



**NEED ANALYSIS REPORT<sup>1</sup>**

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**CENTRUL PENTRU PROMOVAREA INVATARII PERMANENTE TIMISOAR  
ASOCIATIA**

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## NEED ANALYSIS SURVEY RESULTS

### 1. INTRODUCTION

The impact of technology on the learning and teaching environment is dependent on how it is used correctly. It is critical to use technology exclusively as an aid in the learning and teaching process, and to take measures against potential technological harms. With the importance of technology in the learning and teaching process, teachers with technology and digital competency are in great demand. As a result, it has become critical for teachers to have digital skills in order to prepare students for the digital age and to advance their own professional development. There are a few essential ideas about the necessity for teachers to use technology and be digitally competent. The team from four different countries prepared the Empower Digi Teach Project (Empowering Digital Competences of Teachers with Designing Digital Learning Materials Through Gamification (2022-1-TR01-KA220-HED-000089215) ” to meet the need of teacher and candidate teacher by improving their digital competence. In this context, the project aims to create a gamification-based learning management system that is integrated with a micro-credential framework to support the development of teachers' digital competence. The system will be open-source and will incorporate gamification features along with micro-credentials to promote motivation and collaboration among teachers. By incorporating these features, we hope to make professional development more engaging and participatory, and to facilitate collaboration and competition among teachers to improve teaching and learning practices. In line with this purpose, the aim of this questionnaire is to gather teacher and candidate teachers' opinions about gamification, micro-credentials and areas of teacher digital competence, which will feed into design of EmpowerDigiTeach online learning platform to develop teacher digital competency with designing and using digital learning materials.

Teachers with informed digital competency are in high demand. Teachers must recognize the value of technology in the learning and teaching process and obtain the requisite technology training. To improve teachers' competency with digital tools, we need to define it first.



## 1.1. Review of Frameworks Related to Teacher Digital Competence

Technology integration in education has become a growing need, especially given our increasing reliance on digital tools in numerous facets of our life all around the world. As a result, it has become critical for K-12 teachers to be digital competent in order to prepare students for the digital age and to advance their own professional development. When it comes to defining the digital competence of teachers, we see a lot of different conceptualizations existing in the literature (Falloon, 2020). Furthermore, the constructs of digital competence and digital literacy are used interchangeably. Thus, it is necessary to define how we are conceptualising the construct of being digitally competent for teachers.

The EU defines digital competence as: "the safe, critical and responsible use of and interaction with digital technologies for learning, at work and for participation in society." (Council of the European Union, 2018, in cited Basilotta-Gómez-Pablos, Matarranz, Casado-Aranda and Otto, 2022).

While this definition targets citizens' digital competency, when teacher digital competency is considered, Silva, Lázaro, Miranda and Canales (2018) defines the construct as having pedagogical and technological knowledge that allow them to use technological tools in their teaching process. Similarly, Duran (2019) states that teacher digital competence is a collection of knowledge, skills and attitudes for a teacher to utilise technological tools effectively in their daily teaching practice. From these definitions, one can clearly see that teacher digital competency includes knowledge about technological tools being used in the teaching process, skills for using a specific technological tool in pedagogically fruitful ways and understanding about how to effectively integrate the content being taught (Falloon, 2020)..

Once we, as members of the EmpowerDigiTeach Project, have reached a consensus on what it means for teachers to be digitally competent, we need a framework for determining the aspects of teacher digital competence. Therefore, we began a review of the extant frameworks for determining the digital competencies of teachers. In this regard, the International Society for Technology in Education (ISTE) (2017) has developed a set of standards to help educators integrate technology into their teaching practices. Lifelong learning, leadership, digital citizenship, collaboration, designing effective learning experiences, and facilitating student learning are all emphasized in these requirements. Below, the digital competencies of K-12 teachers based on the ISTE Standards for Educators are examined.



Figure1. ISTE Standards for Educators (ISTE, 2017)

While the standards for digitally competent teachers proposed by ISTE framework are useful in terms of illustrating what competent educators can do with technology to both improve teaching process as well as their professional development, however, the standards do not provide guidance regarding necessary technological and pedagogical knowledge for achieving such competency.

Another framework that we examined is called UNESCO ICT Competency Framework for Teachers (see Figure 2). This framework maps teachers' digital competency along three progression levels (Knowledge Acquisition, Knowledge Deepening and Knowledge Creation) across six areas. These areas are Understanding ICT in Education, Curriculum and Assessment, Pedagogy, Application of Digital Skills, Organization and Administration Skills, and Teacher Professional Learning.

