

Digital competence of Moroccan teachers of English

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ABSTRACT

During recent years, digital competence has become a major concept in the discussion of which skills people should have in the knowledge society. Teachers' digital competence is becoming a key element for the construction of useful pedagogical knowledge for practice and improvement of students' learning.

This paper presents the results of a research based on the adaptation of the Competence Framework for the Digital Competence of Educators (DigCompEdu) to explore, in a case study with 160 Moroccan English teachers, how they perceive their digital competences.

In general, the statistics show a good distribution of competence levels across our subjects of study. The competences that had the highest mean scores are: selecting digital resources, teaching and reflective practice. Teachers with a higher level of digital teaching confidence and those with more years of teaching experience are more likely to have higher digital competence scores.

The critical competences with low average scores like digital assessment strategies, differentiation and personalization, self-regulated learning and facilitation of learners' digital content seem to be more advanced and need rethinking the official teachers' professional development.

Keywords: *Competence, Digital, DigCompEdu, Framework, Teachers, Learning.*

INTRODUCTION

The proliferation of mobile technologies such as smartphones and tablets has changed the way people live, communicate, interact, learn, and generate new knowledge. As a result, today's citizens require a range of new knowledge and know-how in the form of skills which they must acquire and develop in order to effectively participate in modern society (Aguaded, 2012). The educational movement to integrate technology into learning has been highlighted as a priority for the current generation of learners (Ertmer & Ottenreit-Leftwich, 2010; Sadik, Sendurer & Sendurer, 2012).

In general, the teaching profession is facing regular challenges and demands, which require a new broader and more sophisticated set of competences than before. The large ubiquity of digital devices and applications requires educators to develop and reinforce their digital competence. The strategic importance of providing digital education should be identified because the skills of the teachers are reflected on the students. The OECD notes: "Teachers have not yet become good enough at the kind of pedagogies that make most of technology" (Schleicher, A. 2016).

Krumsvik (2011) suggests that digital competence is the teacher's proficiency in using ICT in a professional context with good pedagogic-didactic judgement and his or her awareness of its implications for learning strategies and the digital "Bildung" of pupils and students.

For UNESCO, digital competence of teachers means the ability to help students become collaborative, creative and problem-solving learners through the use of ICT so they will be effective citizens and members of the workforce (UNESCO, 2011, p. 3).

Teachers have to be able to integrate pedagogic skills with digital skills and utilize these skills in practice. Research suggests that the better trained a teacher is in the use of technology, the more likely it is that they will be able to successfully integrate ICT into their teaching delivery (Hsu, 2010). Teachers must change as the curriculum evolves with the needs of the 21st century. The curriculum of the 20th century was subject-based and weighted towards memorising facts. Whereas modern curriculum is now being injected with new 21st century skills and competencies that can only be taught through exploration, practice, and feedback (Misk Foundation, 2017). Therefore, the role of teachers and the systems around them must be reinvented.

On international levels, there is consequently considerable interest in equipping teachers with the necessary competences to fully exploit the large potential of information and communication technologies for enhancing teaching and learning and for adequately preparing their students for life and work in a digital society. Teacher training is a key element for the effective development of students' digital competences to enable them to use technology appropriately and effectively (Aslan & Zhu, 2015; Gisbert & Lázaro, 2015; Woodruff, Martin, & O'Brien, 2015). Many countries are currently in the process of developing or revising frameworks, self-assessment tools and training programs to guide teacher training and continuous professional development in this area.

In 2017, the ICT Development Index (IDI) elaborated by the International Telecommunications Union (ITU) in measuring the Information society shows that Morocco has the lowest ICT skills sub-index in North Africa. This sub-index includes three proxy indicators (adult literacy, gross secondary enrolment and gross tertiary enrolment). Our review of the literature revealed also that, in Morocco, there is a scarcity, if not an absence, of studies related to digital competence of teachers and learners. Therefore, the present study is an attempt to fill this gap. The results of the proposed study have the potential to give an image about digital competences of Moroccan teachers' perception and their satisfaction level of how they use these competencies.

Digital competence is influenced by personal factors (e.g. attitudes towards the use of ICT) and context (e.g. curricula requirements, years of teaching, infrastructure). Objectively assessing it calls for an assessment strategy that explores many variables. Self-confidence in terms of ICT use, teaching experience and gender are among the factors whose relationship with digital competence will be explored in this study.

To this end, the present article tries to answer the following research questions:

- What are the self-perceptions of Moroccan teachers about their level of digital competences?
- Is there any relationship between digital teaching confidence, years of teaching experience, gender and the self-perceptions of Moroccan teachers regarding their level of digital competences?

THEORETICAL FRAMEWORK

Balanskat & Garoia (2010) points out that teachers' professional communities as well as researchers and education policy makers are aware that teachers need to be trained and assessed in digital competence that goes beyond functional skills or information literacy. Many teacher professional development programs cover pedagogical ICT targets as opposed to basic

ICT functional knowledge, even if those targets are still described in a very general way and pedagogical digital competence is still a working concept for educational research.

Illomäki, Kantosalo & Lakkala (2011) claim that the topic of digital competence was poorly developed in the existing frameworks and also in theoretical research. Indeed, technological-pedagogical competence of teachers was emphasized as teachers' ability to apply technology in their pedagogical practices, but mostly in a static and traditional way, demonstrating that digital technologies were not considered as means for more comprehensive transformation of pedagogical practices or educational objectives. The assessment of technology-enhanced teaching competence is also a new area and there are few exemplars against which teachers can gauge their progress.

The Technological Pedagogical Content Knowledge Model (TPACK) established by Mishra and Koehler in 2009 identifies teacher's digital competence as the intersection of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). This framework is interesting as it highlights the fact that the digital competences of teachers may differ according to the subject taught.

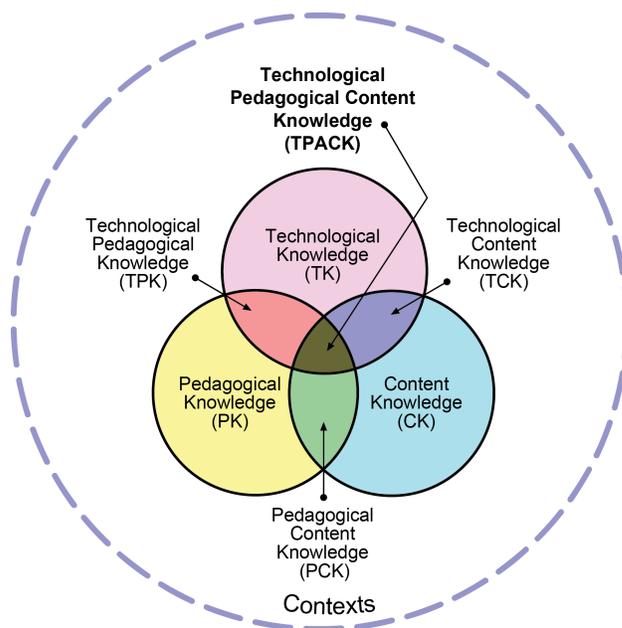


Figure 1: TPACK model. Source: <http://tpack.org/>

The UNESCO ICT competency standard for teachers (2011) is an attempt to identify pedagogical digital competence. This framework articulates the competence in six areas (understanding ICT in education, curriculum and assessment, pedagogy, ICT, organization and administration, teacher professional learning). Three levels of competency are defined:

- Technology literacy, related to technological competence,
- Knowledge Deepening, related to the capacity to apply technology in real problem-solving
- Knowledge Creation, related to the capacity to use technology to produce new knowledge.

