**Accelerating Digital Innovation in Schools
through Regional Innovation Hubs
and a Whole-School Mentoring Model**

WP1/ D1.3

REPORT ON TEACHER DIGITAL COMPETENCE

AND SCHOOL DIGITAL MATURITY

WP1 Leader: TLU

I-HUB4SCHOOLS

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iHub4Schools - Accelerating Digital Innovation in Schools through Regional Innovation Hubs and a Whole-School Mentoring Model

D1.3: Report on teacher digital competence and school digital maturity

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Executive Summary

Deliverable 1.3, the Report on teacher digital competence and school digital maturity, was originally designed to provide an overview of the results derived from assessing the digital maturity of schools and the digital competence of teachers. Moreover, it was planned to serve as the basis for selecting schools to participate in the iHub4schools project activities. Given the complexity of this activity, this deliverable digs into various aspects of this task. It outlines our approach to recruiting schools for project activities, details the instruments employed and their rationale, describes how schools were actively involved in self-assessing their digital competence, maturity, and practices, and shares the valuable lessons we have learned throughout this process.

The first section of this deliverable gives an overview of the concepts of digital competence of teachers and digital maturity of the schools by providing some lights to policy level aspects and research oriented lessons. In the second chapter we describe how the assessment of digital competence and maturity should be better supported by wider processes and how we embedded this practice into our School mentoring model. In the third section we elaborate our national experiences on how the assessment was organized, how schools were recruited, for what purpose data was collected and how school teams and teachers were integrated into the discussion of the results. Finally we reflect on the lessons from the cases and come up with conclusions.

The most significant lesson we have learned is that self-assessment of digital competence and/or digital maturity alone does not provide a comprehensive understanding of schools. It is crucial to consider schools in conjunction with various other factors to make accurate assessments. Instead, it is essential to integrate self-assessment into the broader school development processes to facilitate evidence-informed school improvement. By doing so, we can better support schools in their journey towards improvement based on reliable evidence.

Introduction

Task 1.3 (T1.3) of the iHub4Schools project had the objective of **assessing the digital competence of teachers and determining the digital maturity of participating schools.** This assessment and mapping process was planned to be executed by our piloting partners in Estonia, Finland, Lithuania, and Georgia. During this task, schools were expected to engage in self-assessment and provide evidence using the self-assessment framework, which covered areas such as pedagogy, infrastructure, and change management. To facilitate this process, a web-based application called Digital Mirror was made available. The results obtained from this assessment were intended to be utilized in identifying schools for subsequent activities within the project.

T1.3 aimed to carry out the assessment of digital maturity of the schools and digital competences of the teachers with the aim to recruit the schools into the project activities. This task proved to be the most difficult of the project for a number of reasons. From the very beginning of the project, it had been overlooked that **dividing the schools into experienced and less experienced ones in terms of their level of digital maturity poses challenges** in different education systems. Schools do not differ much from each

other because of national curriculum standards, or each school has a strength in its own unique domain. Such an ethical question arose already during the preparation of the project grant agreement.

Secondly, during the evaluation, the project team realized that the **schools themselves needed the results of the evaluation**, as iHub4schools emphasizes the agency of the schools and their ability to notice their development needs and set goals to increase digital capacity accordingly. What matters to the schools themselves is the level of their digital maturity and the digital competence of their teachers, but the use of their assessment results to recruit for the program does not support this goal. We believe that this is, in fact, a very important lesson, that all schools are strong and innovative in something, and that comparison is not a process that we should support. In particular, we should support the schools' own understanding of how to analyze, support and monitor their development, and this has been taken into account by the project pilots.

Thirdly, as planned in the project, **countries used different solutions to analyze digital competences and capabilities**. However, not all solutions are designed to allow researchers or similar third parties to access this data. This means that we, as the researchers and mentors, did **not always have access to their results**. We could have asked the results, but this raised some ethical questions among the consortium. In some of the cases there was access to data (e.g. Georgia). However, in working with schools, it was clear that **it would be unethical to report on these schools**, together with their self-assessment results, as schools that are lagging behind. Also, different localised instruments did not leave room for comparison - it was difficult to interpret schools that are lagging behind, but it would be possible to identify schools (assuming that there is an access to data) who perceive them stronger in one aspect and less experienced in other components of digital innovation. This means that we changed the focus of this task a little bit and instead of recruiting schools to the project on the basis of the self-assessment results, schools were recruited to the programme in a different way and the whole self-assessment became part of the mentoring process and above all the self-assessment was a tool for schools and teachers to support evidence-based school improvement.

The deliverable 1.3 (D1.3) "**Report on teacher digital competence and school digital maturity**" is the result of T1.3, which aimed to identify the digital competence of teachers in participating schools and determine the digital maturity of the participating schools. Assessment and mapping was carried out by piloting partners (Estonia, Finland, Lithuania and Georgia). Different self-assessment tools were used to support schools to understand their development needs and set goals in the process of digital innovation. In this deliverable, we will elaborate on the reasons why schools were not recruited based on self-evaluation results. Additionally, we will provide an explanation on how the evaluation results were utilized and outline the process through which schools were invited to join our mentoring initiatives. This deliverable reviews the literature, explaining what lies behind the concepts of digital competence and digital maturity and how they have been operationalised in practice so far, through that we will further elaborate on the work presented in Deliverable 1.1 (D1.1: State of the Field review of research on digital innovation) Secondly, we will explain the importance of assessment of digital maturity and competence in the context of the School mentoring model in our project. Thirdly, we will describe how the assessment was implemented in our project and for what the results were used. And finally we will explain how we recruited our schools.