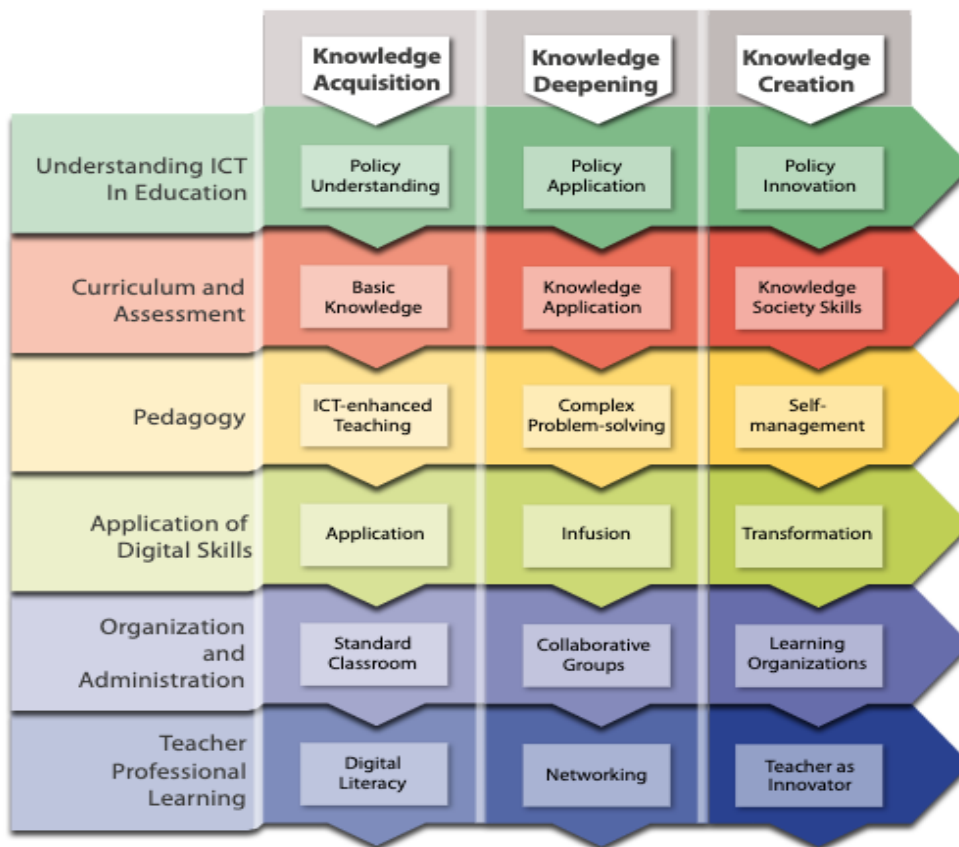


Figure 2. UNESCO ICT CFT Teachers Version 3 (UNESCO, 2018)

At the Knowledge Acquisition Level, first level on the development of a teacher's digital competency based on UNESCO ICT framework, basic digital literacy skills, digital citizenship, and the ability to choose and use suitable commercially available educational tutorials, games, drill-and-practice software, and web content are all included. These skills are used to supplement traditional curriculum objectives, assessment strategies, unit plans, and teaching techniques. At the Knowledge Deepening Level, teachers determine the most effective ways to use ICT to enhance authentic learning and may connect contemporary concerns with the environment, food security, health, and conflict resolution to the curriculum's requirements. This level frequently calls for an interpretation of the curriculum that emphasizes conceptual depth and the application of suitable and contextually relevant assessment strategies. At the Knowledge Creation Level, teachers are expected to go beyond the available curriculum to facilitate skills required for continuous learning communities such as problem-solving, communication, collaboration, experimentation, critical thinking, and creative expression. Such a continuing learning community is created and supported through the use of a range of

networked tools, digital resources, and electronic settings for knowledge creation and anytime, anywhere collaborative learning.

Last framework that we reviewed is the framework proposed by the EU for improving educators’ digital competency called The European Framework for the Digital Competence of Educators (DigCompEdu) (Redecker, 2017). The DigiCompEdu framework outlines teacher digital competency in three broad domains namely professional competences, pedagogic competences and learners’ competences. In addition to that, the DigiCompEdu comprises six distinct areas and within each area the framework has several competencies for educators (See Figure 3). The framework also specifies a progression level for each of the competencies specified within each of the competency areas.

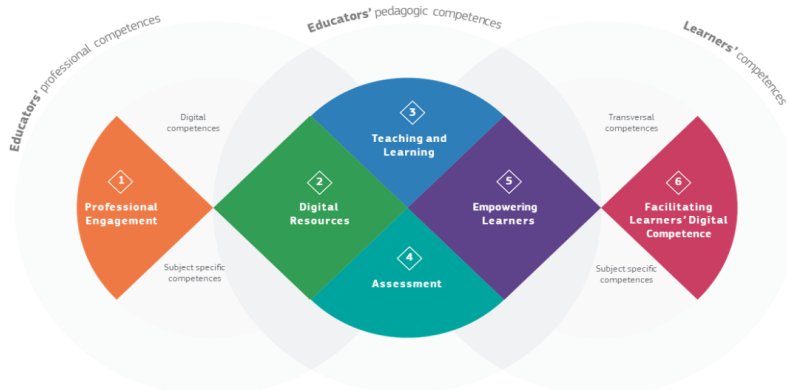


Figure 3. The European Framework for the Digital Competence of Educators (DigCompEdu) (Redecker, 2017)

For instance, one of the competences stated for the assessment area within the pedagogic competences domain of the DigiCompEdu is that “Using digital technologies to collect and analyze evidence on students’ learning processes and outcomes.”. As apparent on this competency, the DigiCompEdu framework sees digital competency of teachers as involving knowledge about technological tools (how to use specific tools for a specific purpose) and how to employ it in pedagogically fruitful ways in a learning and teaching environment.

## 1.2. Comparison of the Reviewed Frameworks Related to Teacher Digital Competency

Across three frameworks that we reviewed, we see similarities and differences among them. In terms of similarities that we witnessed across reviewed frameworks, all the frameworks intrinsically see teacher digital competency as involving knowledge about

technological tools and how to use them in pedagogically effective ways in teaching and learning process. This pattern is also well aligned with our consensus definition of teacher digital competency. In addition to that, except ISTE Standards for Educators, the other two frameworks draw teacher digital competency as a progressive process. For instance, UNESCO ICT framework frames this progression as involving three levels, the DigiCompEdu framework outlines progression starting from newcomer to pioneer, involving six levels.

In terms of differences among these three frameworks, we see that grain size of the stated competencies among three frameworks are different. The most fine grained competencies are stated in the DigiCompEdu framework. We think that this is an important point when it comes to designing effective learning experiences for developing teacher digital competency. When competencies are defined broadly as in the case of the first two frameworks reviewed here, it is becoming hard to determine the necessary technological tools and specific pedagogical strategies to develop teacher digital competency.

As a result of our review of the teacher digital competency frameworks, we decided to employ the DigiCompEdu framework as a guide to our development of the EmpowerDigiTeach platform. We gave this decision since the DigiCompEdu framework covers the competency areas that other frameworks emphasise and it frames a fine grained competencies within each of the competency areas. Because the main aim of the EmpowerDigiTeach is to empower teacher competency related to developing and using digital learning materials, we also decided to focus only on four competency areas of the DigiCompEdu, namely digital resources, teaching and learning, assessment and empowering learners.

