ORIGINAL RESEARCH ARTICLE

Digital competences of teachers in Lebanon: a comparison of teachers' competences to educational standards

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The impact of digitalisation on everyday life has necessitated the need for learners to acquire digital competence as part of their education. In order to prepare students to become digital citizens, it has become necessary for teachers to acquire and implement digital competence in the classroom. This study applied the DigCompEdu framework to Lebanese schools and teachers to examine the digital competences of teachers and their alignment with Ministry of Education & Higher Education (MEHE) standards. This study followed a cross-sectional descriptive design and involved 170 in-service teachers in Lebanese schools. This study found that whilst schoolteachers' practice meets all MEHE indicators, there is a significant need for training to schoolteachers in using digital tools and resources to promote collaboration in the learning process. The findings highlighted the importance of digital competences in schools and the need for ongoing training and support for teachers in this area.

Keywords: DigCompEdu framework; digital competences; teacher education; digital education; Lebanese education system

Introduction

The effects of digitalisation are undeniably spreading across all areas of everyday life. It is changing the way people interact, communicate, learn and work (Schleicher, 2019). Therefore, acquiring digital competence as part of the education that learners receive at school has become a crucial and natural response to the broadening wave of digitalisation (Ala-Mutka, 2011). In the attempt to prepare and equip students to become digital citizens who acquire the digital skills needed for learning, work and life in general, it has become imperative for teachers to acquire, master and implement digital competence in the classroom. This has led to a dramatic change in the role of the teacher (Engen, 2019; ISTE, 2000; UNESCO, 2011).

In response to this worldwide shift and in an effort to bridge the gaps in the outdated Lebanese curriculum and transform schools, Lebanon's Education Reform Strategy and Action Plan (LERSAP) was launched in October 2011, followed by Lebanon's National Educational Technology Strategic Plan. A major focus in this

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plan was the integration of information and communications technology (ICT) to support the learning and teaching processes in local schools. As displayed in Figure 1, the plan could be summarised through six interrelated and complementary goals and objectives:

- Procurement of learning-related systems, hardware, software, reliable connectivity and relevant digital content
- Placement and maintenance of digital tools and resources in classrooms
- Ongoing professional development, training and support for school leaders and schoolteachers in the management, implementation and integration of digital tools and resources to promote a more effective learning experience
- Evaluation of ventures in implementing digital learning and literacy within Lebanese schools
- Implementation and support of school-based endeavours in digital learning
- Support for the introduction and integration of curriculum-related, content-relevant, digital tools and resources, and the appropriate adaptation of instruction and assessment procedures.

The plan repeatedly acknowledged and emphasised the need for providing ongoing professional development to both public and private teachers in order to acquire the necessary competence in managing, using and integrating ICT to enhance the learning process for students. This is to be accomplished through partnering with
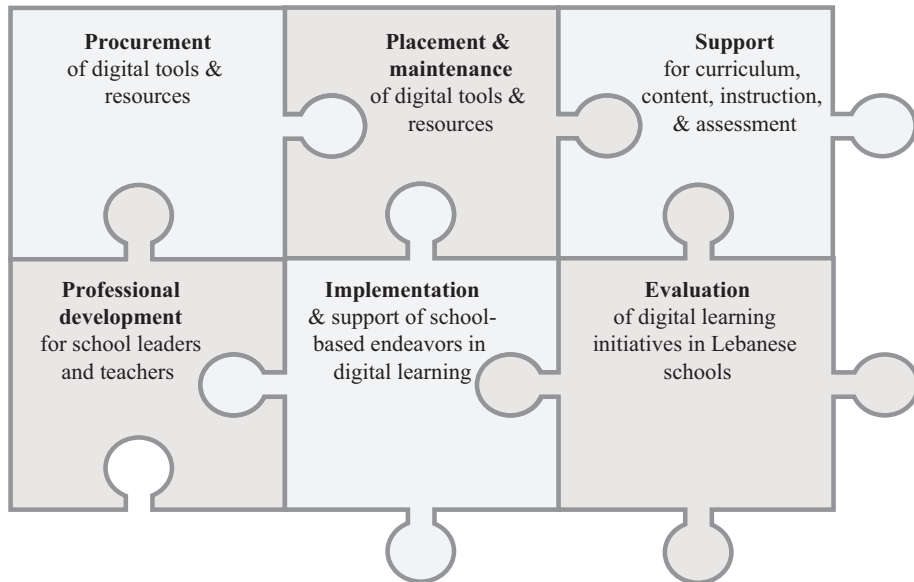

Figure 1. Areas of goals and objectives in LERSAP.
Note. Adapted from 'Areas Guided by the Strategic Plan 2012–2017', in MEHE, *Teaching and Learning in the Digital Age: Lebanon's National Educational Technology Strategic Plan* (p. 6), 2012, The Ministry of Education and Higher Education Strategic Planning Development Team. Copyright 2012 by MEHE. LERSAP = Lebanon's Education Reform Strategy and Action Plan.

local businesses, non-governmental organisations and tertiary education institutions that offer teacher training programs and workshops (Ministry of Education and Higher Education [MEHE], 2012).