In D1.1, we introduced different policy level frameworks and models, which aim to conceptualize teachers' digital competence (e.g. UNESCO ICT-CFT) and schools digital maturity (The DigCompOrg framework

e.g.). Additionally, in D1.1 we explained further how those concepts are treated in different educational systems in Finland, Georgia, Lithuania, Estonia and also Norway. It was already clear at this stage that practices, frameworks and foci were contextually different and that we needed to rethink how we approached this project task.

In our project, we contend that while it is crucial to collaborate with schools and teachers who are less involved in digital innovation, labeling schools as less experienced or less matured, particularly based on self-assessments, may not be the most effective approach to encourage their engagement in development work. This method also lacks objectivity in engaging schools, which was not anticipated during the preparatory phase of the project. The engagement of schools that are lagging behind is of utmost importance, but it is also a delicate matter that requires tactful handling. In this report, we aim to delve deeper into this question and explore strategies for addressing it smartly while engaging schools in mentoring activities or planning measures to develop schools' digital maturity.

1. Concepts of Digital Competence of teachers and Digital Maturity of the schools

The starting point of iHub4Schools project is that digital technologies have gained extensive usage in European schools, creating new educational opportunities, however it is also well-known that the mere availability of technology does not guarantee effective adoption of the solutions (Dexter, 2011; Ley et al, 2021). Petterson (2021) has highlighted the intricate nature of the digitization process, emphasizing that it affects multiple dimensions of school operations, extending beyond pedagogical practices and infrastructure. To capture the extent of this process, the concept of "schools' digital maturity" has been introduced by Milić and Divjak, which refers to the readiness of educational institutions for digital transformation and the level of implementation of digitization (Milić & Divjak, 2022).

Digital maturity of the schools

In Deliverable 1.1 we synthesized different national and international frameworks and models that have been tailored to the educational context to evaluate, understand and support the schools to become digitally innovative. We provided an overview of eight digital maturity frameworks with the aim to identify common areas of these frameworks and to understand how a digitally innovative/mature school has been evaluated and conceptualized: Digital Mirror (Estonia), eLearning Roadmap (Ireland), eLemer (Hungary), Framework for Digitally Mature Schools (FDMS) (Croatia), Innovative digital school (IDI school) model (Finland), Opeka (Finland), NAACE Self-review framework (SRF) (UK) and SELFIE for Schools (International, developed by EC). In our synthesis, we concluded that elements like **leadership and planning**, which involves the development of a vision statement and/or short- and long- term digital strategy in collaboration with teachers and other stakeholders, are important elements of such frameworks. Second, **pedagogical practices** which mainly reflect in the activities carried out by the teachers to integrate technologies purposefully in their own practice, which relates to professional development of teachers. Next, **students' digital competence** is emphasized in the models and frameworks of digital maturity of the schools. Finally, all the frameworks address **schools' ICT infrastructure and resources** as the characteristics of digital innovation.

A study of Pata et al. (2022) aimed to analyse schools' self-perceptions of their digital maturity based on the Digital mirror framework and the tool that supports it. Based on the results of 92 self-reports, the following variables were found to be important 'catalysts' of digital transformation in schools: elements of change management like shared leadership, structural changes in organisation, leadership practices) and teachers' role in teaching and learning IT-management. These are the key factors that should be developed if schools want to improve themselves towards digital innovation. Timotheou et al. (2022) run a literature analysis and found out that different interconnected factors that affect the impact of digital technologies on education, which are a bit broader than work of Pata et al. (2022): a) digital competence; b) teachers' personal characteristics and professional development; c) school leadership and management; d) connectivity, infrastructure, and government support; e) administration and data management practices; f) students' socio-economic background and family support and g) the socio-economic context of the school and emergency situations. Ilomäki and Lakkala (2018) looked at digital innovative schools through the lens of leadership and instruction. A digitally innovative school according to their model is described by the school's vision, leadership and practices of the teaching community, school-level knowledge practices and digital resources. We can see that, while there are many models - some more detailed than others - it is important to pay attention to leadership and change management, to teachers working together, to developing teachers' competences, and then to expect that this in turn will lead to changes in student learning.

One of the widely used instrument among schools today is SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies[1]). By design, SELFIE scaffolds collaborative reflection of the school maturity levels, because similar questions are asked from different stakeholders of the school (leaders, teachers and students). The tool has been adapted in several countries: for instance in Italy (Bocconi et al., 2020) and Spain (Castano Munoz et al., 2022). Costa et al. (2021) concluded that the SELFIE tool offers a solid foundation for school communities to engage in reflection and discussion regarding the digital capabilities of their schools. It also facilitates the development of action plans aimed at integrating digital technologies in one or more areas covered by the tool. Nonetheless, as highlighted by Costa et al. (2021), it is crucial to be mindful of the drawbacks associated with relying solely on self-reflection data. Such data can be influenced by subjective perceptions, potentially leading schools to present themselves in a more favorable or unfavorable light than reality. Additionally, schools might encounter challenges when attempting to accurately self-assess their level of maturity in certain components. However, when the purpose is clear why the evaluation is carried out and the tool is supporting schools' development processes, then the possible bias is not that crucial either.

Extensive research of Kampylis and Sala (2023) based on the data collected with SELFIE from 650 schools shows that there is still room for improvement in the digital infrastructure of schools, while teachers require additional training to effectively incorporate technology into their instructional methods. The same authors conclude that as the overall views of the leaders and teachers were pessimistic towards the digital technologies in schools, there might be a need for development programs for teachers with opportunities for peer learning and sharing practices on the effective use of digital technologies in teaching and learning, because improved infrastructure will not bring a change alone. The importance of policy interventions for the schools was also raised by Castano Munoz et al. (2018) to extend self-reflection exercises on school

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[1] https://education.ec.europa.eu/selfie/about-selfie

digital capacity in schools. Furthermore, authors argue that using a basic agreement scale to measure digital maturity is not helpful when comparing different schools. In their research analyzing schools' digital innovation, Ilomäki and Lakkala (2018) contend that a combination of data sources and to follow the mixed methods approach is essential for studying the practices of a whole school. They argue that relying solely on survey data does not facilitate comprehension of key distinctions among schools, and would only offer a limited perspective on each school's situation. Castano Munoz et al. (2018) also state that the DigCompOrg model, which the SELFIE tool is based on, is a generic framework that needs to be adapted to specific contexts. As a result, the SELFIE tool cannot accurately capture the unique characteristics of a particular country. Furthermore, none of the research findings analyzed provide evidence of how a school's digital maturity is validated or explain how a tool contributes to the school's improvement in digital maturity.