### **1.3. Review of Gamification Based LMS**

Gamification is an element that we are going to embed into our EmpowerDigiTeach platform to motivate teachers as well as provide opportunities for collaboration. Gamification refers to the use of game elements in non-game environments (Deterding et al. 2011). According to Sailer and Hommer (2020) although the factors that contribute to successful gamification are not entirely clear, gamification is an effective method for teaching and learning process.

Gamification involves the incorporation of videos or game elements in the teaching and learning process to engage and motivate students in an enjoyable way (Dacre et al., 2021). It utilizes game mechanics to enhance group collaboration by utilizing badges, rewards, virtual incentives, and leaderboards to achieve learning milestones (Feng et al., 2022). Leaderboards

are used to track the progress of learners (Park & Kim, 2021). Gamification is not limited to students; it can also be extended to teachers' training and human resource development in the industry (Farooq et al., 2022). Teachers can also enjoy engaging tasks and spend time playing games while completing their assignments (Y. E. Kim & Kim, 2021). It can facilitate teachers and students in problem-solving, collaboration, self-regulated learning, co-regulated learning, and communication (Juan-Lázaro & Area-Moreira, 2021).

Gamification enhances students' motivation through various factors such as presenting teachers as facilitators who promote collaborative and interactive learning, incorporating performative tasks, cognitive aspects, and providing support for learning institutions (Prieto Andreu, 2020). Non-profit organizations can also benefit from gamification-based learning by enhancing communication and sharing knowledge in an enjoyable way (Farooq et al., 2022).

Previous studies (Werbach & Hunter, 2015) have identified three major elements of gamification-based learning: surface elements, underlying dynamics, and gaming experience. Each element contributes in a specific manner to define the gamifying approach.

Another study (Dos Santos et al., 2020) suggests that gamification consists of three elements: mechanical, personal, and emotional. Mechanical elements include setting goals, sub-goals, onboarding, and feedback (Prabawa et al., 2018). Personal elements involve leaderboards, avatars, and collective responsibility (Tsarapkina et al., 2021). The emotional aspect of gamification is linked to the concept of flow (Schöbel et al., 2023). Task inclusion is also an essential aspect of gamification-based learning, encompassing tasks evaluation, point scoring, making progress, overcoming challenges, and presenting achievements on leaderboards (Bernecker & Ninaus, 2021).

There are various elements in gamification models. But in the context of e-learning environments, according to Yu and Park (2023), most common gamification elements that have a strong impact on learners are competition and collaboration, mission and avatars, rewards, levels, badges, points, and leaderboards, badges, and level.

The LMS has major management functions that manage users, generate student reports, handle course management, and administer classes (Yun & Park, 2023). The class management aspect of the gamification model provides features for collaboration between students. In the context of gamification-based LMS, students (users) are considered players, and the mechanics are based on LMS design to shape students' behavior towards achieving learning goals (Raharjo et al., 2021). The interaction between game players and game design creates a dynamic system



based on gamification aesthetics, resulting in an interactive and enjoyable learning experience to enhance learning engagement among players (Manalang et al., 2020).

To decide what and how to integrate gamification elements into our EmpowerDigiTeach platform (LMS), we considered these most effective gamification elements as a starting point to gather our teacher participants' views through the need analysis questionnaire. Thus, we incorporated questions into the questionnaire both related to general aspects of gamification as well as specific gamification elements such as competition, progress bars etc.

#### **1.4 Review of Microcredentials Literature**

Micro-credentials are a recent higher education trend that serves as an alternative to standard study programs for obtaining independent official qualifications. These are short, competency-based, industry-aligned learning units that enable individuals to demonstrate mastery of information or competence in a specific location or subject (Oxley & van Rooyen, 2021). Micro-credentials can provide more precise information on a greater number of learning successes than a course level can. They are useful in higher education for capturing learning that would otherwise go unnoticed by formal academic procedures. Micro-credentials can also be utilized to indicate professional learning and improvement in candidates (Clausen, 2022). They are gaining traction in higher education and can be aided by digital platforms (Wheelahan & Moodie, 2022). Micro-credentials can be utilized to improve instructor abilities, provide relevant information, foster flexibility, and assess earner mastery. They can also be used to promote post-COVID-19 pandemic recovery in a variety of ways, including fostering innovation in higher education institutions (Tamoliune et al., 2023). Overall, micro-credentials represent a novel, tailored professional development modality that can improve transitions from study to work and respond to growing labor demands in industries (Hunt et al., 2020).

Although there is not a consensus definition in the literature, the European Commission (2023) has identified the following mandatory elements that micro-credits should include:

- i) identification of the learner
- ii) title of the micro-credential
- iii) country(ies)/region(s) of the issuer
- iv) awarding body(ies) v) date of issuing
- v) learning outcomes

- vi) notional workload needed to achieve the learning outcomes (in European Credit Transfer and Accumulation System – ECTS, wherever possible)
- vii) level (and cycle, if applicable) of the learning experience leading to the micro-credential (European Qualifications Framework, Qualifications Frameworks in the European Higher Education Area), if applicable
- viii) type of assessment
- ix) form of participation in the learning activity
- x) type of quality assurance used to underpin the micro-credential

The project aims to create a gamification-based learning management system that is integrated with a micro-credential framework to support the development of teachers' digital competence. The system will be open-source and will incorporate gamification features along with micro-credentials to promote motivation and collaboration among teachers. By incorporating these features, we hope to make professional development more engaging and participatory, and to facilitate collaboration and competition among teachers to improve teaching and learning practices.

The development of the micro-credential system will be led by DEU, with each partner contributing to the creation of certificates, micro-certificates, and badges. Incorporating the European Approach that was proposed by European Commission (2023) into the project could help provide a useful framework for ensuring that project aligns with current micro-credential elements for promoting digital competencies. The project offers a new and sustainable way to support teachers' continuous professional development through an open-access learning management system with embedded gamification and micro-credential features. The unique aspect of the project lies in the integration of gamification and micro-credential features, which will make the learning process more engaging, motivating, collaborative, and interactive. This contrasts with traditional professional development that can be one-way and information-heavy, such as video lectures.

