authors	Terms	Sample	instrument	Competencies	Conclusion
Zho (2016)	Educational competencies necessary to implement e-learning	N=24 female teachers-did not specify specialties - Al-Baha region- Random sample	Ad hoc 5- Likert questionnaire consists of the 9 constructs.	9 competencies that have been developed based on previous studies. They include: <ul style="list-style-type: none"> • cognitive competencies, • performance competencies, • competencies for employing e-learning, • competencies for using software and multimedia, • Internet usage competencies, • computer usage competencies, • competencies related to e-content management, • competencies related to information protection systems • competencies of designing e-courses 	The level of e-course competencies and competencies for using educational and content management system teachers had moderate degree while the level of computer and Internet usage competencies were high.
Al-Melhi (2021)	Digital competencies for digital transformation	N=648 general education teachers of different specialties- Male & female random sample	The digital competency scale based on the European framework for digital competencies) DigComp Edu) which contains 4 main domains, 15 sub-domains and 30 digital competencies and uses 5 levels of judgment	30 competencies in 4 dimensions of digital pedagogical competence: <ul style="list-style-type: none"> • digital pedagogy, • digital content use and production, • digital communication and collaboration • digital citizenship. 	Teachers at a good level for the digital pedagogy dimension and beginner for the rest.
Al-Dogan&AbdulL atif(2021)	Competencies of integrating ICT	N=150 teachers of Arabic language, general education, Al-Ahsa - by Male & female random method	The TPACK Confidence Survey (TCS) (Albion 2010) which is 4- Likert survey.	20 competencies of 2 constructs: <ul style="list-style-type: none"> • enhancing student learning outcomes, • transforming student learning outcomes. 	Teachers' competencies are available at a moderate degree
Al-Salem (2012)	E-learning competencies	N=30 male secondary school teachers from Kingdom private schools – Riyadh	Ad hoc 5- Likert questionnaire consists of 3 constructs of competencies	29 competencies were developed based on previous studies, and peer-reviewed. They were categorized into 3 dimensions: <ul style="list-style-type: none"> • E-learning literacy competencies • using networks and Internet competencies • Software and multimedia design competencies 	Teachers' competencies are available at a moderate degree.
Al-Zahrani (2019)	Competencies required to implement technology in education	N=58 male physical education teachers in Al-Baha region. Random sample	Ad hoc 4- Likert questionnaire consists of 4 construct of competencies	76 competencies were developed based on previous studies, and peer-reviewed. They were categorized into 4 dimensions: <ul style="list-style-type: none"> • Technical knowledge competencies, including knowledge of technical concepts and terms, the role of educational technology, its importance and role, and technical tools and devices that are appropriate to educational situations. • Effective use of technology competencies, including operating a computer, using Microsoft Office programs, using e-mail, digital library, the Internet, multimedia, and social networking sites in education, e-books, and simulation • Designing and producing competencies for educational materials, including analyzing the characteristics of learners and educational content, setting goals and organizing educational content for the production and design of electronic educational materials. • Evaluation and feedback competencies include employing technology in the evaluation process, analyzing results and improving performance 	Teachers' competencies are available at a moderate degree
Al-Amari (2017)	Computer and Internet Competencies	N=150 male secondary school teachers in Tabuk region, excluding computer teachers – random sample	Ad hoc 3- Likert questionnaire	37 competencies were developed based on previous studies, and peer reviewed. They were categorized into 2 dimensions: <ul style="list-style-type: none"> • Competencies using the computer, including the use of Microsoft Office programs, playing discs and computer accessories, dealing with folders, using the smart board and electronic completion file, and being able to use SPSS. • networks and the Internet, competencies including using Internet, search engines, social networks, smart phones, uploading and downloading, websites and digital libraries, and preparing tests using Google applications 	Teachers' competencies are available at a moderate degree
Al-Ajlan (2019)	Competencies required for implementing blended learning	N=377 male teachers - various regions: Riyadh, Mecca, Dammam,Hail,Jazan, cluster sample	Ad hoc 67-itmesquestionnaire of 67 items consists of 6 constructsof competencies	In developing the questionnaire, the research relied on the educational literature and previous studies related to its topic as well as guided by the opinions of experts and specialists in the field. The number of competencies was not mentioned but they were categorized in 6 areas: <ul style="list-style-type: none"> • competencies related to the technical environment • competencies related to teachers • competencies related to students • competencies related to content • competencies related to evaluation • competencies related to academic advising 	The level of teachers' competencies was low.
Al-Hilali and Al-Salahi (2021)	Competencies of the digital age	N=86 23 male education-al supervisors and 63principals random sample Al-Lethregion.	Ad hoc 5- Likert questionnaire based on ISTE consists of 5 constructs	20 competencies were developed based on (ISTE 2016) and peer reviewed. They were categorized into 5 dimensions: <ul style="list-style-type: none"> • Supporting student learning • Designing digital materials • Implementing digital tools • Applying the principles of digital responsibility • Professional and leadership growth 	From the educational supervisors and principals' point of view, the level of teachers' competencies was at a moderate degree

5. Discussion And Conclusion

To answer the first question: What teachers' digital competencies does existing research in Saudi Arabia identify?