Digital competence of the teachers

Similarly to the concept of schools digital maturity, teacher digital competence has also been at the center of a variety of frameworks for years; previously often called e.g., ICT skills or competencies (see Ilomäki et a., 2016). In our Deliverable D1.1 we introduced some of them, which have been aiming to explain what are the components of teachers' digital competence. The traditional perspective of digital competence refers to a person's "*ability to use digital technologies in a critical, collaborative, and creative way*" (European Commission, 2019). One of the first frameworks was developed by *The International Society of Technology in Education* (ISTE, 2018): **ISTE Standards for Teachers** that provides guidelines for essential technology knowledge and skills. From the same period of time, **ICT Competency Framework for Teachers** (ICT CFT) was proposed by UNESCO (2018) for both in-service and pre-service teacher training - a tool that is composed of 18 competence items allocated in six dimensions of teachers' professional practice. For years now, the most well-known framework for teachers' digital competence is the **DigCompEdu**: European Framework for the Digital Competence of Educators (Redecker, 2017). This has been adapted and localized by different countries. DigCompEdu describes 22 competences allocated in the following six dimensions: 1) professional engagement, 2) digital resources, 3) teaching and learning, 4) assessments, 5) empowering learners, and 6) facilitating learners' digital competence. Later **SELFIEforTEACHERS**: the DigCompEdu self-reflection tool for teachers has been proposed, which includes 32 items based on what teachers can identify their strengths and gaps and design their learning paths to further develop their digital competence. Although it is a bit different, the **TPACK** framework also cannot be ignored when investigating teachers' digital competence. TPACK describes the three main components of technological knowledge, pedagogical knowledge, and content knowledge (Mishra & Koehler, 2006) and is also well known and widely adapted in the research and practice of in-service and pre-service teachers' digital competence. Furthermore, in several countries there are national frameworks combining items from more than one framework or there are national instruments assessing digital competencies (e..g. New literacies -framework and Opeka in Finland or PfDK in Norway).

However, it is not clear how the frameworks are used in practice to promote the teachers' professional learning and leaders' evidence-informed school improvement or what kind of decisions are made by whom based on the assessment results: whether the frameworks are used as policy tools to plan resources and investments for the development of teachers' digital competence; research tools to conceptualize digital competence as a measurable construct and what are the factors influencing this competence; or can be considered as practical tools to help teachers and schools approach digital competence development in a

conscious way. Today, the instruments do provide feedback to the performer, but little is known about the extent to which this feedback is implemented and in which teacher professional development or school development processes this feedback is embedded.

Loads of research has been conducted in the field of digital competence of teachers, mostly in the field of higher education (Basilotta-Gómez-Pablos et al, 2022; Zhao et al, 2021), to some extent in initial teacher education (Pinto-Santos et al, 2022) and in-service professional development (Fernández-Batanero et al, 2022). Tens of review studies have been carried out based on the extensive research with different focuses and conclusions. The study of Mattar et al. (2022) focused on analyzing the instruments used for assessing teachers' digital competence: instrument types, underlying frameworks, process of developing instruments and aspects of the validity and reliability of these instruments. They found out that the questionnaires are mainly based on the areas and competences described by DigComp and DigCompEdu frameworks and self-report measures and self-assessments through Likert agreement scales are the most commonly used approaches. Mattar et al. (2022) also refer to Laanpere (2019) who have suggested that the purpose of the assessment defines how the instrument is designed. Similarly Nguyen and Habók (2023) found in their review that self-evaluation instruments are typical and only a few studies promote subjective evaluation in combination with objective assessment to offer an all-encompassing comprehension of the digital competency of teachers, which again highlights that the development of frameworks, needs, objectives and the design of instruments do not always go hand in hand. Clearly, there are some expectations, for instance the Finnish frameworks created by the University of Tampere: in OPEKA, besides digital competence, teachers also reflect the various school-level practices, and similarly in ROPEKA, school leaders reflect the same issues (Tanhua-Piiroinen & Viteli, 2019). A study of Petterson (2018) aimed to investigate how digital competence in the research studies have been addressed in the wider context in terms of policy, organizational infrastructures, strategic leadership as well as teachers and their teaching practices. According to the findings of Petterson (2018) viewing digital competence as an isolated occurrence at an individual level may not be advantageous. Instead, it should be seen as a collective responsibility within an organization, influenced by various contextual factors that exist both within and beyond the broader school setting. Most of the research raises the need for teacher PD, training and support to systematically support the development of teachers' digital competence (e.g. Tzafilkou et al., 2023). However, according to our knowledge, very few (if any) studies highlight the importance of a teacher's self-assessment of his or her digital competence as a more systematic part of professional practice and, more importantly, of school development. Assessment should not be assessment for assessment's sake, but it holds a lot of potential to be part of schools' digital maturity. For instance the study of Sillat et al. (2023) pointed out that teachers felt that the results provided by the SELFIE as such are not geared towards professional self-development and are therefore considered unnecessary, but that they saw potential in the school level report to enable management to plan school improvement activities.