## 2. METHOD

### Creation of Need Analysis Questionnaire

Once we decided to employ the DigiCompEdu framework for organising our project, then we started to form items to be included in the questionnaire. We thought that there must be questions related to four areas of DigiCompEdu namely Digital Resources, Teaching and Learning, Assessment and Empowering Learners. In addition, we also thought that there must be questions regarding gamification based LMS as well as microcredential systems. Including questions related to these six areas of our project would better allow us to capture teachers' needs.

Once we formed our draft items for the questionnaire, we then conducted multiple cycles of review and revise sessions with the partners. After that, we send our questionnaire to expert evaluation. With the revision from the expert review, we modified the questionnaire and administered it to a group of teachers for pilot implementation. Our discussions and revisions based on the pilot study resulted in the final version of the questionnaire that included 38 questions including 5-likert type questions and open ended questions. The questions in the questionnaire were put into an online form (Google Forms) and distributed to the teachers via link. Participation in the questionnaire was voluntary.

### Participants

The questionnaire was distributed to teachers from Spain, Portugal, Romania, and Türkiye and 266 valid responses were obtained. In terms of teaching experience, the majority of the participants had more than 10 years of teaching experience.

### Data Analysis

The answers given by the teachers to each item of the questionnaire were analysed descriptively and presented as percentages and frequencies. The answers to the open-ended questions were classified into categories and supported with sample quotations.

## 3. RESULTS

### Results of the Needs Analysis Survey in the Sub-Dimensions Context

The responses of the participants to the items of the questionnaire were presented in tables and interpreted. Open-ended questions were analysed and supported by sample quotations.

Table 1. Frequency of Teachers' Digital Tools Use in Their Teaching

Teaching and Learning	1	2	3	4	5
<b>1.1. How often do you use digital tools in your teaching practice?</b>					
Türkiye	1 (1,3%)	4 (5,2%)	16 (20,8%)	18 (23,4%)	38 (49,4%)
Spain	0 (0%)	1 (4,8%)	3 (14,3%)	9 (42,8%)	8 (38%)
Portugal	0 (0%)	0 (0%)	12 (12,4%)	45 (46,4%)	40 (41,2%)
Romania	3 (3.1%)	4 (4.1%)	26 (26.8%)	35 (36.1%)	29 (29.9%)

As seen from the table, nearly half of the participants across the countries reported that they always use digital resources in their teaching practice, which is the most significant result for the teaching and learning dimension of the questionnaire. In addition, it is obvious from the table that around 70% of participants or more across the countries indicated that they use digital tools in their teaching practice on a regular basis or always. This clearly shows that teachers are in some way incorporating digital tools in their daily teaching practices. However, the frequency with which these tools are used to promote student collaboration and responsibility for their own learning is considerably lower (Table 2 and Table 3). In addition to the aforementioned findings, although many teachers stated that they benefit from digital tools in order to make their students responsible for their learning, it would not be wrong to say that this use is at a moderate level due to the concentration at 3-points (Table 3). These quantitative findings all show us that teachers are incorporating digital tools into their teaching but are probably doing this in a way to promote traditional learning outcomes such as remembering and recalling the facts presented in the materials rather than cultivating innovative learning outcomes like collaboration and taking their own responsibility in terms of learning.

Table 2. Frequency of Teachers' Digital Tools Use in Their Teaching for Promoting Collaboration

Teaching and Learning	1	2	3	4	5
<b>1.2. How often do you use digital tools in your teaching to provide students opportunities to collaborate on classroom tasks?</b>					
Türkiye	5 (6,5%)	9 (11,7%)	24 (31,2 %)	24 (31,2%)	15 (19,5%)
Spain	3 (14,3%)	3 (14,3%)	7 (33,3%)	6 (28,6%)	2 (9,5%)
Portugal	1 (1,6%)	8 (16,3%)	17 (34,7 %)	51 (65,3%)	20 (25,0%)
Romania	6 (6.2%)	10 (10.3%)	35 (36.1%)	29 (29.9%)	17 (17.5%)

Table 3. Frequency of Teachers' Digital Tools Use in Their Teaching for Promoting Student Responsibility of Their Own Learning

Teaching and Learning	1	2	3	4	5
<b>1.4. How often do you use digital tools for making students responsible for their learning?</b>					
Türkiye	6 (7,8%)	11 (14,3%)	28 (36,4%)	23 (29,9%)	9 (11,7%)
Spain	0 (0%)	8 (38,2%)	5 (23,8)	4 (19%)	4 (19%)
Portugal	2 (2,1%)	11 (11,3%)	28 (28,9%)	39 (40,2%)	17 (17,5%)
Romania	8 (8.2%)	12 (12.4%)	28 (28.9%)	36 (37.1%)	13 (13.4%)

When it comes to digital tools that teachers use for providing students opportunities to collaborate during their learning, we categorized teachers' responses into **three separate**

**aspects (devices, platforms and applications).** Regarding devices, teachers frequently mentioned **computers, smartboards, and smartphones.** In terms of platforms, they listed the **video-conferencing tools** including Zoom, Microsoft Teams and Google Meet that they used during the emergency remote teaching times (i.e. COVID-19 times and the earthquake took place in Türkiye). As for the applications, the majority of the teachers answered the question by stating that they frequently utilize **document sharing** (i.e. *Google Drive*), **collaborative** (i.e. *Padlet, Canva*) and **gamification-based** (i.e. *Kahoot, Wordwall*) **Web 2.0 applications** such as Google Drive, Padlet, Canva, Google Forms, Kahoot, Wordwall, etc. Some **subject-specific tools** were also mentioned such as *Geogebra, Tinkercad, Scratch, MataLab*, etc.

