

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

Guidelines for mentoring schools in the use of digital technology: School mentoring model

Editors: Liisa Ilomäki, Minna Lakkala and Kairit Tammets



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Introduction

Liisa Ilomäki

A topical and essential issue in many countries and in many schools is how to support teachers in adopting and implementing digital technology in education. There is no single solution to how this should be done; there are different ways and methods depending on the school, the resources available, the visions, and the local school administration, for example. One of the means for supporting the change to using digital technology in schools is mentoring: experienced mentors can guide and support teachers in various ways. In these guidelines, our focus is on mentoring and mentors.

The aim of these guidelines is to support mentors in their mentoring when the focus is especially on developing the use of digital technology in education. From previous experience and research, we know that the implementation of digital innovations in schools does not easily take place without external support, such as external mentors, because it often requires changing pedagogical practices, not just learning to use new technological tools or solutions. The guidelines in this book provide models, methods and ideas for mentors who work with “the whole school”, with several teachers, principals and other staff, sometimes even students, aiming to improve the school as an entity through mentoring and inter-school collaboration. The final goal is naturally to help improve students’ learning and digital competence.

The mentoring guidelines and the School mentoring model introduced in this book were created in the EU-funded project Accelerating Digital Innovation in Schools through Regional Innovation Hubs and a Whole-School Mentoring Model (iHub4Schools). In these guidelines, we describe the School mentoring model, which consists of three parts: a theory-based Conceptual model, a Process model, and Individual methods for conducting mentoring in practice.

We know that starting a school-level mentoring process is demanding, and the process of starting mentoring should be accepted by all participating stakeholders: teachers, principals, ICT teams and external participants, like the local school administration. These mentoring guidelines are a second step: first there must be acceptance of the mentoring, and then of the implementation of the mentoring process, which will be the school mentoring model. These guidelines will support this endeavour.

Mentors have various backgrounds: they might be teachers, teacher trainers, ICT experts, researchers, or school administrators, and they have a range of skills, which can be applied to mentoring. In these guidelines, we discuss the roles and competencies of mentors, but only in brief, because other publications about mentoring in general are available.

These guidelines consist of the following chapters:

- ▶ In the first part, we will define mentoring, and discuss the aims of mentoring and the mentor's role, as well as providing examples about mentoring processes in the iHub4Schools project.
- ▶ In the second part, we describe the theoretical background of the school mentoring model by describing the Conceptual model.
- ▶ In the third part, we describe the Process model for school mentoring and individual methods to be used in various phases of the mentoring process.
- ▶ The final chapter is about the lessons learnt about mentoring during the iHub4Schools project.

The creation of the mentoring guidelines

The mentoring guidelines and the School mentoring model were created in the EU-funded project *Accelerating Digital Innovation in Schools through Regional Innovation Hubs and a Whole-School Mentoring Model* (iHub4Schools) (grant agreement:101004676). The project was conducted from 2020 to 2023, and it was coordinated by Tallinn University (Estonia), by professor Kairit Tammets. The other partners were the University of Helsinki (Finland), the University of Bergen (Norway), University College London (UK), Batumi Shota Rustaveli State University (Georgia), Vilnius University (Lithuania), the Swiss Federal Institute of Technology Lausanne (Switzerland), STePS (Strategies and Tools to Enhance People's Skills, Italy), and Harno (the Education and Youth Board, Estonia). More information about the iHub4Schools project is available on the [project website](#).

The main goal of the project was to coordinate and support the creation of sustainable multi-level regional innovation hubs in local communities in partner countries, each fostering the scaling of digital innovation in local schools. The other main goal was to create an adaptive and flexible whole-school mentoring model to help mentors, schools, and educational staff in general, who work on promoting digital innovation in schools.

From the very beginning of the iHub4Schools project, we started to define the theoretical basis for the project and for mentoring. The basis had already been described

at a general level in the application for funding, but we wanted to continue the discussion to create a common understanding about the basis for mentoring between partners at the beginning of the project. These discussions led to the conceptual model for mentoring. Based on the partners' previous work in research and development projects, we started to create a process model, trying to answer how mentoring for the promotion of digital innovation can take place in practice in schools and with teachers. This process model was then used for mentoring the teachers during the project, and based on these experiences, we revised the process model. In addition, from the beginning of the project, the partners collected individual methods for describing the implementation of specific situations in practice in schools. Partners also started to create new individual methods when they were mentoring at the schools during the project. As a result, in autumn 2023, we published the report "The school mentoring model" as one of the project deliverables, which consisted of the Conceptual model, the Process model and Individual methods.