It is clear from the above that the assessment of both teachers' digital competences and schools' digital maturity needs to be meaningful for different stakeholders and part of the wider school level processes and teacher professional development practices. Assessment for assessment's sake, on the basis of which teachers or schools are labeled, should not be a standard practice. Research has suggested that there is a need for interventions where teachers and leaders are taught to work with these tools and to plan and monitor their own development, and where these tools are embedded in practice, this supports collective reflection and shared understanding.

2. Digital competence and maturity in the context of School Mentoring Model

In D3.3, we introduce the School Mentoring Model, which is developed to support mentors in their mentoring processes in schools to become digitally innovative. Our model consists of seven phases, and some of them are related to the evaluation of schools' digital maturity or teachers' digital competence and using the evaluation results in the school improvement procss. Figure 1 presents the School mentoring model developed in the iHub4Schools project, which was implemented in several cases during the project activities. Using self-assessment tools in collaboration with mentors can play a crucial role in understanding development needs, setting visions and goals, monitoring innovation implementation, and making improvements in School mentoring phase 1, phase 4, and phase 7.

The initiative for learning and development in **Phase 1** can originate from policy makers who possess information indicating the need for increased engagement of certain schools in the improvement process. Likewise, schools themselves can take the initiative following self-reflection. Such initiatives are frequently prompted by identified gaps that signify a need for improvement. These gaps are substantiated by data, such as national-level satisfaction surveys of teachers or students, student results, or feedback gathered from school staff members, students, parents, or local administrators. During **phase 4**, the process of mapping development needs and joint learning aims enables the alignment of school and teacher level development needs with national or local competency standards, as well as other relevant frameworks. This alignment empowers school teams and teachers by enabling them to identify priorities for change and recognize areas that require development within their planning process. In the reflection phase, reliance on data is a prerequisite for an evidence-based school improvement. Going back to initial state of the art and development needs and reflecting the changed practices in the light of that, help school teams to understand the effectiveness of the development program and mentoring and based on that, set new development goals.
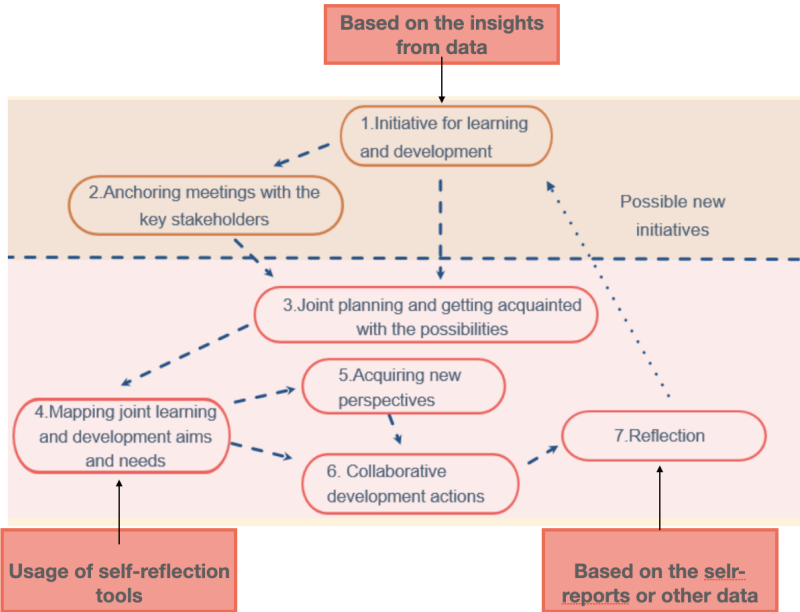

Figure 1: School mentoring model and connection with the teachers' self-assessment of digital competence and digital maturity of the schools

3. National experiences with the assessment of digital competence and digital maturity

In this chapter we will describe how school teams and teachers were engaged in the self-assessment of schools' digital maturity and digital competence and how the participants were recruited into the mentoring activities.

Case of Finland

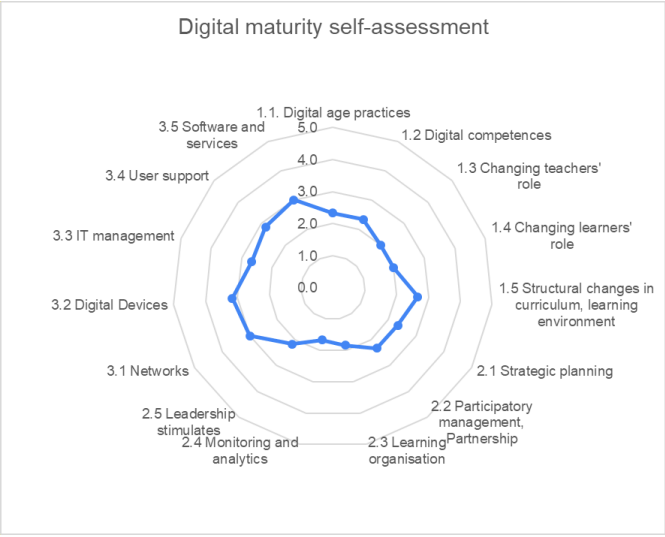|	
How were the schools recruited into the program? How the aspects of digitally-less competent schools was considered	The recruitment of schools was **based on earlier collaboration** between the researchers of the University of Helsinki and the principal of one of the schools. They had discussions about the new situation for the schools in the city to change the technical platform and start using O365 tools in all teaching. Later the city launched a DigiPath framework that defines digital competences that should be provided for all students in different grade levels, and the schools had an obligation to implement the new framework in all teaching. The first school was also interested in developing collaboration with another school that has premises in the same building: the first school was Finnish speaking and the other school was Swedish speaking, which created some additional challenges in collaboration but was also a source for inspiration. These two schools constituted the first case, and later two other schools formed a similar case of two collaborating schools when they heard about the mentoring experiences in the first case. The principals expressed a need and interest to get mentoring to promote pedagogically meaningful development work in digitality. Therefore, we based our mentoring of the schools urgent needs in the new situation, not in the evaluation of their digital maturity. In addition, in Finland schools do not differ much from each other because of national curriculum standards. Furthermore, **schools are not keen on using extra efforts** in surveys etc. if they do not consider them relevant for themselves.
Instrument that was used to assess teachers' digital competence or evaluate schools' digital maturity. Short explanation about the reason of using this tool	In the first mentoring case, we organised a workshop for the two schools where teachers evaluated in small teams their schools digital practices (good practices, needs for improvement, suggestions for development actions) using the Innovative **Digital School model** (Ilomäki & Lakkala, 2018) and template developed based on that (see Annex 1). The model is research based and we have many positive experiences about using it with schools and teachers as a practical and overarching framework for evaluating digital practices in a school in a comprehensive way.
The aim of applying the instrument	There were several aims: **to engage all teachers in the discussions** about their schools digital practices, **to collect information** of teachers' perceptions about what they need and want to develop, and to **direct the focus of development actions** towards the whole-school approach, not the responsibilities or competences of individual teachers.