Competencies included in the reviewed articles were examined and summarized. There was no consistency across the reviewed articles, neither in their numbers nor in their identity. One article included 10 competencies while another included 120. Some articles included very basic computer skills such as downloading and uploading documents while other articles included advanced application –not necessarily to master- such as SPSS software. The reason behind that was that the authors of most of the reviewed articles developed digital competencies as personal diligence based on previous studies and they had peers review the competencies' clarity or relevance to the dimensions they suggested. They did not rely on a theoretical framework which in turn makes each article to have different dimensions and different categories. It was difficult to compare and draw general conclusions or diagnose the situation. There were similar areas where some of them focused on basic technology skills such as using Microsoft Office software, search engines, digital libraries, educational websites, and multimedia applications which they named as Internet and Computer Usage dimension. Such skills are considered as one part of digital competencies (Tárraga-Mínguez, et al., 2021). The three articles that were based on teachers' digital competencies frameworks were open to other important dimensions such as digital communication, digital citizenship, digital responsibility, or professional growth.

Another effect of developed digital competencies as personal diligence was the incorrect wording of a competency. Instead of measuring ability, usage was measured. Authors of some of the reviewed articles assess the teachers' competencies based on their ability to use a very specific tool or application. For example, instead of assessing teachers' ability to implement social media in education, it was written to assess the teacher's ability to use Facebook.

Two articles attempted to categorize digital competencies into a general group that all teachers in different specialties need to have and a special group of competencies that teachers in a specialty area need to have. However, in naming their instruments for the special group they used general competencies, adding the subject in the description: for example, "preparing students to take the responsibility of their learning in e-learning of physics".

It is clear that there is no simplified shared understanding among the reviewed articles of what teachers' digital competencies are. This is confirmed by a call for an ambitious plan in Saudi Arabia to prepare teachers for the new educational digital transformation stage, and a need to identify, assess, diagnose, develop and improve the competencies for the teachers (Al-Melhi, 2021). In particular, digital transformations have not found a parallel response in the education system, teaching and learning (Tsymbal, 2020).

With identifying of such competencies falling short, awareness of teachers' digital competencies is needed for all those involved in the field of education (university faculty members, teachers, stakeholders, student teachers, interested researchers). Educators need to develop digital competencies to play their role productively, safely and ethically in diverse and steadily changing learning environments. Without clear understanding of these competencies, teachers will not be able to develop them.

To answer the second research question: What is the level of Saudi teachers' digital competencies according to the existing research in Saudi Arabia? findings of the reviewed articles were examined and summarized. Different aspects made reaching a conclusion difficult. First, the competencies were different across the reviewed articles as mentioned earlier. Consequently, the synthesis of finding of each study and putting them all together was not reasonable. Second, the instruments used in most articles were ad hoc ones. No two articles had the same or even similar instruments. Third, two articles used the educational supervisors or school principals to evaluate the level of digital competencies. Fourth, self-reported questioners may compromise the validity of the results. Fifth, some studies included only females or only males, meaning the conclusion was not based on a representative sample of the Saudi teacher population.

However, six of the reviewed articles found that the teachers' competencies they identified were available at a moderate degree in their samples (Al-Hilali & Al-Salahi, 2021; Al-Amari, 2017; Al-Zahrani, 2019; Al-Salem, 2012; Dogan & AbdulLatif, 2021; Mohamed, 2017). Three articles reached a conclusion of low-level competencies for the teachers: Al-Ajlan (2019) did not include the competencies in his study, just the dimensions. Al-Mousa and Al-Rahili (2017) worded competencies in a way that suggested practice, not ability with such phrases as I use, I do etc. Mohamed (2017) evaluated teachers' ability to use advanced application or software to determine their level of digital competencies such as developing a database using Access software. These results were consistent with a study that argued that ICT competence is the second most-demanded training need of teachers (Tárraga-Mínguez, et al. 2021). Three articles found that the teachers had a high level of the competencies they identified but with a closer look to these competencies, it became clear that they were of the basic skills of using Internet and computers (Batout, 2018; Zho, 2016; Beni-Hamd, 2019). In general, the results of these articles indicate that teachers do not feel sufficiently confident they have the necessary digital teaching competencies. This result is consistent with other studies that suggest the teachers need training in the necessary digital skills (Gallego-Arrufat, 2019; Tárraga-Mínguez et al., 2021)

Thought is needed regarding developing a framework or a model for the digital competencies for Saudi teachers. That framework or model should consider the culture and local environment with all their aspects and

should be adopted by colleges of education which are responsible for preparing future teachers. The framework also should be adopted by teachers in their planning, designing and implementation of their teaching and in developing their abilities to benefit from digital resources safely and sustainability. The framework should guide teacher training programs. In addition, some of the reviewed articles identified a link between teaching competencies and pre-service teachers' programs as a key factor in the teachers' own digital competencies. This emphasized that necessary priority must be given to the pre-service teachers in the field of digital teaching competence (Tárraga-Mínguez et al., 2021)

Although, this systematic review may have significant practical implications in theoretical, and practical fields, a limitation of this study is the small sample. Data were collected from only 12 papers published in the last 10 years using a specific set of keywords. The result of the search for articles to be included in this study did not show any studies that dealt with teachers in pre-K education despite the importance of this stage. All studies were quantitative. Qualitative studies in this field are necessary to investigate the competencies teachers have and the ones that they need to develop.

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