During the iHub4Schools project, as well as during the creation of the mentoring guidelines, we collaborated with various educational experts who are knowledgeable in school mentoring, including Anna Laghina from the In-house Pedagogical Consultant in Mentoring for School Improvement (MenSI) project (2020–2023) by the European Schoolnet. Anna Laghina also kindly commented on this document, and we are grateful for that. Another project which gave us inspiration for these guidelines was Technology Enhanced Learning Mentoring Support (2016–2018), co-ordinated by H2 Learning (Ireland). We are also grateful to three external reviewers, Hanna-Maria Partanen, Veiko Hani and Maria Begoña Arenas Romero, whose comments helped us to improve the guidelines.

The School mentoring model and the individual methods are free for anyone to use, following the Creative Commons licence CC BY-NC-SA (4.0).

Mentoring and mentors for supporting schools in digital innovation

Liisa Ilomäki and Minna Lakkala

In the field of education, practices like mentoring, peer-to-peer learning, networking, training, and coaching are common methods among educational staff wishing to improve their professional expertise in recent years, especially if they wished to implement, adopt and increase the competence of using digital technology in teaching and learning. Improving professional expertise and supporting the use of digital technology in teaching and learning are intertwined; for example, a mentoring process can include participation in some digital technology training events, or peer-to-peer learning can include mentoring. Successful mentoring can be evaluated by its impact on a school, such as sustainable changes in practices, increased teacher consciousness and expertise, interest in development efforts, and, of course, improved pedagogical practices in classrooms and, as a consequence, improved student learning outcomes.

A school is an institution which has long traditions, stable structures, well-educated staff and (usually) a status which is appreciated by society. There has been extensive research and development work about school change, the importance of implementing digital technology into daily educational practices, as well as the problems and shortcomings of digital technology in education, but we have not focused on these issues in this book. However, it is useful to recognise the recent discussion about school development, which has focused on schools as professional learning communities. This is a concept with several definitions and diverse content. For example, Stoll and colleagues [1] defined a professional learning community as a community of people who have a shared a learning vision, they support and work with each other, and together they learn new and better approaches to support all students' learning. That approach is also in the School mentoring model: the aim of mentoring is to support teachers as a community to learn new ideas and practices, even from each other, and together, to put new solutions and activities into practice.

Mentoring supports both individual and collective aims

During a longitudinal mentoring process, the mentees learn to implement new ideas and practices into their own work. Mentoring can take place in informal conversations in the staff room, in other informal situations, or professionals may agree to meet at regular intervals and face to face [2]. During the COVID lockdown, various online mentoring practices became common. In these guidelines, our aim was to develop systematic and formal mentoring of teachers and schools, to which the school leadership is also committed to. The mentoring events can take place either face to face, or online.

In general, mentoring is often regarded as an individual process as, e.g., Bush [3] defined it as: “a process where one person provides individual support and challenge to another professional. The mentor may be a more experienced leader, or the process may be one of peer mentoring” (p. 379). An example of a mentoring process between individuals is a practice transfer process conducted at two elementary schools, in which a teacher supported a colleague [4, 5, 6]. The teachers were from the same school, and they followed a structured collaboration process through which the more competent teachers shared their pedagogical practices with the less competent ones and supported them to plan and implement their own scenario in the classroom. We describe this practice as an individual method called *Collegial tutoring* in the *Individual methods for mentoring* sections.

Mentoring can also take place with a group of teachers, and as Dempsey, Arthur-Kelly and Carty [2] defined, usually at school or district levels. Teachers receive professional support in the form of collective coaching and participate in solution-focused activities, mediated by an experienced senior teacher, but also by external experts, e.g., from a university or local school administration. An example of this kind of group mentoring was conducted in an upper secondary school at which university researchers supported voluntary teachers in creating courses in which the aim was to integrate a range of subjects into one teaching entity; for example, physics, chemistry and biology teachers created a course in Energy [7]. In the project, teachers started to create innovative pedagogical courses, and they started to collaborate with external partners, such as local polytechnics and voluntary work organisations. It is important that both levels are present in school development: the school community and the individual teachers.