Process how the instrument was applied	A 1.5 hour online workshop was organised for the teachers of both schools. Teachers worked in school-based teams. For each team, each team had a link in Teams channels to a Google document with the table including the main and sub-categories of the model (see Annex 1) The teams wrote their comments and suggestions online in the document. After the workshops, the mentors made a summary of outcomes and went through them with the coordination team of the schools to make decisions of further actions. The design of the workshop is described in the Individual method description available in the project website.
Reflection	We think that the aims of the reflection workshop were achieved quite well. One problem was that there was very limited time, and the discussion had to be concise. However, the coordination team members from both schools experienced that they received useful information from the workshop outcomes.

Case of Estonia

How were the schools recruited into the program? How the aspects of digitally-less competent schools was considered	School selection for "Digital Accelerator" program participation involves **multiple criteria** such as frequency of being engaged in digital training, self-assessments of school's digital maturity (results from 2019), results of the national satisfaction survey of educational institutions, and other data from the Ministry of Education and Research's external evaluation department. Processes needed negotiations with the representatives of local government, which supervise the schools, who showed significant support for school participation and mediate the communication between school leaders and program developers.
Instrument that was used to assess teachers' digital competence or evaluate schools' digital maturity. Short explanation about the reason of using this tool	Digital practice survey (see Annex 2) was carried out both before and after the "Digital Accelerator" program. It is individual questionnaire created in cooperation with Tartu University and consists of following topics: ● Self-confidence in using digital technology; ● The frequency of using digital technology in personal life, within learning process with students, and during general working hours (e.g. preparing lessons and doing administrative work); ● Frequency of using digital technology in different aspects of the teaching and learning process (e.g. assessment, feedback, content creation, supporting motivation etc.) ● Implementation of digital technology in different subjects; ● Statements to assess attitude towards effectiveness of using digital technology. 198 teachers from 6 schools filled out the digital practice pre-survey. Results from the before-the-program questionnaire are used **as a basis for the initial mentoring**, which was put in place specifically to create a safe and anonymous environment for each individual teacher to address their fears and insecurities. Since there is a digital practice survey filled out by every

	participating teacher before the beginning of the program, it is ideal for a mentor to **reflect on those results and ask additional questions** to get a better sense about how accurate the answers are. Initial mentoring together with the survey results give more detailed overview about the level of digital competence within the school team and is a very good basis for four key components and activities that are crucial in the program: - focus of teachers' digital training main topics and learning outcomes; - division of teachers into training groups based on their level of digital competence and learning goals; - setting up the main mentoring sessions individually, in groups and in different topics in a way that it is complementary for the digital training programs and overall school needs; - specifying the digital development project goals and main content. Digital practice post-questionnaire was carried out 4 months after the program, to get more reliable results on the impact and to assess the improvement of the digital pedagogy within school and for each individual teacher. 112 teachers answered the digital practice post-survey. Digital maturity self-assessment survey was used as an **assignment during the school leaders digital training program** in addition to other pedagogical aims. Leadership digital training consists of key topics about digital technology (digital safety and infrastructure, digital competence in school curricula etc.) and digital development project implementation. Altogether 20 people from 6 schools participated in the assignment to analyze their school's digital maturity. The theoretical basis for the creation of the [digital maturity assessment mode](l) is based on the concept of the three areas of school digital innovation, developed in parallel and closely interlinked, by Michael Fullan. These areas of digital maturity are: - Pedagogy: change in the way we learn, pedagogical innovation through the use of digital technologies; - Leadership: change management at school level, learning from each other's experience, ensuring sustainability of change; - Digital infrastructure: developing the school's digital infrastructure, ensuring digital security and user support. Items were rated on scale 1-5, where 1 described the level of Exchange (episodical implementation of digital innovation, rare cases of using digital technology); 3 described the level of Enhance (the changes in the learning and teaching processes, systematic, evidence-based changes on a school level) and 5 described the level of Empower (leverage and acting as a regional leader in some certain aspects of digital innovation).
The aim of applying the instrument	The purpose of implementing a digital practice survey is to **provide an evidence-based approach for identifying the key areas** of focus in digital training and mentoring, while also **evaluating the effect** of the "Digital Accelerator" program. Similarly, the objective of implementing a self-assessment digital maturity model is to provide schools, in addition to the comprehensive school