There have been several efforts to define the digital competences needed by teachers (Education and Training Foundation, 2019; Elliot et al., 2011; Fernanda et al., 2013; ISTE, 2000; JISC, 2023; Johnson & Mielke, 2013; Kelentric et al., 2017; Mentoring Technology-Enhanced Pedagogy [MENTEP], 2016; Mishra & Koehler, 2006; Tondeur et al., 2017; UNESCO, 2011). It is therefore not a simple task to reach agreement on what teachers' digital competences. There are no simple and straightforward definitions. Instead, definitions of digital competences tend to be bound to cultural contexts and subject to continuous change. Thus, a framework that attempts to present teachers' digital competence should consider personal factors, cultural values and the complexity of the teaching and learning process (Conway et al., 2009).

One framework that aims to present a comprehensive set of digital competences for teachers is the European Framework for the Digital Competence of Educators DigCompEdu (European Commission et al., 2017). This framework examines educators' competence not only in the general utilisation of digital tools but also in the implementation of these tools for the purposes of teaching, learning, assessment and equipping learners with digital literacy. The DigCompEdu responds to the need for a well-defined set of digital competences related to the teaching profession rather than general digital competences (European Commission et al., 2017), and it presents a frame of reference that can be validly applied to all educators at any level (childhood to university) and in any sector, including but not limited to academic, vocational or adult education (Lucas et al., 2021).

Literature review

A brief overview of the Lebanese education system

Education in Lebanon is closely regulated by the MEHE. The Lebanese education system is divided into two sectors, public and private. Public schools are free of charge. However, private schools are the predominant forms of schooling in the country, and they lead the way in terms of the quality of education and resources. Still, the ministry of education controls both public and private schools through requirements of licencing and standards. Also, the national exam requirement for all students in Lebanon does not allow private schools to significantly depart from the curricula set by the ministry (Friedrich Naumann Foundation, 2020). In 2021, 60% of the 2.15 million students in Lebanese schools attended private schools (World Bank, 2021).

By law, education in Lebanon is compulsory until the age of 11. However, the government has not been able to fully implement this law. The ministry has designed several reforms since 1995 in an attempt to reorganise the education sector after the civil war. The most significant endeavour was in 1997 with the introduction of economics and social studies, technology and computer skills instruction, and a second foreign language to the national curriculum. Although the reforms were necessary, their implementation and monitoring was not effective. In addition, very little was done to train teachers in using technology and adopting student-centred methods (Friedrich Naumann Foundation, 2020).

Standards of the Lebanese ministry of education for teachers' digital competence

As a follow-up to LERSAP and right in the following year, the MEHE devised and published Lebanon's National Educational Technology Strategic Plan (MEHE, 2012). The plan attempts to provide a common vision, goals and objectives, and recommendations for the government, educators and donors. It also offers a roadmap that sets guidelines for the implementation and integration of ICT in the Lebanese education system, both public and private sectors, over the 5-year period from September 2012 to September 2017 (MEHE, 2012).

Based on the findings of a previous study (Burns, 2012), this strategic plan identifies eight areas of challenges facing the Lebanese educational system. These challenges are:

1. An overall, low-quality instruction in government schools
2. A shortage of teachers in some regions of the country and in certain subject areas
3. Relatively low student achievement levels in comparison with international levels
4. The absence of technology integration in the national curriculum
5. Poor technology infrastructure
6. National examinations that lack the focus on the necessary skills for a digital age
7. Lack of an effective support system for teacher professional development, including in digital skills
8. The absence of data and information systems at the national level

The last five of these challenge areas are directly related to digital literacy, digital competence and digital tools. In fact, Burns (2012) categorises Lebanon's overall efforts in integrating ICT in education within the emerging category of nations in her comparison study of Lebanon, Jordan, the UK and the USA.