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANIZATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organizations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

Figure 2: UNESCO ICT-Competence Framework for Teachers (2011)

The European Commission's Joint Research Centre (JRC) published in November 2017 a framework for the Digital Competence of Educators (DigCompEdu). This framework is directed towards educators at all levels of education, from early childhood to higher and adult education, including general and vocational education and training, special needs education and non-formal learning contexts. The focus of the framework (Figure 3) is not on technical skills. Rather, it explains how digital technologies can be used to enhance and innovate training, teaching, learning and assessment.

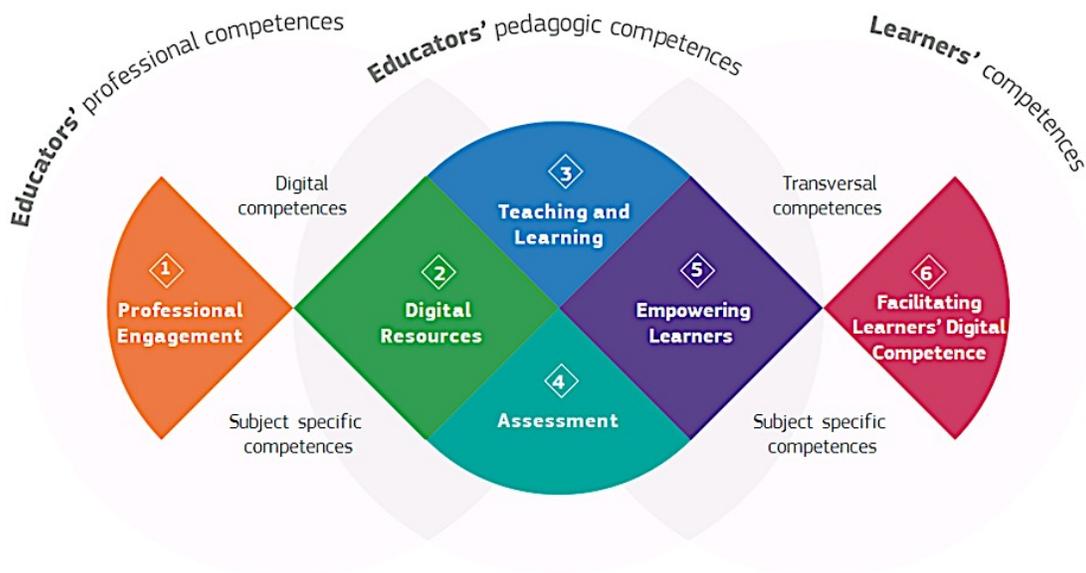


Figure 3: DigCompEdu conceptual framework - Source: Redecker (2017)

DigCompEdu details 22 competences (Figure 4) organised in six areas focusing on different aspects of educators’ professional activities.

1. Professional Engagement	2. Digital Resources	3. Teaching and Learning <i>Using digital technologies to enhance & innovate</i>	4. Assessment <i>Using digital technologies to enhance & innovate</i>	5. Empowering Learners <i>Using digital technologies to empower learners by facilitating:</i>	6. Facilitating Learners' Digital Competence
1.1 Communication	2.1 Selecting	3.1 Teaching	4.1 Assessment strategies	5.1 Accessibility & inclusion	6.1 Information & media literacy
1.2 Professional collaboration		3.2 Guidance			6.2 Communication
1.3 Reflective practice	2.2 (Co-)creating	3.3 Collaborative learning	4.2 Analysing evidence	5.2 Differentiation & personalisation	6.3 Content creation
1.4 Continuous professional development (CPD)		3.4 Self-regulated learning			4.3 Feedback & planning
	2.3 Managing				6.5 Problem solving

Figure 4: DigCompEdu areas of competences - Source: Redecker (2017)

The DigCompEdu framework distinguishes 6 different, progressively advancing competence levels, aligned with the Common European Framework of Reference (CEFR) language competence levels. Within the framework, these levels (Figure 5) are designed to describe typical stages and roles educators pass through when integrating digital technologies into their professional practices.

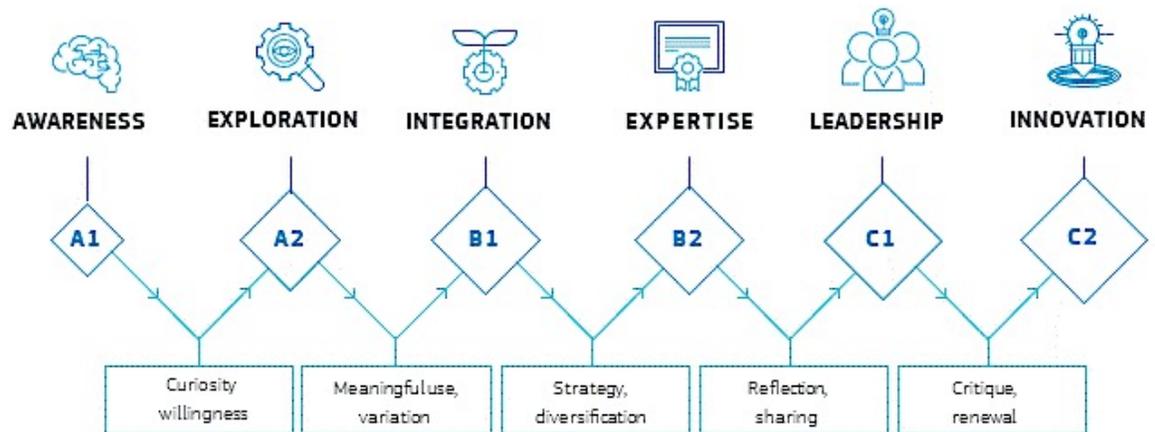


Figure 5: DigCompEdu progression model- Source: Redecker (2017)

Newcomers (A1): The teacher has not yet really started using digital technologies in teaching.

Explorers (A2): The teacher is aware of the potential of digital technologies and is interested in exploring them to enhance pedagogical and professional practice. The teacher has started using digital technologies in some areas of digital competence without, however, following a comprehensive or consistent approach.