In these guidelines, we focus on the mentoring of teacher groups, not individuals, as described in the following chapter about the theoretical background. One basic reason is that to obtain sustainable results in using digital technology in education, the whole teaching community should share the same goals and strategies. This is because implementing digital technology in education changes teaching practices and the roles of teachers and students (see the *School mentoring model: the conceptual background* chapter; also, Ilomäki & Lakkala [8]). However, although the aim of the

mentoring is to support the whole school, this does not mean that there cannot also be individual mentoring and group mentoring. In practice, that is often the case in school-level mentoring processes.

For there to be effective mentoring, the participants' own activity in defining goals, engaging, making improvements and reflecting on their experiences is necessary. The approach of mentoring should be based on the participants' needs and interests, not on the mentor's wishes. Further, it is important that in mentoring, the process becomes important, not only the content that the mentees should "learn". This is because through a successful process, the participants will commit to the aims and the changes will be more sustainable. Another important issue is to bridge the work situation – in education this means teachers' work in schools – and teachers' learning of new practices during the mentoring process, so that the participants have an opportunity to reflect on their own practices and share their viewpoints with others [3]. A similar approach of connecting individual learning with workplace practices is also emphasised in professional learning: it is a systemic phenomenon and a process of teachers as teacher groups. Furthermore, for effective mentoring, it is essential that all stakeholders involved in the process speak the same language, i.e., that they share a vision and pursue the same goals. To achieve this, the mentoring process should be transparent and clear. In addition, the decisions should be written down for further work.

Mentors as experts in the topic and in supporting change

Mentors are experts in the field that they mentor but besides this, they need competencies and attitudes for mentoring, such as which are close to competencies of adult teaching. However, teachers and other advanced practitioners involved in mentoring at other schools should also know about effective mentoring strategies and processes. Sowell [9] investigated mentors working with new individual teachers. She maintained that a mentor should create a trusting relationship with the new teacher, support and guide the teacher in creating a classroom environment that supports learning and be able to support and guide the new teacher in appropriate instructional strategies which are suitable for the teacher in question. These requirements are certainly also necessary in mentoring teacher groups. As Sowell [9] wrote, mentors need ongoing training in classroom management, instructional practices and relationship building, in order to remain effective as mentors. One problem is that many of the mentors working in school contexts are not educated to mentor adults, and they often have a teaching background. Mentoring adults, sometimes even teachers at the same school, is not the same process as teaching in the classroom. In these guidelines, we describe models and methods that especially support mentoring processes with a group of teachers (and other educational staff).

Especially for the acceptance and implementation of digital technology, mentoring individuals and groups has been used because the traditional training of large groups is not an effective way to advance the learning of new pedagogical practices with digital technology nor to promote deep-level changes in pedagogical thinking. In their study concerning secondary school teachers' preferences in the process of individual technology mentoring, Top, Baser, Akkus, Akayoglu, and Gurer [10] found that teachers need flexibility in their context to integrate digital technology, and they are ready to use their knowledge of ICT in solving problems if they have the opportunity to try out their ideas. The authors suggested that teachers should be actively involved in the decision-making process concerning the content of digital technology training.

Mentors' various roles

It is typical for the mentor of digital technology to be an advanced practitioner: a teacher at the same school, a teacher from a neighbouring school, or a technology-oriented teacher provided by the school administration. Often the focus of mentoring in the use of digital technology is on technological issues: in applications, hardware, or new software features, even though teachers have the main difficulties when applying digital technology in teaching and learning practices. The mentor's role in promoting the use of digital technology has been investigated in the following two studies. In the context of higher education, Vennix and colleagues [11] described five roles of the educational information and communication specialist: the change agent, who is able to initiate and support an effective change; the coach, who enthuses, supports and trains lecturers in the pedagogical use of IT in education; the advisor, who provides management and the organisation with advice, and communicates this effectively; the networker, who brings people together in an approachable and accessible manner, brings ideas and examples together, and ensures that these collaborations, ideas and practices are viable and adopted in the organisation, and the inspirer, who monitors the potential of new pedagogical and technological developments, communicates the opportunities that these offer for education, and therefore inspires other professionals to take action. Besides these roles, in their study, Gökoğlu and Çakiroğlu [11] found that mentors also worked as the technical support or the trainer: the mentors presented teaching materials and guided their use for the achievement of those materials, increased the technological literacy and guided the use of technology in the teaching programme. It is obvious that mentors often do the work of a technical supporter or trainer, but in mentoring, it is important that they focus on sustainable changes in the other roles. One person cannot have all these roles and expertise, but for mentors, it is important to be aware of their own approach to mentoring.