There have not been many studies evaluating the outcome of LERSAP reform plan of 2011 or Lebanon's national educational technology strategic plan of 2012. A study (Saad, 2013) published just 2 years after the announcement of the national educational technology strategic plan highlighted the absence of any existing national standards related to teachers' digital competences. Another study (Chelala, 2015) draws a rather dim picture of the results about 3 years after the launching of both plans. This study identifies many persisting challenges and a lack of effective intervention from the ministry. Several challenges – such as lack of funding, inadequate compensation to teachers and the need for a more radical reform of curriculum – are listed, but a major problem highlighted is the lack of adequate training for teachers in digital competences. One study (Awada & Diab, 2016) that presents a relatively positive review of the 2011 reform lists all the initiatives that the ministry has implemented, acknowledging the need for further improvements. Regardless of whether the reform plan was effectively implemented or not, the situation is bad, if not worse. In 2021, the World Bank (2021) published An Educational Reform Path for Lebanon (sounding the alarm that the Lebanese education is under threat and calling for an urgent response to the decline in educational outcomes). This decline also includes outcomes related to ICT integration and teacher training.

Two major documents issued by the Center for Educational Research and Development (CERD), which operates under the MEHE, set some standards for ICT integration in the Lebanese school curriculum. However, they do not clearly delineate the competences needed by teachers.

The Updated Standards for an Effective School document (CRDP, 2022) is an improved version of a previous document that sets educational standards for Lebanese schools. The updated version has expanded on the standards related to ICT and digital literacy to include a section detailing the digital learning and ICT standards that schools are required to embrace (Table 1).

These standards are presented in a framework that lists criteria and indicators as evidence for the attainment of each standard. Although the standards themselves address school performance and not teachers' competences, the criteria present a benchmark for the digital competences required of schoolteachers to guarantee the attainment of the standards. The indicators that are relevant to teacher competence are extracted from the framework, summarised and listed as follows:

2.1.f. engaging in professional development trainings in digital teaching & learning strategies

2.2.c. identifying digital teaching strategies that meet learners' needs

2.2.f. managing, storing and sharing digital resources and making them available to learners

2.2.i. using digital assessment strategies to monitor learners' progress

2.2.k. preparing reports and analysing assessment data

2.2.m. providing feedback to learners

3.1.d. promoting learners' active participation and motivation to communicate and learn

3.2.a. promoting learners to communicate with peers and with teachers through collaborative activities

3.2.e. empowering learners to use digital tools for research and problem-solving

3.2.f. activating learners' engagement through personalisation and differentiation of content

Table 1. Standards of digital learning and ICT for effective schools in Lebanon.

Area 1: Integrating ICT in the teaching & learning process	Area 2: Activating digital learning	Area 3: Effective communication	Area 4: Digital environment
Standard 1.1: Develop an action plan to develop ICT and integrate it into the teaching and learning process. Standard 1.2: Equitable access to technology and distance learning management system	Standard 2.1: Building the capacity of the school community Standard 2.2: Curricula and assessment	Standard 3.1: Teacher-learner communication mechanisms Standard 3.2: Engaging learners Standard 3.3: Digital learning community	Standard 4.1: Academic integrity Standard 4.2: Attendance requirements

ICT = information and communications technology.

3.3.c. providing opportunities to learners to develop their digital learning community through positive communication with peers and adults
3.3.f. promoting digital citizenship and Internet safety
4.1.e. using academic integrity indicators to promote credibility of student work

The second document (CRDP, 1997) is part of the Lebanese school curriculum. It specifically focuses on the curriculum for computer and informatics education. The ministry has provided 10 goals, which set a standard for the competences that students need to acquire by the end of their school education, but it makes no direct mention of the competences required of teachers.

- Goal 1: To develop positive attitudes towards computers and reinforce student's self-confidence through the efficient use of this technology
- Goal 2: To value the educational and economic role of the computer as well as its function in facilitating communication
- Goal 3: To interact with other cultures and civilisations through various programs and computer networks
- Goal 4: To develop creativity, logical thinking, problem-solving and analysis abilities through programming
- Goal 5: To recognise the uniqueness of the computer as a programmable machine, which can perform specific tasks
- Goal 6: To acquire basic computer concepts and their use in various cultural, industrial and commercial domains
- Goal 7: To acquire information management skills: navigating through information, sending, receiving, storing and retrieving it
- Goal 8: To acquire database management techniques
- Goal 9: To use the computer efficiently and to manipulate its peripherals for various purposes
- Goal 10: To acquire the basic computer skills needed in the labour market

To sum up, whilst the digital competences required of schoolteachers are not clearly and straightforwardly defined, a minimum set of standards may be deduced from the standards related to schools and students since teachers are supposed to be the contributors to the process of developing these competences. In other words, teachers need to acquire these competences first in order to later transfer them to students in their classrooms (Admiraal et al., 2017).