Integrators (B1): At this level, the teacher experiments with digital technologies in a variety of contexts and for a range of purposes, integrating them into many of his practices. The teacher creatively uses them to enhance diverse aspects of his professional engagement. The teacher is eager to expand his repertoire of practices. However, The teacher is still working on understanding, which tools work best in which situations, and on fitting digital technologies to pedagogic strategies and methods.

Experts (B2): teacher uses a range of digital technologies confidently, creatively and critically to enhance your professional activities. He purposefully selects digital technologies for particular situations, and try to understand the benefits and drawbacks of different digital strategies. Teachers are curious and open to new ideas, knowing that there are many things he has not tried out yet.

Leaders (C1): teacher has a consistent and comprehensive approach to using digital technologies to enhance pedagogic and professional practices. The teachers rely on a broad repertoire of digital strategies from which he knows how to choose the most appropriate for any given situation. The teachers continuously reflect on and further develop his practices. Exchanging with peers, the teacher keep updated on new developments and ideas. The teacher is a source of inspiration for others, to whom he pass on his expertise.

Pioneers (C2): teacher belongs to an extremely unique and rare species. The teachers question the adequacy of contemporary digital and pedagogical practices, of which he is a Leader. He is concerned about the constraints or drawbacks of these practices and driven by the impulse to innovate education even further. The teacher experiment with highly innovative and complex digital technologies and/or develop novel pedagogical approaches. The teacher lead innovation and is a role model for younger teachers.

Passing to the next stage typically requires a set of actions characteristic for this step. For example, to move from the second stage, Explorer (A2) to the third stage, Integrator (B1), educators typically need to amplify their repertoire of digital strategies. However, to move from the Integrator (B1) to the Expert (B2) stage, instead of an increase in variety, a more strategic and systematic approach is needed.

It's emphasized that for educators it is not important to aim for mastery at C2 level. It makes clear that only very few teachers will be competent at C2-level and that those competent at C1 level are already leaders in their field. What is important for educators, however, is to continuously work on their competences and aim to further expand them to, at least, become, and then remain, an Expert (B2).

In our study, DigCompEdu has been preferred, as a framework, to other frameworks, because, as stated by the European Commission Joint Research Center, the framework is the result of a series of discussions and deliberations with experts and practitioners based on an initial literature review and the synthesis of existing instruments on local, national, European and international levels. DigCompEdu synthesizes all existing models and instruments into one generic framework as a common frame of reference.

METHODOLOGY

Research design

In order to gauge digital competences of our subjects, we may consider making some observations of their digital practices in different academic situations or submitting specific tasks to our sample in which they will have to use ICTs. In the context of our research, the implementation of both approaches is difficult to achieve, since, on the one hand, the observation is difficult to put in place because it assumes that the researcher finds a way to observe and study digital practices of the research subjects without altering them, but on the other hand, the experimental approach will give only a partial idea of the digital competences of the sample.

Another option of assessing teachers' digital competence is the use of a self-assessment tool. At this point, teachers using a self-assessment tool need to have a certain level of self-efficacy (including ICT use) in order to function independently. Despite numerous studies on the weaknesses of self-assessment in terms of its subjectivity (participants over- or underestimating their real competence), there is a notable paucity of studies that examine the self-assessment of teachers' digital competence (Maderick et al. 2015).

Given the aims of the study, the methodology proposed is quantitative and descriptive. Such a design is most appropriate for this study since it allows for the investigation of relationships among variables.

The "DigCompEdu CheckIn" self-reflection survey tool is used to collect the information sought after an adaptation to the Moroccan educational context. Indeed, some of the questions have been reformulated and paraphrased in our own words, many demographic questions were added on age, gender, years of teaching experience, personal digital equipment, confidence of using digital technologies in the classroom and at home. The questionnaire comprised also 22 items organised in six sections assessing teachers' digital competence.

The content of the DigCompEdu CheckIn tool was migrated to a google survey form for the testing with Moroccan teachers and then disseminated via two professional networks of English teachers, encouraging them to share the link through their networks. The geographical location of teachers and teaching levels have been taken in consideration. Responses were collected between March and April 2018.

The data collected were put into Statistical Package for Social Science 22.0 (SPSS 22.0) and coded. Then, a series of statistical techniques were processed to generate descriptive and inferential statistics.

Survey tool

The DigCompEdu Check-In instrument (see Appendix) is presented to participants with one concrete action statement per DigCompEdu competence, i.e. 22 statements in total. For each of these statements participants are asked to indicate to which extent this statement reflects their own practices, by selecting one of five options. The five answer options are organised progressively, from "No: I do not do this at all" to "Yes: I do this comprehensively". Depending on the concrete item, more information is provided in the answer option as to what, for example, a sample survey item would comprise:

I use digital technologies to allow learners to monitor their learning themselves.

E.g. using quizzes or surveys for self-assessment, ePortfolios for showcasing, online diaries for reflection...

- Not at all:** My learners do not monitor their own learning
- Not really:** My learners monitor their own learning, but not with digital technologies
- Sometimes** I use quizzes for self-assessment
- Yes,** I use **different digital tools** for learners to monitor their learning
- Yes,** I follow a **structured approach** integrating different digital tools to allow learners to monitor and reflect on their progress

The scoring rule for the instrument allocates 0 point to the lowest answer option, 1 to the second lowest, and so on, so that the maximum number of points per question is 4. The maximum total number of points is 88.

For the calculation of the DigCompEdu competence level, an aligned scoring rule with Common European Framework of Reference (CEFR) language competence levels was developed by the European Commission Joint Research Center. The starting point is the observation that a person whose competence would centre around the "Somewhat" answer option, i.e. obtaining a score of 44, would have to be considered an Integrator (B1); a person consistently choosing the simple "Yes" option, e.g. scoring 66, would be at the point of moving from Expert (B2) to Leader (C1); and that the difference between the first two "No" options would roughly correspond to the difference between Newcomers (A1) and Explorers (A2). The scoring of Newcomer (A1) category to scores below 20, the Explorer category (A1) to scores between 20 and 33 (this upper limit corresponding to half of the items selected being "Not really" and the other half "Somewhat"); scores between 34 and 49 are mapped on the Integrator category; scores between 50 and 65 on the Expert (B2) category, thus splitting in equal halves the distance between the upper limit of the Explorer (A2) category and the lower limit of the Leader (C1) category.

Scores between 66 and 80 are attributed to the Leader (C1) level and only those selecting the highest option for at least two thirds of the 22 competences would be qualified Pioneers (C2). It was expected that in actual practice the lowest and the highest competence levels, Newcomer (A1) and Pioneer (C2), would not be obtained by participants.

In order to check the item characteristics and quality, some classical psychometric analyses were used, considering the following statistics: Item-Score correlation, Squared Multiple Correlation and Cronbach's Alpha if Item Deleted. These allow us to check if any item is inconsistent with the average behaviour of the others and consequently to check if the items can be considered for further analysis. It is expected that a respondent who selects the highest category in an item, in general, has higher overall competences than respondents who mark lower categories in an item.