	assessment, with a **foundation for determining the specific focus** of their digital development project.
Process how the instrument was applied	Digital practice survey was integrated into following activities: 1. Introduction of the survey during the anchoring meeting with the school leaders. 2. Distribution of the survey through school management. 3. Collection of the data. Data analysis and overview of the results provided for the mentors 4. Further analysis and preparation for the initial mentoring and digital training programs done by mentors. 5. Distribution of the survey through school management after the training program. 6. Collection of the data. Data analysis to assess the results of the program. 7. Revision of the "Digital Accelerator" program, adjustment, improvement to the structure and content of the program, also adjustments to the surveys. Digital maturity self-assessment survey was integrated into following activities: 1. Introduction of the assignment for the school teams. 2. Working in groups within their school teams for two weeks to fill out the self-assessment survey. 3. Overview of the results from the educator at the beginning of the next contact seminar. 4. Working in groups to finalize their schools projects ideas based on the digital maturity self-assessment survey results. 5. Group presentations about the project ideas and the lessons learned from the digital maturity self-assessment assignment. 6. Schools carry on working on the digital development projects between and during the next three contact seminars. Following figure gives an overview of Digital maturity self-assessment results (arithmetic average) based on online survey answers from six schools.

	Digital maturity self-assessment
Reflection	Reflections from the digital practice survey implementation: ● Participating school management seem to have their own idea of **what is the level of teachers' competence** and what are t**he most important issues to be addressed**. Explaining overall results from surveys helps to find a common ground with the mentors what to focus on during the "Digital Accelerator" program. ● Before and after survey enables specifically **to measure the change,** because the starting point is described and described based on the collected data. Reflections from the Digital maturity self-assessment implementation: ● Digital maturity self-assessment analysis has to **be a group effort consisting** of key persons responsible for the changes in the school's digital pedagogy, leadership and digital infrastructure. This way the analysis has a much broader effect and is an incentive for other much needed changes within schools. ● It has to be emphasized for the school teams that it is a **self-assessment and the aim is not to provide a better picture** about the schools, but to realize the areas that need improving and/or changes. ● Some focus should be put on explaining to the school teams that the **digital development of the school is not something that is separate from the overall school strategic goals** and leadership, learning and teaching processes, or infrastructure. Digital technology is a tool, not a purpose itself.

Case of Lithuania

How were the schools recruited into the program? How the aspects	Vilnius University has close relationships with many schools and schools were recruited into the activities based on the earlier collaboration and

of digitally-less competent schools was considered	networks. The schools were invited to join the initiative according to the following aspects: investigation of students' study results, school results and geographical area. Principals and teachers from the chosen schools have expressed their willingness to collaborate with Vilnius university as part of the iHub4Schools project and participate in research activities. During interviews, principals and teachers demonstrated their motivation to improve their skills and knowledge. It is important to highlight that government officials, school principals, and teachers openly discussed the obstacles they face in implementing digital innovations in their schools. These challenges primarily revolve around teacher competence, as well as insufficient school infrastructure and equipment.
Instrument that was used to assess teachers' digital competence or evaluate schools' digital maturity. Short explanation about the reason of using this tool	Vilnius university team led by prof. Valentina Dagienė was invited by the European Commission to pilot SELFIE for TEACHERS tool in 2021 and 2022 (together with teams from Italy, Estonia and Portugal). As a result, the majority of **teachers in Lithuania are familiar with the tool, understand how to use it and how they can benefit from it.** Additionally, the previous SELFIE school evaluation tool is well known in Lithuanian education and some schools have been using it. During the piloting SELFIE for TEACHERS was translated to Lithuanian language and explanatory material prepared for teachers. That is why, within iHub4Schools, the decision was made to **implement the SELFIE for TEACHERS tool for mapping teachers' digital competences** and establishing their development objectives.
The aim of applying the instrument	The primary objective was to **motivate teachers to assess their own digital competence,** specifically in terms of their knowledge of innovative technologies and their utilization of modern technologies in teaching. The assessment also aimed to **identify the challenges teachers faced in** integrating digital tools into their teaching practices.
Process how the instrument was applied	First, SELFIE for TEACHERS was **localized** and tested and ensured that all questions were clear to avoid any unexpected difficulties during the survey. **Mentors were assigned** to support teachers to fill-in the survey, some teachers completed the questionnaire independently, while others received assistance from mentors. Each teacher received a report based on their questionnaire responses, which they then shared with the researchers and mentors. Several face-to-face and online meetings were organized with the participating teachers, where the survey results were presented. A brief group interview was conducted to gather feedback on the self-assessment tool. Based on the teachers' needs identified during this meeting, further development activities were planned.
Reflection	Teachers in the participating schools were satisfied with SELFIE for TEACHERS as a tool to assess their digital competences. Teachers especially liked to **explain and discuss their results**, and to discuss how each of them could improve their digital competence. The teachers exhibited high levels of

	motivation and self-reflection, recognizing that the evaluation was primarily focused on their personal development rather than solely assessing their competencies.
	Teachers expressed a strong sense of confidence in the SELFIE for TEACHERS tool, as the questionnaire provided them with personalized assessments, allowing each respondent to independently evaluate their own competence. This personalized approach contributed to the high level of trust and belief in the accuracy of the SELFIE for TEACHERS among all participating teachers.

Case of Georgia

| How were the schools recruited into the program? How the aspects of digitally-less competent schools was considered | Five Public Schools were selected in the Adjara region. The Ministry of Education, Culture and Sports of the Autonomous Republic of Adjara and the educational resource centers of the municipalities helped us in the selection of schools. school level(s): primary, elementary, secondary; The schools were selected according to the following criteria: experience, size, geographical area, infrastructure and teacher achievements, etc. The school selection process was also based on the results of the research carried out in Georgia. According to preliminary data, it was certain that a large number of teachers faced certain difficulties in using digital technologies in the teaching process.

Principals and teachers from the selected schools expressed readiness for cooperation with BSU within the iHub4Schools project and participating in research. The interviews with principals and teachers revealed that they were motivated to enhance their competence. It is worth noting that the government, school principals and teachers spoke openly about the challenges with the use of digital innovations in their schools, which are related to the competence of teachers, as well as school infrastructure and equipment.