Digital competence

The primary focus of the traditional approaches to teachers' technological proficiency was on their ability to promote digital literacy in students (Borthwick & Hansen, 2017). This term was first introduced by Paul Gilster (1997) as 'the ability to properly use and evaluate digital resources, tools, and services, and apply it to lifelong learning processes' (p. 220). With the emergence of new technologies since then and the increase of access to the internet, many new 'literacies' have emerged, such as information literacy, internet literacy, media literacy and even multi-modal literacy. Therefore, the definition of digital literacy is continuously evolving with the development of new tools and the accessibility of new channels for learning (Ala-Mutka, 2011;

Ferrari et al., 2012; Heydon, 2007). In recent years, all computer-related literacies have started to be regarded as 'life skills' under the commonly used, but not exclusive, title 'digital competence' (Ferrari et al., 2012) or 'digital capability' (JISC, 2023).

In terms of teachers' role, it is assumed that they need to be equipped with the basic set of competences needed to produce digitally literate students (Admiraal et al., 2017). However, most teacher training programs have been criticised for fostering a narrow focus on teaching digital skills to the teacher, with little or no consideration for the authenticity of learning experiences and socio-cultural contexts for the use of technology (Gruszczynska et al., 2013; Lim et al., 2011; Lund et al., 2014; Ottestad et al., 2014). The approach has mostly centred on equipping teachers with the necessary technical skills ignoring crucial elements related to dispositions, ethics, safety, collaboration and digital citizenship (Foulger et al., 2017; Hinrichsen & Coombs, 2013). Most recent studies have called for redefining the approaches of teacher training in digital proficiency, encouraging the adoption of an all-encompassing approach to digital competence, which entails the sensible and holistic use of digital tools (Janssen et al., 2013). Furthermore, the concept of digital competence in teacher training necessitates a constant revisiting of the tools, skills, attitudes and other considerations involved. This is due to the evolving nature of education coupled with the ever-changing digital environment (Janssen et al., 2013). A digital competence framework that was developed with all these considerations in mind is the European Framework for the Digital Competence of Educators DigCompEdu (Caena & Redecker, 2019).

The European framework for the digital competence of educators (DigCompEdu)

As explained by Caena and Redecker (2019), the generation of the European Framework for the Digital Competence of Educators (DigCompEdu) came as a response to the digital revolution that has had and still has a revolutionary impact on the digital environment for people in general and teachers and learners in specific. The development of the framework was grounded in two major foundations: (1) the findings and recommendations of the most recent studies regarding the adoption of a holistic approach to digital competences of teachers, including cognitive and metacognitive competences, adaptive and evolving expertise in areas of reflexivity, professional awareness, individualisation, cooperation and personal mastery, and (2) an extensive analysis of international policies, standards, frameworks, and expert and stakeholder consultations. As for the designing of the DigCompEdu framework, it acknowledges the need for flexibility and adaptability to various social contexts. Therefore, the resulting transnational design resonates with the diversity of cultural and contextual specifics.

The framework organises the teacher-specific digital competences in six competence areas with 22 elementary competences: Area 1 deals with educators' use of technology for the purpose of interaction with colleagues, students, parents and other stakeholders in their professional setting. Area 2 proposes the competences that teachers need to use, create and share digital resources for learning in a responsible, effective and efficient way. Area 3 focuses on planning, managing, designing and orchestrating the use of digital tools and resources in teaching and learning. Area 4 focuses on the use of digital technologies and strategies to assess learners' performance, provide feedback and make learned decisions. Area 5 emphasises the potential of using digital technologies to create personalised and differentiated learning

activities that maximise learning and empower learners. Area 6 presents the digital competences of teachers that help them in promoting their students' digital literacy and the responsible, safe and meaningful use of technology (European Commission et al., 2017; Lucas et al., 2021).

As a result, the DigCompEdu successfully offers a frame of reference that is readily applied to international, regional and local initiatives to inform educational policymakers and practitioners in their efforts to enable innovation in the integration of digital tools and skills and emphasises digital competence as an essential professional competence for educators to be able to create learning experiences that respond to the continuously growing digital skill set.

Therefore, this study applies the DigCompEdu framework to the case of Lebanese schools and teachers in order to examine the standards set by the MEHE and the practice of schoolteachers in Lebanon.