In terms of digital tools teachers use to provide students opportunities for taking their learning responsibility, teachers listed numerous applications that they already mentioned in the preceding question. Moreover, teachers mentioned that they frequently use **content-specific Web applications**, such as *Morpakampüs*, the Educational Informatics Network (EBA), KhanAcademy, and one teacher mentioned that s/he commonly use an **AI application** named as *ChatGPT.Quizziz, Flipgrid, Nearpod, Edpuzzle, wooclap, Video, Podcast Wordwall, Educaplay, Moodle.*

Table 4. Frequency of Teachers' Digital Tools Use in Their Teaching for Summative Assessment Purposes

Assessment:	1	2	3	4	5
<b>2.1. How often do you use digital tools for summative assessment of student learning?</b>					
Türkiye	8 (10,4%)	9 (11,7%)	31 (40,3%)	17 (22,1%)	12 (15,6%)
Spain	4 (19%)	7 (33,3%)	4 (19%)	4 (19%)	2 (9,5%)
Portugal	5 (5,2%)	13 (13,4%)	30 (30,9%)	31 (32,0%)	18 (18,6%)
Romania	13 (13,4%)	19 (19,6%)	26 (26,8%)	30 (30,9%)	9 (9,3%)

Table 5. Frequency of Teachers' Digital Tools Use in Their Teaching for Formative Assessment Purposes

Assessment	1	2	3	4	5
<b>2.2. How often do you use digital tools for formative assessment of student learning?</b>					
Türkiye	9 (11,7%)	12 (15,6%)	25 (32,5 %)	23 (29,9%)	8 (10,4%)
Spain	1 (4,8%)	7 (%33,3)	5 (23,8%)	6 (28,6%)	2 (9,5%)
Portugal	4 (4,1%)	11 (11,3%)	29 (29,9 %)	39 (40,2%)	14 (14,4%)
Romania	10 (10.3%)	16 (16.5%)	33 (34 %)	30 (30.9%)	8 (8.2%)

One of the striking results that can be drawn from Table 4 and Table 5 is that the majority of teachers ( almost more than 50% of teachers across the countries) use digital tools for summative and formative assessment on a medium level, or, to be more precise, slightly above (between 3 and 4) the midpoint. With this finding, it can be said that the frequency of teachers' use of technology for assessment purposes is considerably lower than the frequency of using digital tools for teaching and learning practices in the classroom.

Table 6. Frequency of Teachers' Digital Tools Use in Their Teaching for Formative Assessment Purposes

Assessment	1	2	3	4	5
<b>2.4. How often do you use digital tools for collecting student data to provide evidence on student learning?</b>					
Türkiye	7 (9,1%)	18 (23,4%)	29 (37,7 %)	17 (22,1%)	6 (7,8%)
Spain	1 (4,8%)	5 (%23,8)	6 (28,6%)	5 (23,8%)	4 (19%)
Portugal	2 (2,1%)	10 (10,3%)	36 (37,1%)	33 (34,0%)	16 (16,5%)
Romania	8 (8.2%)	20 (20.6%)	36 (37.1%)	23 (23.7%)	10 (10.3%)

Another significant finding about the use of digital tools for assessment is that teachers do not commonly use digital tools to provide evidence about student learning. More than 50% of the teachers across the countries indicated that they have a low use of digital tools for this purpose (rating between 2 and 3), which is an interesting finding. Because digital tools provide teachers with reliable, precise, and easy to use means of conveying unbiased proof.



Table 7. Frequency of Teachers' Digital Tools Use in Their Teaching for Adjusting Instruction with Feedbacks from Assessment to Enhance Student Learning

Assessment	1	2	3	4	5
<b>2.7. How familiar are you with the digital tools used in adjusting instruction with feedback from assessments to enhance student learning? (Not Familiar at All (1) Extremely Familiar (5))</b>					
Türkiye	11 (14,3%)	10 (13,0%)	28 (36,4%)	22 (28,6%)	6 (7,8%)
Spain	3 (14,3%)	6 (%28,6)	5 (23,8%)	3 (14,3%)	4 (19%)
Portugal	11 (14,3%)	10 (13,0%)	28 (36,4%)	22 (28,6%)	6 (7,8%)
Romania	11 (11%)	13 (13.4%)	29 (29.9%)	29 (29.9%)	15 (15.5%)

In terms of the familiarity with the digital tools in adjusting instruction with feedback from assessments to enhance student learning, we see that the majority of the participants across the countries (except the participants from Spain) indicated a relatively high level of familiarity with this aspect. This finding is somewhat inconsistent with the findings from 2.1 and 2.2. Examining the participants' responses for 2.7, since the competency level in 2.7 is higher than those stated in 2.1 and 2.2, the frequencies stated here would be expected to be lower than the other benchmarks. The reason for the difference may be a subject of research in future studies.

In terms of designing summative and formative assessment, teachers focused on **essential technical infrastructure and accessibility** when addressing this question. So much so that in order to gain access to higher-level resources, basic requirements must first be completed. **Ownership of information and communication technologies (computer, smartboard, internet connection, etc.), user manuals of these devices, software product licenses, training on the use of digital tools/software, and IT competencies of teachers/students** are listed as primary resources by teachers. Apart from them, teachers

indicated a couple of **Web 2.0 applications** such as *Kahoot, Google Forms, Quizziz, ClassDojo, Plikers, Mentimeter, etc.*

While some of the respondents mentioned not using any digital tools or platforms and relying on **traditional methods** like *written exams and physical documents*, various other tools and platforms were mentioned by the teachers, including **MS Office applications** (i.e. *Excel, PowerPoint, Word*), *Google Classroom, Student/Teacher Support System in EBA, SPSS, Mentimeter, SurveyMonkey, Padlet, and Bamboozle.*

Many of the teachers stated that they use **institutional learning management systems and school-specific educational sharing** (i.e. *SebitVCloud*), and **collaboration platforms** (i.e. *SAKAI, EBA*) to collect and analyze evidence to gain insight into the learning processes of their students. In addition, a substantial number of teachers stated that they do not use any digital tools for this purpose at all or that they keep the exam papers printed and their assessment scores digital in **Microsoft Office applications** such as *MS EXCEL or MS WORD.*

Approximately half of the teachers either **did not respond or responded with "I don't know."** Furthermore, many teachers responded that their knowledge related to this question is insufficient and that they would like to attend if an **in-service training** related to these applications is offered in the future. Although the teachers were unable to identify a specific application, they provided the following list of technical capabilities that the application should possess. They expressed the need to utilize applications with a robust database capable of storing student-based measurement tools and their responses, predicting the future, and reporting in terms of various variables.