Regarding all the analyses presented here, it is worth keeping in mind that the sample size is very small, considering that the items have 5 categories of responses, and the sample is not representative of the European context. In addition, 2 respondents were excluded from the analysis and 155 responses from teachers were considered for the results presented below.

Table 1 presents the results from the psychometric analyses. Cells highlighted in pink and yellow refer to the items that could be revised and/or improved, as these items have lower levels of discrimination for the competence level of the teachers. The results presented in the table reveal that most of the tool items are appropriate.

Table 1. Item Score correlation, Squared Multiple Correlation and Cronbach's Alpha if Item deleted

#	Item statement	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	I use different digital communication channels for different purposes.	0.455	0.342	0.904
2	I use digital technologies to work together with colleagues inside and outside my school.	0.479	0.376	0.903
3	I continuously reflect on how I can improve my use of digital technologies in teaching and learning.	0.5	0.433	0.903
4	I participate in online training opportunities e.g. online courses, MOOCs, webinars, virtual conferences...	0.477	0.322	0.903
5	I use different internet sites and search strategies to find and select digital resources	0.336	0.336	0.906
6	I create my own digital resources and modify existing ones to adapt them to my needs	0.492	0.441	0.903
7	I effectively protect sensitive content, e.g. exams, students' grades.	0.405	0.319	0.905
8	I carefully consider how, when and why to use digital technologies in class, to ensure that they are used with added value.	0.578	0.525	0.901
9	I monitor learners' behaviour and engagement in the collaborative digital environments I use.	0.549	0.456	0.901
10	When my students work in groups or teams, they use digital technologies to generate and document evidence.	0.626	0.499	0.9
11	I use digital technologies to allow learners to monitor their learning themselves	0.658	0.583	0.899
12	I use digital assessment formats to monitor student progress .	0.55	0.486	0.902
13	I reflect on the digital and non-digital evidence I have on learners' behaviour and progress to better understand individual problems.	0.477	0.401	0.903
14	I use digital technologies to provide effective feedback and help students understand their learning needs.	0.602	0.506	0.901
15	When I create digital assignments for learners I consider and address problems they may have with the digital format	0.569	0.493	0.902
16	I use digital technologies to provide my students personalised learning opportunities	0.622	0.501	0.9
17	I use digital technologies to more actively involve learners.	0.546	0.46	0.902
18	I teach learners how to check if information is reliable and to identify fake news.	0.496	0.467	0.903
19	I set up assignments which require learners to use digital means to communicate with each other or with an outside audience.	0.595	0.462	0.9
20	I set up assignments which require learners to create digital content (E.g. videos, audios, photos, digital presentations, blogs, wikis...).	0.572	0.489	0.901

#	Item statement	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
21	I teach learners how to behave safely and responsibly online.	0.598	0.49	0.9
22	I encourage learners to use digital technologies creatively to solve concrete problems.	0.522	0.413	0.902

After checking the properties of the items, an analysis was performed in order to verify how closely related a set of items are as a group. For that purpose, the reliability of the instrument was calculated. Cronbach's alpha was computed to measure the internal consistency of the instrument for the Moroccan sample of teachers. Cronbach's alpha reliability coefficient normally ranges between 0 and 1 and the closer this statistic is to 1.0 the greater the internal consistency of the items in the scale. The internal consistency of the instrument considering all 22 items was $\alpha=0.91$. This indicates that the DigCompEdu CheckIn tool for the Moroccan sample of teachers has an excellent internal consistency. As a robustness check the same kind of analysis was undertaken deleting the worst item of the tool (Item 5) and the internal consistency of the instrument remained excellent.

Sample of the study

This paper is based on a case study of 160 Moroccan English teachers. Reaching of such teachers has been made possible through the support of professional networks of English teachers in Morocco. Ethical approval to conduct the research has been addressed. Participants have been provided with sufficient information about the goals of the study and informed they are free to join or not the research. In order to protect and respect the personal data provided by participants, the survey tool was anonymous.

RESULTS AND DISCUSSION

As concerns the perceived level of digital competence, we are confronted with a rather advanced group of teachers: 51% stated to feel fairly confident and 41% to feel very confident in using digital technologies in the classroom; 41% felt fairly confident and 55% very confident in using digital technologies at home.

There were more male participants (62%) than female participants (38%). All teachers were relatively young: (7%) were 21-25 years old, (16%) were 26-30 years old; (14%) were 31-35 years old. (16%) were 36-40 years old; (15%) were 41-45 years old and (32%) older than 45. 42% of teachers had less than 10 years of teaching experience; 30% had between 10 and 15 years of experience as teachers, and 28% with more than 16 or more years of teaching experience. Put differently, we are confronted with a rather experienced group of teachers, with 80% of teachers having more than 3 years of teaching experience, with the mean, median and mode values falling in the group of teachers with 10 to 15 years of experience.

ICT equipment of the sample of study

Regarding the types of IT equipment used by our sample, the following graph reveals that our respondents are in general very well equipped (Figure 6).

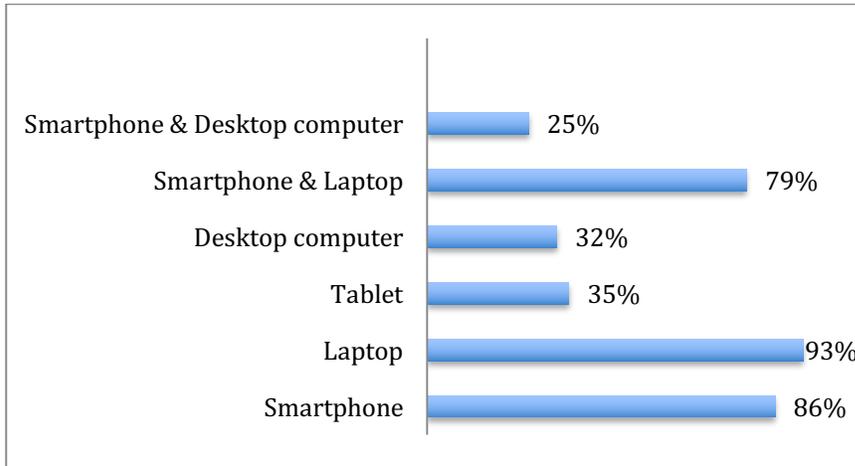


Figure 6: ICT equipment of the sample of study

Participants’ digital competence

Considering the participants' high levels of confidence in using digital technologies in class, it is interesting to see that the group displays a rather comprehensive spread of digital competence levels, when measuring these on the basis of the self-reflection statements employed in the DigCompEdu CheckIn tool (Figure 7). As expected, few participants scored at the lowest or highest level of competence. However, all four core competences levels, Explorer (A2) to Leader (C1), were well represented in the group. In accordance with the design of the scoring rule and its intentions, most participants were classified to be either Integrators (B1) (42%) or Experts (B2) (27%).