Purpose statement, research questions and hypothesis statements

This study aims to examine the needs of Lebanese schools in regard to digital competences. It endeavours to do so by looking into schoolteachers' digital competences as compared to the MEHE standards, analysed against the DigCompEdu framework. This study attempts to answer the following research questions:

1. What are the levels of digital competences practiced by schoolteachers?
2. How do the teachers' competences align with the ministry of education standards?

Methods

This section presents the method used to design the study and the procedure followed to collect data. First, it explains the rationale for the study design and the use of data collection approach. Second, it gives a concise breakdown of the participants. Third, it briefly describes the instruments used for qualitative and quantitative data collection.

Study design

This study follows a *cross-sectional descriptive* design. The primary goal of *descriptive* design studies is to describe the state of a social phenomenon or reality at a specific point in time or over an extended period of time. As opposed to observational studies, descriptive studies do not attempt to examine or establish causality although they may make use of similar sources of data (Jann & Hinz, 2016). This study attempts to give an account of the reality of Lebanese schools, describing the digital competences of teachers and the needs of schools. Since the temporal dimension of the study is limited to examining this reality at a specific point in time, it is considered to be *cross-sectional* (Jann & Hinz, 2016; Spector, 1981).

Participants

The survey participants were 170 in-service teachers in Lebanese schools, 140 females and 30 males. The number of teachers teaching at public schools was 34 (3 males

and 31 females) and of those teaching in private schools was 136 (27 males and 109 females).

The sample included teachers in a variety of fields, including early childhood, languages, humanities, sciences and mathematics, arts and others. Eighty of these teachers started using digital tools and resources only after the COVID-19 pandemic (see Table 2).

Instruments

This study used the DigCompEdu CheckIn self-reflection tool, which constitutes 22 competences organised in six areas corresponding to those of the DigCompEdu framework, as well as a section that includes data related to demographics and the work environment. The 22 competences are measured through 22 items, each having 5 options based on the complexity of the proposed activities. Below is a sample item from the questionnaire, targeting the competence of Professional Collaboration under the area of Professional Engagement. The item is designed to measure not only the frequency of using the competence but also the complexity of its practice. The answers are assigned an increasing score from 1 to 5.

I use digital technologies to work together with colleagues inside and outside my educational organisation

- ◦ I **rarely** have the opportunity to collaborate with other academics
- ◦ **Sometimes** I exchange materials with colleagues, e.g. via e-mail
- ◦ **Amongst colleagues**, we work together in **collaborative environments** or use shared drives
- ◦ I exchange ideas and materials, also with academics **outside my organisation**, e.g. in an online professional network
- ◦ I **jointly create** materials with other academics in an **online network**

The questionnaire was prepared on Microsoft Forms. It was then piloted by sending it to 11 expert teachers and receiving feedback. The survey was then conducted, and data were collected over a period of 2 months with 170 respondents.

Table 2. Breakdown of survey participants.

Competence Type	Number	Percentage
Gender		
Female	140	82.35
Male	30	17.65
School type		
Public	34	20.00
Private	136	80.00
Years of teaching experience		
1–3 years	20	11.76
4–5 years	18	10.59
6–9 years	32	18.82
10–14 years	37	21.77
15–19 years	28	16.47
20 or above	32	18.82
Not specified	3	1.77

Results

This section presents the descriptive and inferential analysis of the data collected. The aim of this study was to examine the needs of school by examining schoolteachers' digital competences and standards set by the Lebanese ministry of education. The first set of data, that of the schoolteachers, was collected using the DigCompEdu CheckIn Self-reflection tool. The quantitative data collected were analysed using R software. As for the ministry standard criteria related to teachers' digital competence, each criterion was matched with the most relevant competence presented by the DigCompEdu.

The first research question sought to study the levels of competences of schoolteachers. The means, in Table 3, reveal that the highest level of competence is practiced in the area of digital resources (Mean 4.065) with managing, protecting and sharing digital resources scoring the highest (Mean 4.441). On the other hand, the lowest level of competence is in the area of facilitating learners' competences (Mean 3.486), but the standard deviation for this area is the highest, which indicates a relatively higher variation in the levels of competences in this area. A significantly low Mean is 2.988 for the competence to promote learners' collaborative learning through digital tools.

In the Professional dimension, whilst organisational communication (Mean 4.024) and self-reflection (4.182) are relatively advanced, school teachers exhibited less proficiency in using digital tools and media for collaboration within the organisation (Mean 3.851) and in the involvement with digital continuous professional development (Mean 3.476).