Table 8. Frequency of Teachers' Familiarity with Search Engines and Online Repositories for Digital Learning Materials

Digital Resources	1	2	3	4	5
<b>3.1. How familiar are you with different search engines and online repositories for digital learning materials?</b>					
Türkiye	5 (6,5%)	11 (14,3%)	18 (23,4%)	27 (35,1%)	16 (20,8%)
Spain	3 (14,3%)	1 (4,8%)	5 (23,8%)	7 (33,3%)	5 (23,8)
Portugal	5 (5,2%)	13 (13,4%)	46 (47,4%)	26 (26,8%)	7 (7,2%)
Romania	3 (3.1%)	13 (13.4%)	25 (25.8%)	26 (26.8%)	4 (30.9%)

The majority of teachers report their familiarity with various search engines and online repositories for accessing digital learning materials (see Table 8). This finding is not unexpected, given the widespread implementation of Emergency Remote Teaching (ERT) as a response to the closure of schools during the Covid-19 pandemic. In a rather unexpected outcome, it has been observed that a significant number of teachers, specifically over 67%, exhibit an outstanding level of familiarity with the copyright regulations that must be taken into account during the development of digital learning materials. Another important result from the Table above is that more than 50% of teachers mention that they are familiar with the ways to share organized digital content to learners, parents and other educators and Open Educational Resources (OER) on a medium level, or, to be more precise, slightly above (between 3 and 4) the midpoint.

Table 9. Frequency of Teachers' Developing Digital Learning Resources for Their Classrooms

Digital Resources	1	2	3	4	5
<b>3.4. How often do you develop digital learning resources to use in your classroom?</b>					
Türkiye	16 (20,8%)	12 (15,6%)	19 (24,7 %)	21 (27,3%)	9 (11,7%)
Spain	5 (23,8%)	6 (28,6%)	2 (9,5%)	5 (23,8%)	3 (14,3%)
Portugal	3 (3,1%)	6 (6,2%)	26 (26,8 %)	52 (53,6%)	10 (10,3%)
Romania	6 (6.2%)	20 (20.6%)	34 (35.1 %)	26 (26.8%)	11 (11.3%)

Table 10. Frequency of Teachers' Modifying Digital Learning Resources for Their Classrooms

Digital Resources	1	2	3	4	5
<b>3.5. How often do you modify digital learning resources to use in your classroom?</b>					
Türkiye	14 (18,2%)	15 (19,5%)	25 (32,5 %)	18 (23,4%)	5 (6,5%)
Spain	3 (14,3%)	5 (23,8%)	7 (33,3%)	5 (23,8%)	1 (4,8%)
Portugal	3 (3,1%)	6 (6,2%)	22 (22,7%)	54 (55,7%)	12 (12,4%)
Romania	10 (10.3%)	13 (13.4%)	26 (26.8%)	36 (37.1%)	12 (12.4%)

In addition to accessing and using digital learning materials, teachers are expected to engage in the development or adaptation of innovative instructional materials that align with the level of their students. For this reason, teachers are presented with an invaluable chance to engage in specialized courses that intend to improve their skills in designing and developing instructional materials in their undergraduate programs. However, as shown in the table, despite the fact that teachers have successfully finished these courses and been appointed to the teaching profession, there is still a medium level of involvement (slightly above the midpoint) in designing and developing digital learning materials except Portugal and Romanian teachers. In a rather unexpected outcome, it has been observed that a significant number of teachers, specifically over 67%, exhibit a medium level of familiarity with the copyright regulations that must be taken into account during the development of digital learning materials.

Table 11. Familiarity of Teachers' with the Ways to Share Organized Digital Content

Digital Resources	1	2	3	4	5
<b>3.8. How familiar are you with the ways to share organized digital content to learners, parents and other educators?</b>					
Türkiye	8 (10,4%)	14 (18,2%)	17 (22,1%)	22 (28,6%)	16 (20,8%)
Spain	3 (14,3%)	4 (19%)	6 (28,6%)	5 (23,8%)	3 (14,3%)
Portugal	4 (4,1%)	14 (14,4%)	31 (32,0%)	30 (30,9%)	18 (18,6%)
Romania	7 (7.2%)	10 (10.3%)	25 (25.8%)	28 (28.9%)	27 (27.8%)

Table 12. Familiarity of Teachers' with Copyright Rules

Digital Resources	1	2	3	4	5
<b>3.9. How familiar are you with copyright rules?</b>					
Türkiye	10 (13,0%)	15 (19,5%)	19 (24,7 %)	14 (18,2%)	19 (24,7%)
Spain	1 (4,8%)	9 (42,8%)	3 (14,3%)	3 (14,3%)	5 (23,8%)
Portugal	4 (4,1%)	6 (6,2%)	29 (39,9%)	34 (35,1%)	24 (24,7%)
Romania	10 (10.3%)	15 (15.5%)	25 (25.8%)	15 (15.5%)	32 (33%)

Table 13. Familiarity of Teachers' with OER

Digital Resources	1	2	3	4	5
<b>3.10. How familiar are you with OER (open educational resources)?</b>					
Türkiye	6 (7,8%)	14 (18,2%)	19 (24,7 %)	24 (31,2%)	14 (18,2%)
Spain	6 (28,6%)	5 (23,8%)	5 (23,8%)	3 (14,3%)	2 (9,5%)
Portugal	13 (13,4%)	25 (25,8%)	26 (26,8%)	23 (23,7%)	10 (10,3%)
Romania	17 (17.5%)	17 (17.5%)	26 (26.8)	19 (19.6%)	18 (18.6%)

In terms of types of digital resources that teachers usually search for, undoubtedly, the most prevalent source of information and educational content is derived from **videos**, with a particular emphasis on **interactive educational videos**. Furthermore, teachers have expressed a preference for **interactive animations and simulations**. Subsequently, the discourse pertains to **games**, with a comparatively diminished emphasis on **audios, texts, presentations, and quizzes**.