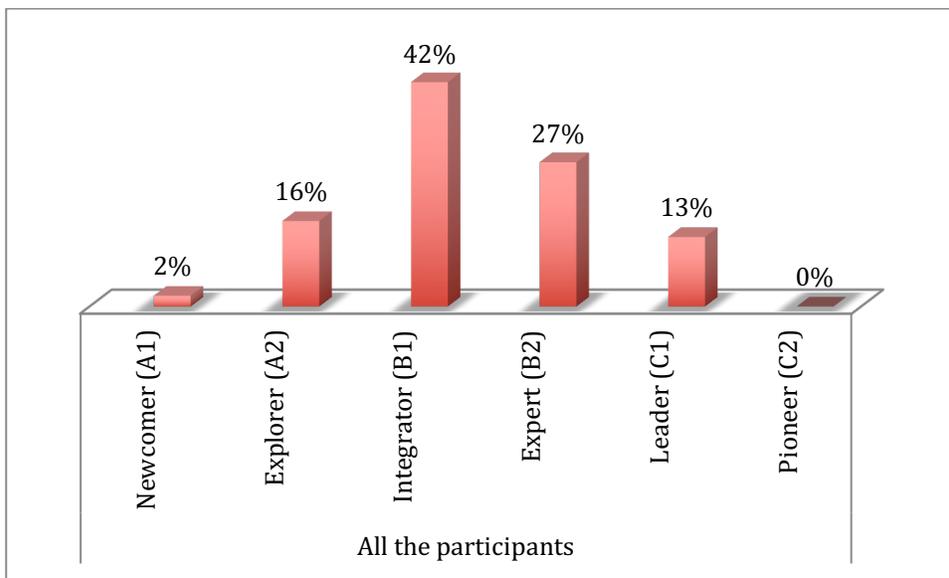


Figure 7: Sample categories

The second outcome (Figure 8) is not only interesting as concerns participants' competence levels, but also allows us to get a first idea of which of the 22 DigCompEdu competences are more difficult, and which are easier to obtain – or for which competences a too ambitious action statement or answer option scale was selected. When we compare the average scores of the different items, we can exclude the second interpretation. There is no single item or group of competence statements that would fall out of the overall assessment scale. As each item allows for five different scores, ranging from 0 to 4, the natural average, if all answer options were equally likely, would be the value 2. We can see in this sample that the overall average value across all 22 competences was 2.04, with average values ranging from 1.41 to 2.98.

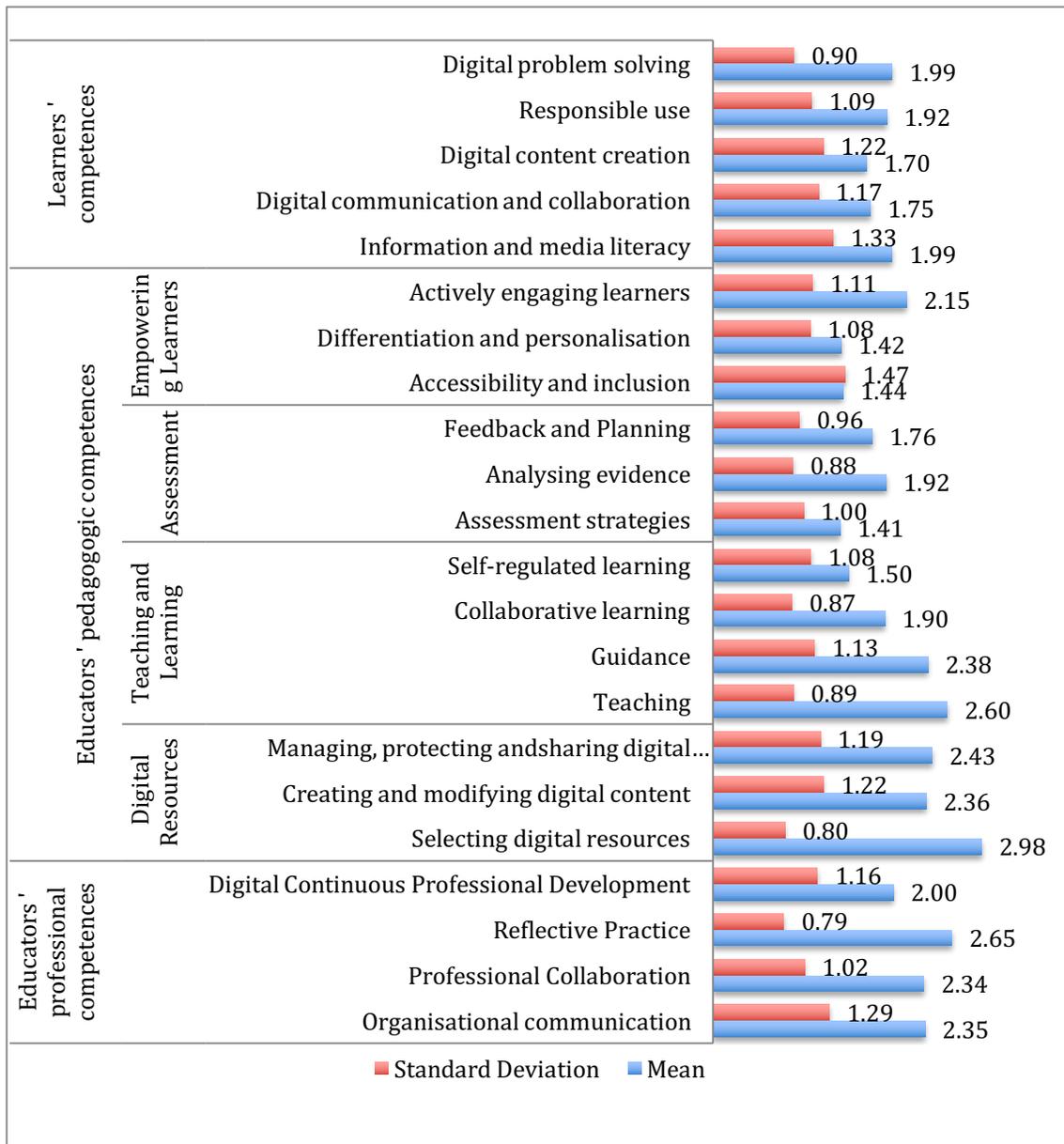


Figure 8: Average scores by competence

When we compare the different competences, this interpretation is further confirmed. Those competences that are more at the core of digital teaching – selecting digital resources, integration of digital resources into teaching, reflective practice – have higher average scores, reflecting the relatively high level of digital confidence and teaching experience in the sample. Critical competences with low average scores are those that are more advanced in the sense that teachers do not tend to focus on them or seriously consider them when starting to explore digital teaching on their own account: digital content creation, digital communication and collaboration, students' self-regulated learning, assessment, accessibility and inclusion, personalisation and students' creative content development.