This method of school selection has reiterated the fact that the school/teacher should be given the opportunity to identify their professional needs and to plan/implement the intervention in collaboration. When you talk to the school as equal and offer cooperation, they are much more open to innovation. |
|---|---|
| Instrument that was used to assess teachers' digital competence or evaluate schools' digital maturity. Short explanation about the reason of using this tool | SELFIE for TEACHERS was used. is a survey tool provided for schools by the European Commission. It is free of charge for every school. and meant for evaluating how schools use digital technologies for teaching and learning and how digital technology use is perceived by students, teachers and school leaders. |
| The aim of applying the instrument | The aim was to measure teachers' digital competence to determine what knowledge teachers have in terms of innovative technologies, how they use modern technologies in teaching, what difficulties they face in the teaching process, what kind of support they need in order to increase their digital competences. |

Process how the instrument was applied	Preparations: Localization of the SELFIE for TEACHERS, pre-testing of the survey to measure approximately how much time each teacher would need to complete the questionnaire, and to clarify the essence of all questions in order to avoid unexpected difficulties during the survey.
	Filling in the survey: Mentors were allocated for the teachers. Some of the teachers filled out the questionnaire independently, and some of them filled out the questionnaire with the help of mentors. Support refers to technical support only. No mentor intervened in the content part.
	After the survey: BSU team analyzed the results. After completing the questionnaire the report was sent to each teacher. Teachers shared the reports with researchers and mentors.
	Face-to-face meeting was conducted with the participant teachers and the results of the survey were introduced. Short group interview was conducted to get the feedback on the self-assessment tool. The need for the further steps were identified and according to teachers' needs the development activities were planned.
	At the end of the training, the instrument was applied again. The final results of the survey (with the principle of protecting the personal data of the participants) were presented in the form of a presentation to the administration of the schools involved in the study and the participating teacher
Reflection	The iterative research process was much easier because the teachers were already familiar with the specifics of SELFIE for TEACHERS and did not need any technical help. Teachers were also much more motivated and self-critical because they realized that the e**valuation is focused on their (teachers') development** and not only on the assessment of their competencies. The results of the study showed that: a) The digital competencies of the teachers involved in the research increased; b) The SELFIE for TEACHERS proved to be relevant for evaluating teachers' competencies and identifying needs; c) The participation of the teachers in the trainings after the first study was active, because the topics of the trainings were specifically planned according to their needs, as a result of their own self-evaluation; d) Confidence in the SELFIE method was high on the part of teachers, because the questionnaire is individual and all respondents have the opportunity to independently assess their competence. e) Schools gained experience in using the SELFIE method, which will allow them to conduct similar research at other times and with other teachers.

Based on the information provided above, it becomes evident that the **selection of schools for the project** considered a comprehensive range of information concerning each school. However, the assessment of digital competence and maturity is primarily linked to the schools' individual development, focus, and

vision. Furthermore, it became evident that the selection of instruments could be based on a recognized EU-levels tool. However, in cases where researchers are involved in the process, instruments associated with specific theoretical concepts could also be considered and implemented. In all cases, the main objective is to enhance teachers' and school leaders' understanding of the reasons behind competence development, as well as the methods involved and how it can contribute to overall school development. Nevertheless, to ensure the success of this attempt, a systematic support system is necessary, which is precisely what our developed School mentoring model provides.

4. Lessons learnt from the cases and conclusions

The original goal of D1.3 was to report the level of digital competence of the teachers and digital maturity of the schools and describe how, based on those results, the schools were recruited into the activities of iHub4Schools activities. Quite early on in the project, we realized that such a plan would not work in all partner countries and that we needed to rethink the task. First we will explain why this approach did not work:

a) Dividing schools into more and less digitally mature **on the basis of self-evaluation alone does not give an objective view of schools.** All schools have something that makes them strong and the project team lacked a single instrument to label them accordingly. Segregating schools into strong and less advanced ones when recruiting for the programme raises ethical issues that we wanted to avoid in the project.

b) Countries applied **different approaches to recruit schools:** In some cases, the local educational authorities had a role in that, in other cases, the researchers and mentors used their already existing networks and partnership which were extended regionally.

c) The variety of instruments and local contexts made comparisons and the application of similar practices difficult, but it did provide an opportunity to understand the diversity of education systems. For example, we realised that some tools do not allow data to be shared with third parties (e.g. researchers) and some schools are so autonomous that they do not want to share.

d) Instruments should be embedded in the mentoring process instead of using them to label schools and improve interventions based on schools' subjective self-assessments.

In all cases we observed that **teachers exhibit higher motivation and a greater willingness** to be engaged in professional development when they have the chance to assess their own competence and recognize their individual needs. The autonomy of schools in developing their own abilities is crucial to emphasize. When school leaders have the freedom to identify and address their areas of improvement without external directives, the allocation of human and financial resources for professional development becomes meaningful and effective. When teachers have the opportunity to assess their own competence and identify their individual needs, it fosters a higher level of motivation and engagement in professional development. For instance, observing students' progress in solving computational thinking tasks using virtual learning environments can be a powerful motivator for teachers to further embrace digital technologies in their classrooms. Self-assessment allows **teachers to have a clear understanding of their current abilities**, enabling them to set goals and develop targeted strategies for improvement. It empowers them to take ownership of their professional development and seek out relevant training, resources, and support to