In the Pedagogic dimension, teachers showed higher proficiency in the handling of digital resources (Mean 4.065) than in the other areas, which include Teaching and Learning (Mean 3.597), Assessment (3.567) and Empowering Learners (3.706). A noteworthy disparity between competences is in the Teaching and Learning area, where teachers scored significantly higher in using digital resources for instructional purposes (Mean 4.312), but they showed lower proficiency in using digital tools to provide guidance (Mean 3.988), promote self-regulated learning (3.100) and especially enhancing collaborative learning (Mean 2.988).

The lowest score was in the dimension of learners' competences (Mean 3.486). Whilst teachers attested to their ability to teach learners how to responsibly use digital resources, they did not show a similar proficiency in facilitating learners' information and media literacy (Mean 3.488), digital communication and collaboration (Mean 3.147), digital content creation (3.153) and digital problem solving (3.629).

The Chi Square Goodness of Fit analysis (Table 4) was done to compare the expected responses to the actual responses. The analysis shows that the results are significant with a p value of <0.001 for all competences. Therefore, the sample results for all competences and competence areas are representative of the population.

The second research question sought to investigate how schoolteachers' competences align with the standards of the Ministry of Education. To do that, the teacher-related indicators were mapped to the DigCompEdu areas of competence in Table 5. Each indicator is linked to the DigCompEdu digital competence that best corresponds to it with the means and standard deviations for the schoolteachers. This clearly indicates the extent to which each standard indicator is being practiced at schools.

The Ministry of Education standard indicators predominantly map to two areas of digital competences, namely, Facilitating Learners' Digital Competence (Area 6) and

Table 3. Means & SDs of schoolteachers' digital competences.

Competence Type	Competence area	Specific Competence	Mean per competence	SD per competence	Mean per area	SD per area
Professional competences	1. Professional engagement	1.1 Organizational communication	4.024	0.954	3.883	1.031
		1.2 Professional collaboration	3.851	1.144		
		1.3 Reflective practice	4.182	0.895		
		1.4 Digital continuous professional development	3.476	1.110		
Pedagogic competences	2. Digital resources	2.1 Selecting digital resources	4.200	0.901	4.065	0.972
		2.2 Creating and modifying digital content	3.553	1.136		
		2.3 Managing, protecting and sharing digital resources	4.441	0.856		
	3. Teaching and learning	3.1 Teaching	4.312	0.786	3.597	1.046
		3.2 Guidance	3.988	0.967		
		3.3 Collaborative learning	2.988	1.182		
		3.4 Self-regulated learning	3.100	1.195		
	4. Assessment	4.1 Assessment strategies	3.294	1.075	3.567	1.095
		4.2 Analysing evidence	3.841	1.095		
		4.3 Feedback and planning	3.565	1.114		
	5. Empowering learners	5.1 Accessibility and inclusion	3.853	1.102	3.706	1.081
		5.2 Differentiation and personalization	3.347	1.147		
		5.3 Actively engaging learners	3.918	0.988		
Learners' competences	6. Facilitating learners' digital competence	6.1 Information and media literacy	3.488	1.208	3.486	1.184
		6.2 Digital communication and collaboration	3.147	1.180		
		6.3 Digital content creation	3.153	1.207		
		6.4 Responsible use	4.012	1.182		
		6.5 Digital problem solving	3.629	1.145		

SD = Standard Deviation.

Table 4. Chi square analysis of schoolteachers' digital competences.

Competence area	Competence	χ^2	df	*P*
1. Professional engagement	1.1 Organizational communication	119.55	4	<0.001
	1.2 Professional collaboration	94.18	4	<0.001
	1.3 Reflective practice	96.65	4	<0.001
	1.4 Digital continuous professional development	63.65	4	<0.001
2. Digital resources	2.1 Selecting digital resources	42.77	4	<0.001
	2.2 Creating and modifying digital content	127.06	4	<0.001
	2.3 Managing, protecting and sharing digital resources	38.53	4	<0.001
3. Teaching and learning	3.1 Teaching	219.59	4	<0.001
	3.2 Guidance	156.94	4	<0.001
	3.3 Collaborative learning	89.94	4	<0.001
	3.4 Self-regulated learning	29.00	4	<0.001
4. Assessment	4.1 Assessment strategies	20.88	4	<0.001
	4.2 Analysing evidence	51.77	4	<0.001
	4.3 Feedback and planning	60.77	4	<0.001
5. Empowering learners	5.1 Accessibility and inclusion	40.71	4	<0.001
	5.2 Differentiation and personalization	69.82	4	<0.001
	5.3 Actively engaging learners	35.77	4	<0.001
6. Facilitating learners' digital competence	6.1 Information and media literacy	81.82	4	<0.001
	6.2 Digital communication and collaboration	32.00	4	<0.001
	6.3 Digital content creation	25.71	4	<0.001
	6.4 Responsible use	23.94	4	<0.001
	6.5 Digital problem solving	99.12	4	<0.001

Assessment (Area 4), and the least mapped area is Professional Engagement (Area 1) with only one indicator relating to digital professional development (see Table 5).