Teachers' digital competence based on digital teaching confidence

Those who are more comfortable in using digital technologies in the classroom are more likely to have higher DigCompEdu competence levels. The mean score for those stating to feel fairly confident in using digital technologies in the classroom was 40 – a score almost exactly in the middle of the Integrator (B1) point-range; the mean score for those stating to feel very confident was 51, one of the lower values in the Expert (B2) category.

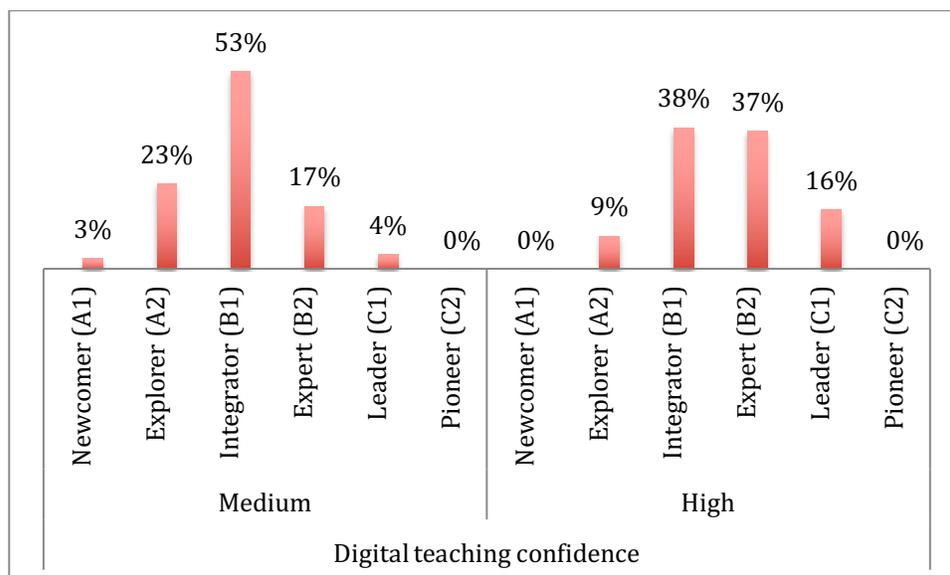


Figure 9: Teachers' digital competence based on digital teaching confidence

Teachers' digital competence based on years of teaching experience

The overall number of years of teaching experience influences teachers' DigCompEdu competence levels. In this sample, DigCompEdu competence levels increase with teaching experience.

Among those with less than 10 years of experience, most had low (A2/B1) levels of competence with 34% at Explorer (A2), 36% at Integrator (B1) level and only 16% Expert (B2), 10% at Leader (C1) level.

Among those with 10 to 15 years of teaching experience, only 5% were at Explorer (A2) and 6% at Leader (C1) level. The vast majority of 56% scored at Integrator (B1) level and 29% at Expert (B2) level.

With those having more than 15 years of experience, the spread of scores widens again: 46% were at Integrator (B1) and 32% were at Expert (B2) levels. When compared to less experienced teachers, there is a higher share of 16% of individuals in the Expert (B2) group and 38% in the Integrator (B1) group.

The mean scores vary correspondingly: In the two less experienced groups, the mean scores are 42 for those with less than 10 years of experience and 44 for those with 10 to 15 years of experience. Both values characterise an Integrator (B1) score. For those with more than 15 years of teaching experience, the mean score rises to 48, close to the entrance score for the Expert (B2) level (Figure 7).

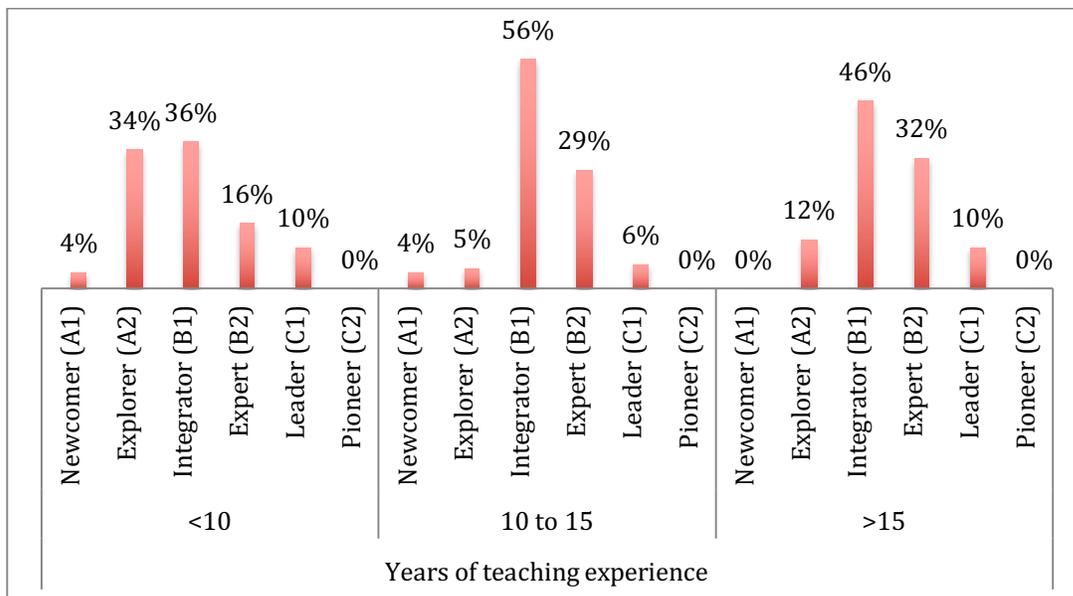


Figure 10: Teachers' digital competence based on years of teaching experience

Teachers' digital competence based on gender

In both sub-sets, the overall competence distribution is in alignment with trends. Where women were under-represented, the competence levels of male and female participants seem to have the same range. In the two groups, the mean scores are 44 for women and 45 for males (Figure 11).