enhance their digital competence. Developing and suggesting innovative teaching materials can significantly enhance teachers' ability to incorporate digital technologies and computational thinking into their lessons; activities to create materials collaboratively is even more efficient because teachers engage in their own work.. These learning resources can include interactive online platforms, educational software, coding tools, virtual simulations, and other digital resources designed to engage students and promote computational thinking skills. In the field of informatics and computational thinking, it is essential to offer teachers a range of materials that cover various learning objectives. This can include lesson plans, coding exercises, problem-solving tasks, project-based activities, and assessments specifically tailored to develop computational thinking skills in students. In some cases (Estonia and Finland, for instance), we noticed that **school leaders and teachers** are self-conscious about what they wish to concentrate on and what they want to spend their limited time resources on. We have found that effective methods for collecting evidence about the schools' situation and practices are those that **foster active engagement** and agency among participants. Ideally, these methods combine elements such as discussion, collaboration, training, and reflection during the data collection process, such as the reflection workshop conducted with all teachers of the school regarding their digital practices. By incorporating these approaches, schools are better equipped to make informed decisions and take appropriate actions based on the collected data. Moreover, providing **ongoing support and professional development opportunities** for teachers is essential to ensure they are confident and proficient in utilizing these innovative materials. Workshops, training sessions, online courses, and communities of practice can serve as valuable platforms for teachers to explore and share best practices in integrating informatics and computational thinking into their teaching. By providing teachers with innovative materials and the necessary support, schools and educational institutions can empower educators to deliver engaging and effective instruction in informatics and computational thinking.

Based on the activities carried out in our project, we have observed that rather than evaluating schools as digitally less competent or digitally innovative, it is more beneficial to involve schools in mentoring activities based on other criteria that are discussed with school owners, for instance. Such a labeling based on the self-assessment results only is not accurate and raises several ethical questions. However, the process of evaluating digital competence of teachers and maturity of the schools should primarily focus on the school teams themselves, providing guidance and support for their development. Overall it is important to highlight that schools will not develop based on the results of their self-evaluation, but they need external motivators, incentives to drive team development e.g. programme/ mentoring to support school leaders and that's what we aimed to do in our own project through the development of School mentoring model and supporting school teams and teachers in their improvement process.

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Annex 1: Template for evaluating digital practices in the school

Please evaluate the changes and needs for improvement in digital technology in relation to different areas of school practices. Write as practical issues as possible.

VISIONS OF THE SCHOOL	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Visions of using digital technology			
Consensus about the vision			
Intentional development orientation			

LEADERSHIP	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Shared leadership			
Networking of the principal			
Role of the principal			

PRACTICES OF THE TEACHER COMMUNITY	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Pedagogical collaboration and sharing of expertise			
Development practices			
Networking of teachers			

PEDAGOGICAL PRACTICES	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Conceptions of using digital technology in education			
Pedagogical practices with digital technology			

SCHOOL LEVEL KNOWLEDGE PRACTICES	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Common knowledge practices with technology			
Physical premises			
Pupils' involvement in school-level activities			
School-level networking			

DIGITAL RESOURCES	Current good practices	Needs for improving the practices	Suggestions and ideas for new practices
Utility of technical resources			
Pupils' digital competence			
Teachers' digital competence			

Pedagogical and technical training and support			

OTHER PRACTICES	**Current good practices**	**Needs for improving the practices**	**Suggestions and ideas for new practices**

Write here three key issues, questions, or suggestions that the whole school should work on together:

If you do not want the evaluation in this document to be used as material in research, tick (X) the answer to the question below.

We do not want our evaluation to be used as research material:

Reference

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Annex 2: Digital practice questionnaire

Developed by Piret Luik (Tartu University) and Harno team

1. Name
2. School
3. E-mail
4. List subjects you teach
5. I am a teacher, who feels using digital technology. *Scale: absolutely sure, sure, so and so, unsure, completely unsure*
6. I am a teacher who teaches students on how to use digital technology. *Scale: absolutely sure, sure, so and so, unsure, completely unsure*
7. I use digital technology *Scale: every day, often, sometimes, rarely, never*
   a. for personal, private purposes (eg reading news, online banking, e-tax office, e-shop, buying tickets, eesti.ee opportunities)
   b. professionally in teaching and educational work
   c. professionally during general working hours, e.g. information systems, other documentation, communicating with colleagues and / or parents, etc.
8. I use digital technology in my teaching *Scale: in all the lessons based on the needs, in most of the lessons, in half of the lessons, in some lessons, do not use*
   a. for preparing lessons
   b. for getting the students' attention
   c. with students to put in place the objectives
   d. for motivating students to focus on the topic
   e. for reminding students of what they have learned before
   f. for presenting new material for the students
   g. for guiding students in learning process
   h. for assessment
   i. for feedback
   j. for evaluation
   k. to generalize and to settle the new knowledge
9. If you answered, "do not use" to any of the above options, please write briefly, what is the reason?
10. Students use digital technology in my subject. *Scale: in all the lessons based on the needs, in most of the lessons, in half of the lessons, in some lessons, do not use*
    a. searching information
    b. reading new material
    c. watching / listening new material
    d. solving assignments
    e. teamwork
    f. communication
    g. creating learning materials
    h. homework assignments
    i. testing
    j. for giving feedback
11. If you answered, "do not use" to any of the above options, please write briefly, what is the reason?
12. I think that *Scale: completely agree, agree, so and so, disagree, totally disagree*
    a. Using digital technology saves me time.

b. The use of digital technology helps me to make teaching more efficient.
c. Using digital technology helps me to organize my work better.
d. For me, using digital technology is easy.
e. For me, learning to use new digital technology is easy.
f. I understand the logic of digital technology very well.
g. teaching using digital technology allows the individual needs of learners to be taken into account.
h. The use of digital technology helps to develop learners' creativity and imagination.
i. The use of digital technology helps to improve cooperation between learners.
j. Digital technology makes learning more interesting for everyone.
k. Every teacher should use digital technology in their teaching.
l. Learners are more motivated when they can use digital technology in their lessons.

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