Discussion

This section seeks to interpret the findings presented in the previous section in order to answer the research questions.

In answering the first research question about the levels of digital competences practiced by schoolteachers, the findings of the survey study depicted in the Results section (see Table 3) show that the competence that schoolteachers mostly use at schools is the handling of digital resources. The weight in this competence area is on selecting digital resources for teaching purposes and managing, protecting and sharing those resources, with less emphasis on creating digital resources. Therefore, in terms of digital resources, schoolteachers lack sufficient competence in designing digital resources that meet the needs of their classrooms. Studies (Colás et al., 2019; Hill & Hannafin, 2001; Maiier & Koval, 2023; Wahyuningsih et al., 2021) highlight the significance of teachers creating their own digital content in teaching as a means to impart their digital skills to students more extensively. Hence, teachers ought to create their own digital materials and content as part of their teaching strategies, aiming to foster their students' digital competence and transformation. The lack of adequate proficiency in creating digital resources in this study matches similar studies in Turkey (Reisoğlu & Çebi, 2020), Ukraine (Maiier &

Table 5. Mapping MEHE standard indicators with schoolteachers' competences with means and SDs.

MEHE standard indicator	DigCompEdu competence	Mean	Standard deviation
2.1.f. Engaging in professional development trainings in digital teaching & learning strategies	1.4 Digital CPD	3.476	1.110
2.2.c. Identifying digital teaching strategies that meet learners' needs	3.1 Teaching	4.312	0.786
2.2.f. Managing, storing and sharing digital resources and making them available to learners	2.3 Managing, protecting & sharing	4.441	0.856
2.2.i. Using digital assessment strategies to monitor learners' progress	4.1 Assessment strategies	3.294	1.075
2.2.k. Preparing reports and analysing assessment data	4.2 Analysing evidence	3.841	1.095
2.2.m. Providing feedback to learners	4.3 Feedback & planning	3.565	1.114
3.1.d. Promoting learners' active participation and motivation to communicate and learn	5.3 Actively engaging learners	3.918	0.988
3.2.a. Promoting learners to communicate with peers and with teachers through collaborative activities.	3.3 Collaborative learning	2.988	1.182
3.2.e. Empowering learners to use digital tools for research and problem-solving.	6.5 Problem solving	3.629	1.145
3.2.f. Activating learners' engagement through personalization and differentiation of content.	5.2 Differentiation & personalisation	3.347	1.147
3.3.c. Providing opportunities to learners to develop their digital learning community through positive communication with peers and adults	6.2 Communication	3.147	1.180
3.3.f. Promoting digital citizenship and Internet safety	6.4 Responsible use	4.012	1.182
4.1.e. Using academic integrity indicators to promote credibility of student work	6.1 Information & media literacy	3.488	1.208

SD = Standard Deviation; MEHE = Ministry of Education & Higher Education; Digital CPD = Digital Continuous Professional Development.

Koval, 2023), Germany (Riepl, 2020) and Indonesia (Wahyuningsih et al., 2021), where the findings assert that most teachers need further training in how to effectively design their own digital content. The DigCompEdu model (European Commission et al., 2017) links the competence of professional collaboration to the competence of creating digital competence. Indeed, the findings here confirm the link. This study showed a relatively low proficiency in professional collaboration in digital tools, and this may be part of the reason why teachers are less competent when it comes to designing their own resources.

It is worth noting that the schoolteachers' competences in the areas of Teaching & Learning and Assessment are not very high. These areas constitute the heart of Pedagogic Competences and are probably the most directly relevant to the instructional process. Schoolteachers seem to be most significantly lacking in promoting collaborative learning and self-regulated learning through the use of digital tools and resources.