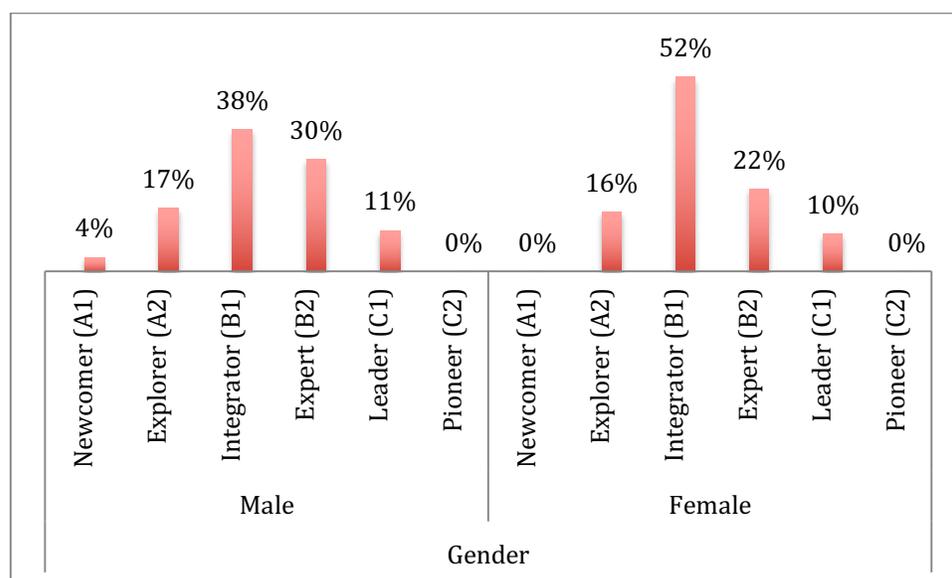


Figure 11: Teachers' digital competence based on gender

IMPLICATIONS OF THE STUDY

Self-assessment of teachers' digital competence is a promising approach to encourage teachers' self-reflection, intrinsic motivation to develop pedagogical digital competencies and more relevant and innovative use of ICT in schools that could have more widespread value.

This study addresses the need, in Morocco's policy, for educators to be able to innovate using ICT and for improved data on their digital competence. It also tackles the need to enhance the uptake of ICT in teaching and learning and to strengthen the professional profile of the teaching profession. In order to achieve this, a real understanding is needed of current approaches to teachers' professional development and their certification, in general, and to digital competence, in particular.

A final and adapted version of DigCompEdu CheckIn tool should be freely available and embedded in national education portals for teachers. It can be also used as a dashboard collecting data on needed training at local, regional and national levels.

CONCLUSION

The fact that the DigCompEdu CheckIn tool delivers a good distribution of competence levels across the sample already indicates that the design of the tool allows for a differentiated assessment. Values are centred across the four major competence categories and the majority of participants obtain a score at the intermediate (B1/B2) level. The calculation of scores and the attribution of competence levels to scores is sound and reflects existing competence levels across an (admittedly very small) population. The fact that teachers with a higher level of digital teaching confidence and those with more years of teaching experience are more likely to score higher further confirms the soundness of the tool.

The question whether such a tool, if it shows such a high level of alignment with teachers' experience and confidence, can provide additional insights and be informative to users can also be confirmed: Not only is there a high variation of scores and competence levels across the group of teachers with similar experience and confidence levels, but there is also a high variation of competence levels across the 22 DigCompEdu competences. The tool is therefore informative to users in both ways: It indicates which overall DigCompEdu competence level they are at and indicates areas of relative strength.

The study reveals several critical competences with low average scores. These competencies are those that are more advanced in the sense that teachers do not tend to focus on them or seriously consider them when starting to explore digital teaching on their own account: Students' self-regulated learning, digital assessment, accessibility and inclusion and personalisation. This finding confirms the need to rethink teachers' professional development and teacher training and focus on coherent approaches to assessment and certification.

LIMITATIONS OF THE STUDY

This study has some limitations which should be acknowledged while interpreting the findings. First of all, the size of the sample of the study. The number of participants is limited (N=160). While this sample may not be representative, it is recommended to repeat the study with a greater number of participants from a range of Moroccan teachers to confirm these initial findings. Moreover, over- or under-reporting of data from the part of respondents may also be a problem and could possibly influence the results of the study. Therefore, this study invites other researchers to broaden the scope of research and investigate more factors that may be of good help in developing digital competences of Moroccan teachers.

We are also aware that throughout this study, we have referred to the teachers' self-perception and not to real data about their level of digital competence. With a view to overcoming this limitation, future research should focus on the design and preparation of a certification tool.

Additionally, in this study only quantitative data were utilized to evaluate teachers' digital competences. Although the quantitative data are informative for evaluation, obtaining qualitative data through others means like interviews and/or observation would definitely have strengthened the obtained results.

Online self-assessment is particularly challenging for two reasons. First, teachers need to have a certain level of self-efficacy in ICT use in order to function independently. Second, there is a risk for participants to over- or underestimate their real competence.

Each teacher is different and differences in prior knowledge, in values and beliefs about teaching and learning circumstances mean that teachers have different professional development needs (Shulman and Shulman, 2004). DigCompEdu CheckIn tool should provide teachers with personalised feedback including a brief explanation and suggestions for how to develop their competences through various types of professional development programs related to national standards and individual needs.

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APPENDIX

DigCompEdu Check In instrument:

Gender

- Male
- Female

Age

- 21-25 years old
- 26-30 years old
- 31-35 years old
- 36-40 years old
- 41-45 years old
- More than 45 years old

Years of teaching experience

- 0-3 years
- 4- 6 years
- 7-9 years
- 10-15 years
- 16-20 years
- More than 20 years

What type of IT equipments do you have? (Please select all that apply.)

- Smartphone
- Laptop
- Tablet
- Desktop computer
- Others...

What best describes your level of technology expertise in your classroom?

- I'm very uncomfortable using technology in my classroom
- I'm fairly uncomfortable using technology in my classroom
- I'm fairly comfortable using technology in my classroom
- I'm very comfortable using technology in my classroom

What best describes your level of technology expertise at home?

- I'm very uncomfortable using technology at home
- I'm fairly uncomfortable using technology at home
- I'm fairly comfortable using technology at home
- I'm very comfortable using technology at home

I use different digital communication channels for different purposes. E.g. E-mail with students; Facebook for general audience; moodle with students; Apps for parent/students' groups, What'sApp with teachers, Skype with students...

- Not at all: I do not use digital communication channels
- Not really: I use the same digital communication channel for everything
- Sometimes I vary communication channels
- Yes, I respect students' preferences
- Yes, I strategically choose between different digital options

I use digital technologies to work together with colleagues inside and outside my school.

- Not at all: I do not use digital technologies to collaborate with other teachers
- Not really: I only use digital technologies to collaborate with teachers inside my school
- Sometimes I exchange materials with colleagues inside and outside my school, e.g. via e-mail
- Yes, I frequently exchange ideas and materials, also with teachers outside my school, e.g. in an online teacher network
- Yes, I jointly create materials with other teachers in an online network of teachers from

different organizations.

I continuously reflect on how I can improve my use of digital technologies in teaching and learning.

- No, never: I do not use digital technologies in teaching
- No, rarely: I do not usually reflect on how to improve my use of digital technologies in teaching
- Sometimes, but not continuously
- Yes, reflection is part of my daily practice
- Yes, all the time, and I frequently participate in targeted training

I participate in online training opportunities e.g: online courses, MOOCs, webinars, virtual conferences...

- No, never
- Not yet, but I am interested
- Somewhat, once or twice
- Yes: I have tried out various different online training opportunities
- Yes, all the time: I frequently participate in all kinds of online training

I use different internet sites and search strategies to find and select digital resources e.g. using educational platforms and repositories or online professional networks to identify suitable worksheets, presentations, videos, pictures, games, quizzes, apps, sites to set up blogs, wikis...