When we ask teachers strategies that they employ to determine the relevance of digital learning materials for your students, the pedagogical strategies commonly employed by teachers in this context encompass the evaluation of the congruity between the digital resources and the **desired learning objectives and the students' proficiency level as stipulated in the curriculum**. Additionally, considerations are given to the **user-friendliness, accessibility, and dependability** of the materials. When it comes to types of digital materials mostly searched for by teachers, undoubtedly, the most prevalent source of information and educational content is derived from **videos**, with a particular emphasis on **interactive educational videos**. Furthermore, teachers have expressed a preference for **interactive animations and simulations**. Subsequently, the discourse pertains to **games**, with a comparatively diminished emphasis on **audios, texts, presentations, and quizzes**.

When we ask teachers to state the type of tools that they use to modify digital learning materials, the majority prefer not to answer this question at all. The remaining teachers stated that they use **Office programs** most frequently, and specifically *PowerPoint* to develop and modify materials (14 teachers). Besides that, the tools/programs that are frequently mentioned are *Canva, Photoshop and Videomaker*. Again, in this question, field-specific tools are mentioned: These are *Tinkercad, Scratch and Mathx*.

When we ask teachers to report the ways in which they ensure that digital materials they share with their students are accessible to them, the majority stated their lack of knowledge about tools as well as ways to do this effectively. Very few teachers reported specific strategies or ways to share materials for students with special needs. These strategies include enriching the materials for students with special needs by supporting them with different **multimedia elements (visual, audio, audio-visual)**, devoting individual time with the student with special needs in order to coach them and make sure they can access the resource, personalizing materials for each student's characteristics, using platforms like Google Classroom or Teams to share resources securely, and adapting materials based on individual student needs, simplifying language and using tools that aid in accessibility, such as infographics, images, and

transcripts for videos and audio, and providing clear navigation and organization of materials to facilitate ease of use for students with cognitive or attention difficulties.

Table 14. Teachers' Views on The Importance of Gamification within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.1. How important is it to you that an online learning environment has elements of gamification?</b>					
Türkiye	4 (5,2%)	3 (3,9%)	10 (13,0%)	33 (42,9%)	27 (35,1%)
Spain	4 (19%)	1 (4,8%)	5 (23,8%)	7 (33,3%)	4 (19%)
Portugal	3 (3,1%)	6 (6,2%)	26 (26,8%)	32 (33,0%)	30 (30,9%)
Romania	5 (5.2%)	17 (17.5%)	23 (23.7%)	29 (29.9%)	23 (23.7%)

Table 15. Teachers' Views on The Importance of Competitiveness within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.2. How important is it to you that an online learning environment demands competitiveness?</b>					
Türkiye	8 (10,4%)	11 (14,3%)	25 (32,5 %)	23 (29,9%)	10 (13,0%)
Spain	5 (23,8%)	4 (19%)	7 (33,3%)	5 (23,8%)	0 (19%)
Portugal	9 (9,3%)	15 (15,5%)	37 (38,1%)	25 (25,8%)	11 (11,3%)
Romania	4 (4.1%)	10 (10.3%)	26 (26.8 %)	40 (41.2%)	17 (17.5%)



Table 16. Teachers' Views on The Importance of Collaboration within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.3. How important is it to you that an online learning environment requires you collaborate with your colleagues?</b>					
Türkiye	4 (5,2%)	5 (6,5%)	12 (15,6 %)	24 (31,2%)	32 (41,6%)
Spain	2 (9,5%)	1 (4,8%)	1 (4,8%)	7 (33,3%)	10 (48%)
Portugal	0 (0%)	2 (2,1%)	4 (4,1%)	61 (62,9%)	30 (30,9%)
Romania	5 (5.2%)	10 (10.3%)	22 (22.7%)	32 (33%)	28 (28.9%)

Table 17. Teachers' Views on The Importance of Problem Solving, Critical Thinking and Decision Making within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.4. How important is it to you that an online learning environment requires you deal with problem solving, critical thinking and decision making situations?</b>					
Türkiye	4 (5,2%)	3 (3,9%)	7 (9,1%)	22 (28,6%)	41 (53,2%)
Spain	0 (0%)	0 (0%)	0 (0%)	7 (33,3%)	14 (66,7%)
Portugal	1 (1,0%)	3 (3,1%)	6 (6,2%)	56 (57,7%)	31 (32,0%)
Romania	4 (4.1%)	7 (7.2%)	27 (27.8%)	29 (29.9%)	30 (30.9%)

Table 18. Teachers' Views on The Importance of Rewards within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.5. How important is it to you that you gain rewards (points, badges, leaderboards, and other virtual or tangible incentives) during your learning in an online learning environment?</b>					
Türkiye	10 (13,0%)	4 (5,2%)	15 (19,5%)	25 (32,5%)	23 (29,9%)
Spain	2 (9,5%)	5 (23,8%)	5 (23,8%)	5 (23,8%)	4 (19%)
Portugal	1 (1,0%)	4 (4,1%)	9 (9,3%)	59 (60,8%)	24 (24,7%)
Romania	9 (9.3%)	11 (11.3%)	37 (38.1%)	20 (20.6%)	20 (20.6%)

Table 19. Teachers' Views on The Importance of Interaction with Others within LMS