On the other hand, the lowest level of competence is in promoting learners' digital competence. Overall, schoolteachers seem to be more skilled at using digital tools

and resources themselves than transferring that skill to their students. Therefore, schoolteachers seem to be less competent at promoting their students' information and media literacy, and the use of digital tools for communication, collaboration and problem solving. In this area, the significantly low competences are related to teachers' facilitation of communication and collaboration amongst learners and promotion of content creation by learners. The DigCompEdu model (European Commission et al., 2017) again states predictors for these two competences, which are confirmed by the results of this study. It establishes a link between promoting self-regulated learning, actively engaging learners and enabling learners to create digital content. In other words, when teachers support self-regulated learning, learners will be empowered to be more engaged in digital learning. This engagement will lead them to create their own personalised digital content. This study clearly shows low proficiencies in all three competences. The relatively low proficiency of teachers in promoting self-regulated learning has subsequently led to a significantly low proficiency of facilitating content creation by learners. Another similar link that the model establishes is between the competence of collaborative learning in the Teaching and Learning area and the competence of communication and collaboration in the Facilitating Learners' Digital Competence area. This is also evidently confirmed by the findings of the study and other similar studies (Benali et al., 2018).

The lowest proficiency exhibited by the teachers in this study was in the competence of promoting collaborative learning in digital contexts. This has unsurprisingly led to a very low proficiency in their ability to facilitate learners' digital communication and collaboration. Undoubtedly, the lack of sufficient proficiency in these two competences, promoting learners' digital content creating and their digital communication and collaboration, has contributed to the area of Facilitating Learners' Digital Competence being the most lacking. This is worth noting in this study because the MEHE standards seem to be most focused on this specific area.

To answer the question on the alignment between the MEHE standards and the actual competences of schoolteachers, the standard indicators were mapped to the DigCompEdu framework. This enables interpreting the findings of the survey study for schoolteachers' competences in light of these standards.

A first look at the findings reveals that all MEHE indicators are met by the practice of schoolteachers at schools. A closer look shows that there is a special emphasis by the MEHE standards on the areas of Facilitating Learners' Competences and Assessment. There is little emphasis, on the other hand, on the competences handling of digital resources and digital professional engagement. Therefore, the ministry expects schools to create environments that promote learners' digital competences and provide a digital system that facilitates the assessment process. Again, the indicator that is least met by schoolteachers' practice is promoting learners' communication with peers and with teachers through collaborative activities. Obviously, there is much need for training to schoolteachers in using digital tools and resources to promote collaboration in the learning process, which is confirmed by several studies (García-Valcárcel & Mena, 2016; Reisoğlu & Çebi, 2020; Rubio-Gragera et al., 2023).

A limitation in this study was the disparity in the number of participants between private and public schools, which was the result of a combination of factors. It is estimated that 56% of all teachers in Lebanon work at private schools (Hammoud & Shuayb, 2022). Also, the data for this study were collected during the academic years 2021–2022 and 2022–2023, during which most public schools barely opened their

doors for students and teachers due to the economic crisis, resulting in a shortage of textbooks, printed material and other basic needs on the one hand, and in continuous teachers' strikes on the other. Even when public schools opened their doors, many teachers refused to return to their jobs because their salaries had lost 90% of their value (El Dahan & Creidi, 2021; Houssari, 2022; HRW, 2021; Khurma, 2023).

However, considering the fact that private schools generally have more resources and their teachers are better equipped in digital competences, this limitation does not constrain the implications of the study findings. The competence gaps found in this study should sufficiently reflect the requirements of both private and public educators. Therefore, this study findings have the potential to guide LERSAP's objective related to the digital professional development of teachers. This study helps identify the areas where teachers need support to develop adequate digital literacy and, thus, informs national educational strategists and teacher training programs in Lebanon to focus on:

- Training teachers in strategies to organise learning material to be used in digital resources and skills to use digital tools effectively to create these resources.
- Empowering teachers for digital collaboration with other teachers in order to enhance their skills of designing digital content and resources.
- Preparing teachers to promote self-regulated learning strategies and providing them with the tools and skills to do it digitally as well.
- Most importantly, equipping the teachers with a varied set of skills and tools that enhance learners' collaborative learning in digital contexts.

These steps will ultimately facilitate learners' own digital competence, especially in creating their own digital resources and collaborating with their peers.

Conclusion

To conclude, this study addressed two research questions on (1) the digital competences of schoolteachers and (2) the alignment between the MEHE standards and schoolteachers' competences.

This survey study showed that schoolteachers lack sufficient competence in designing digital resources that meet the needs of their classrooms, and they seem to be less competent at promoting their students' information and media literacy, and the use of digital tools for communication, collaboration and problem-solving. The mapping of MEHE standards to the DigCompEdu framework revealed that schoolteachers' practice meets all MEHE indicators, but there is a significant need for training to schoolteachers in using digital tools and resources to promote collaboration in the learning process.

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