- Not at all: I do not use the internet much
- Not really: I search the internet
- Somewhat: I know different websites with educational resources and use them every now and then
- Yes, I frequently use different repositories with educational resources
- Yes, I strategically select between the very many different repositories I know

I create my own digital resources and modify existing ones to adapt them to my needs e.g. I create presentations, digital worksheets, videos, blogs, online quizzes; I adapt digital quizzes or worksheets, adjust programmes and apps, embed videos...

- Not at all: I do not create digital resources
- Not really: I do create worksheets with a computer, but then I print them
- Somewhat: I create worksheets and presentations, but not much more
- Yes: I create and modify different types of resources
- Yes, all the time: It is part of my daily practice to create and modify different types of digital resources

I effectively protect sensitive content, e.g. exams, students' grades.

- Not at all: I don't really worry
- Not consistently
- Somewhat: the school takes care of this
- Yes, I password protect these files
- Yes, I comprehensively protect these files (example: combining hard-to-guess passwords with encryption and frequent software updates)

I carefully consider how, when and why to use digital technologies in class, to ensure that they are used with added value.

- Not at all: I do not use technology in class
- Not really: I use the digital whiteboard to explain new concepts, that's all
- Somewhat: I make sure that my presentation is understandable and interesting
- Yes, I also use digital technologies to support individual and group work
- Yes, for each phase of the lesson I have some fun activity ready

I monitor learners' behaviour and engagement in the collaborative digital environments I use.

- Not at all: I do not use digital environments with my learners
- Not really: I do not monitor students' behaviour

- Sometimes I check on them
- Yes, I regularly check on them
- Yes, I regularly intervene with motivating or corrective comments

When my students work in groups or teams, they use digital technologies to generate and document evidence.

- Not at all: My learners do not work in groups
- Not really: My learners do not use digital technologies in group work
- Sometimes they use the internet to find information or present their results in digital format
- Yes, they often use the internet to find information and present their results in digital format
- Yes, extensively: They exchange evidence and jointly create knowledge in a collaborative online space where I can monitor their progress

I use digital technologies to allow learners to monitor their learning themselves (Example: using quizzes or surveys for self-assessment, ePortfolios for showcasing, online diaries for reflection...).

- Not at all: My learners do not monitor their own learning
- Not really: My learners monitor their own learning, but not with digital technologies
- Sometimes I use quizzes for self-assessment
- Yes, I use different digital tools for learners to monitor their learning
- Yes, I follow a structured approach integrating different digital tools to allow learners to monitor and reflect on their progress

I use digital assessment formats to monitor student progress.

- Not at all: I do not regularly check on student progress
- Not really: I do not use digital tests to check on progress
- Sometimes I use online tests to see where students stand
- Yes, I regularly check on student progress using little tests or quizzes
- Yes, all the time, also to understand where I need to improve my teaching

I reflect on the digital and non-digital evidence I have on learners' behaviour and progress to better understand individual problems.

- Not at all: Learners' behaviour is none of my business
- No: This "evidence" is not available to me
- Sometimes, e.g. at the end of the term or period of study, to identify students who need support
- Yes, I watch out for changes in behavioural patterns on a weekly basis
- Yes, on a weekly basis, I identify and discuss changes in behavioural patterns with students

I use digital technologies to provide effective feedback and help students understand their learning needs.

- Not at all: There is no need to involve students
- Not really: Digital solutions are not an adequate response
- Periodically, after each term or period of study
- Yes, frequently: This is part of my daily practice
- Yes, strategically: On a daily basis, and we also discuss which digital solutions work well and which don't

When I create digital assignments for learners I consider and address problems they may have with the digital format (Example: lack of access to digital devices or internet, interoperability and conversion problems when using PCs/tablets/smartphones, learners' lack of digital competence, unequal access to e.g. e-mail, facebook, google docs, WhatsApp, ...

- Not at all: I do not create digital assignments
- Not really: My students don't face these problems
- Yes, by minimizing problems: I adapt the task so as to minimize problems
- Yes, by enabling students: I discuss possible obstacles with students and outline solutions
- Yes, by allowing for variety: I adapt the task, discuss solutions and provide alternative ways for completing the task

I use digital technologies to provide my students personalised learning opportunities (E.g. I give different students different digital tasks to address individual learning needs, preferences and interests).

- Not at all: All learners get to do the same activities, irrespective of their level
- Not really: I provide learners with different activities, but use non-digital formats
- Yes, for some: I provide digital activities for those who are advanced or lagging behind
- Yes, by level: Different ability groups get different digital tasks
- Yes, for each and every student: I provide each student with a set of digital tasks tailored to individual learning needs

I use digital technologies to more actively involve learners.

- Not at all: My students do not use digital technologies
- Not really: I do involve students actively, but not with digital technologies
- Yes, when instructing, I use motivating stimuli: videos, animations, cartoon,...
- Yes, My students regularly engage themselves with digital medias, e.g. electronic worksheets, games and quizzes
- Yes, all the time: My teaching is based on students' active involvement with digital technologies, e.g. they play games or quizzes, they create digital content or solve problems using digital tools

I teach learners how to check if information is reliable and to identify fake news.

- Not at all: This is not relevant in my subject
- Not really: It is not my responsibility to teach this
- Yes, I teach them about reliable and unreliable sources
- Yes, I discuss with students how to verify the accuracy of information
- Yes, comprehensively: we discuss how information is generated and can be distorted

I set up assignments which require learners to use digital means to communicate with each other or with an outside audience.

- Not at all: I do not use assignments that require communication
- Not really: In my subject this does not make sense
- Partly: to communicate with each other
- Yes, to communicate internally and externally
- Yes, in a structured way allowing them to slowly expand their skills

I set up assignments which require learners to create digital content (E.g. videos, audios, photos, digital presentations, blogs, wikis...).

- Not at all: My students do not create content
- Not really: Not all of them have the necessary access to digital technologies
- Sometimes, as a fun activity
- Yes, as integral part of their study
- Yes, strategically: As integral part of their study and with increasing level of difficulty

I teach learners how to behave safely and responsibly online.

- Not necessary: If at all, my students only use safe environments.
- Not really: It is not my responsibility to teach this
- Yes, I explain existing rules of conduct
- Yes, we discuss and agree on rules of conduct
- Yes, strategically: My students practically apply existing and commonly agreed rules in the different digital environments we use

I encourage learners to use digital technologies creatively to solve concrete problems.

- Not at all: This is too difficult for them
- Not really: It is not my responsibility to teach this
- Occasionally, whenever an opportunity arises
- Yes, we often experiment with technological solutions to problems
- Yes, strategically: I purposefully integrate opportunities for creatively using digital technologies into the subject learning