Gamification based Learning Management Systems	1	2	3	4	5
<b>4.6. How important is it to you that an online learning environment requires you to interact with your colleagues during your learning?</b>					
Türkiye	5 (6,5%)	5 (6,5%)	13 (16,9%)	24 (31,2%)	30 (39,0%)
Spain	0 (0%)	1 (4,8%)	6 (28,6%)	7 (33,3%)	7 (33,3%)
Portugal	0 (0%)	2 (2,1%)	9 (9,3%)	63 (65,0%)	23 (23,7%)
Romania	6 (6.2%)	9 (9.3%)	30 (30.9%)	30 (30.9%)	22 (22.7%)

The clearest assertion that can be made regarding teachers' preferences concerning a virtual learning environment for their professional development is that it must involve problem solving, critical thinking and decision making, this was a consistent pattern across all countries. Most teachers value including gamification elements in the learning environment, indicating that this can be an effective strategy to engage students. Teachers also value competitiveness, but most do not consider it as crucial as other gamification elements. This appreciation highlights the importance of collaborative work for student learning and the professional development of teachers. Most teachers value the presence of rewards and incentives in the online learning environment, rating this as "Important" and as "Extremely Important". Rewarding can be an effective motivational strategy to keep students engaged and reward their progress.

Table 20. Teachers' Motivation for Gaining a Certificate

Micro-credential system	1	2	3	4	5
<b>5.1. To what extend do you feel motivated when a professional development course gives you a certificate for your successful participation?</b>					
Türkiye	3 (3,9%)	4 (5,2%)	9 (11,7%)	27 (35,1%)	34 (44,2%)
Spain	1 (4,8%)	2 (9,5%)	3 (14,3%)	9 (42,8%)	6 (28,6%)
Portugal	0 (0%)	7 (7,2%)	12 (12,4%)	33 (34,0%)	45 (46,4%)
Romania	4 (4.1%)	7 (7.2%)	20 (20.6%)	27 (27.8%)	39 (40.2%)

Table 21. Teachers' Willingness for Gaining a Certificate

Micro-credential system	1	2	3	4	5
<b>5.2. How willing would you be considering pursuing a micro-credential to enhance your skills or knowledge in your field?</b>					
Türkiye	5 (6,5%)	8 (10,4%)	15 (19,5 %)	23 (29,9%)	26 (33,8%)
Spain	3 (9,5%)	0 (0%)	5 (19%)	6 (19%)	11 (52,4%)
Portugal	1 (1,0%)	9 (9,3%)	14 (14,4%)	35 (36,1%)	38 (39,2%)
Romania	4 (4.1%)	7 (7.2%)	17 (17.5 %)	26 (26.8%)	43 (44.3%)

Table 22. Teachers' Views on the Importance of Gaining a Certificate

Micro-credential system	1	2	3	4	5
<b>5.3. How important do you think that micro-credentials would be useful for advancing your career goals?</b>					
Türkiye	4 (5,2%)	8 (10,4%)	19 (24,7 %)	20 (26,0 %)	26 (33,8%)
Spain	2 (14,3%)	0 (0%)	4 (23,8%)	4 (28,6%)	7 (33,3%)
Portugal	2 (2,1%)	6 (6,2%)	15 (15,5%)	33 (34,0%)	41 (42,3%)
Romania	5 (5.2%)	7 (7.2%)	26 (26.8%)	24 (24.7%)	35 (36.1%)

A considerable consensus can be inferred from the high degree of favorability displayed by teachers in response to questions about the significance of micro-credential systems. This is a finding that is particularly noteworthy. Almost all the teachers expressed a strong agreement towards being highly motivated if they were provided with a valid and reliable certificate as evidence of their successful participation in a professional development course. In response to the question, "How willing would you be to consider pursuing a micro-credential to enhance

your skills or knowledge in your field?", more than 50% of teachers expressed a strong willingness to engage in training programs that provide micro-credentials in the future. Moreover, an important number of teachers, exceeding 50%, expressed a strong belief in the high level of benefits that a micro-credential system would offer them in terms of advancing their career goals.

Apart from the above questionnaire items, "What digital tools do you use to personalize instruction for students with different learning needs and styles?" and "What digital tools do you use to actively engage students in the learning process?" questions were asked and the answers obtained were analyzed and concluded below.

When the teachers were asked which different digital tools they use to individualize teaching and involve students in the learning process, they answered this question with the Web 2.0 tools they gave to other questions. They did not report a different and new type of tool for personalization or learner engagement. When the teachers were asked what training they needed to improve their digital competencies, they mostly wanted to receive **training on artificial intelligence, 3D design, augmented/virtual reality and gamification**; They stated that these topics can be taught practically by integrating them into the courses in the faculty.

#### 4. CONCLUSION

The need analysis reveals several important findings related to teachers' attitudes towards, knowledge about and practices of digital tools, assessment methods, digital resources, gamification in learning, and micro-credentials. While the majority of participating teachers stated that they use digital resources in their teaching process, this use of digital materials mostly consisted of direct use of digital materials found on the internet without modifying or creating digital materials that would be suitable to their contexts. When it comes to using digital materials for promoting collaboration and taking responsibility for one's own learning, teachers lack necessary knowledge and practices for doing this.

In terms of assessment, teachers reported that they use digital resources for both formative and summative purposes but not frequently. When they do, they do not know how to address assessment data to give feedback to students and adjust instruction accordingly to increase student learning.

Copyright regulations remain an area where teachers need more understanding. Gamification elements and problem-solving skills are highly valued in online learning environments. Teachers show a strong motivation for micro-credentials, and there is potential

to use them effectively for career advancement.

Teachers value collaboration, problem solving, critical thinking skills and reward mechanisms to promote their learning. They want to see a recognition of their effort and learning when they participate in professional learning opportunities online. Hence, microcredential systems were very much valued by our participating teachers as a way to recognize and evaluate their learning.

In conclusion, the results of this need analysis provide valuable insights to design targeted professional development programs and interventions that cater to teachers' specific needs and enhance their teaching practices, ultimately improving the quality of education in the given context.

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