In the guidelines presented in this book, the mentor is primarily depicted as a change agent and networker, sometimes also as an advisor. The roles involve scaffolding

school leaders and the teaching community to participate in the change process, seek practical support and collaborators, as well as to conduct various activities that help them to improve their pedagogical practices with digital technology. The mentor offers suggestions, models and examples to facilitate the organisation of change processes and activities within schools, but is not a primary actor in implementing them. The mentor operates mainly in the background, giving agency to the school representatives, which increases the likelihood that the changes implemented within the community are permanent.

The person who is mentoring at the school in digital development might be someone who belongs to the school staff, like a principal, a leadership team member or an ICT tutor (a teacher who especially concentrates on supporting other teachers). It is even desirable for the school to take responsibility for digital development gradually and independently, and to apply the practices presented in these guidelines without outside help, and for a member of the school's staff to take responsibility for the implementation of active development work.

There are many benefits in the situation in which the mentor comes from the school's staff, such as:

- ▶ **Deep understanding of the school culture:** Being a member of the school's staff means that the mentor already understands the unique culture, dynamics, and challenges of the school. This understanding can facilitate smoother implementation of development initiatives tailored to the school's specific needs.
- ▶ **Established relationships:** The mentor will have established relationships with other staff members, which can foster trust and cooperation during the digital transformation process.
- ▶ **Accessibility:** As an internal mentor, the staff member is readily available for ongoing support, guidance, and feedback. This accessibility ensures that assistance is consistently available to address any concerns or obstacles that arise during the development process.

However, there are also various challenges to consider if no external mentors are involved in the process:

- ▶ **Limited perspective:** The mentor may have a limited perspective of external best practices and innovative strategies for digital transformation, which could hinder the introduction of new ideas or approaches. It is essential to supplement internal knowledge with external resources and professional development opportunities.

- ▶ **Time constraints:** Balancing mentoring responsibilities with existing job duties can be challenging, particularly for busy staff members like principals or teachers. Finding time to dedicate to mentoring activities while managing other responsibilities may require careful planning and prioritisation.
- ▶ **Resistance to authority:** Colleagues may resist guidance or recommendations from internal mentors if they perceive them as exerting authority or control over their professional practices. There might also have been previous interactions or conflicts with colleagues that could influence their perceptions of the mentor's credibility and trustworthiness.
- ▶ **Skill gaps:** The mentor may possess expertise in certain areas of digital technology but lack proficiency in others. Identifying and addressing skill gaps through training, collaboration, or hiring external consultants may be necessary to ensure comprehensive support for digital transformation initiatives.

Mentors' experiences and perceptions of mentoring in iHub4Schools

In this chapter, we summarise how the mentors working with schools and teachers described their experiences and perceptions during the iHub4Schools project. The aim is to describe mentoring from a practical and contextual perspective. All the mentors worked towards enhancing digital innovation at the schools and with the teachers.

In the iHub4Schools project, 20 mentors from Finland, Estonia and Norway completed a questionnaire about their mentoring experiences in schools during the project.

The aim of the questions was to understand how the mentors understood and experienced the mentoring process and their role as mentors. The following results are summarised from the D4.2. Integrated Evaluation Report [13].

The important reasons to mentor schools on the road to becoming digitally innovative was to **avoid the inefficient way of using the technology**, e.g., *“It is so easy to use digital tools inappropriately, digital innovation is about using the digital in a good way, to provide more mastery, motivation and learning experience for our students”*. Especially during and after the distance learning situations caused by the COVID-19 pandemic, teachers and leaders often believed that there is a need to use digital tools a lot and that this is enough. The role of the mentor was **to support teachers and leaders to understand that digital innovation is about using the digital tools in an effective way**, e.g. *“The mentoring process is important for schools because in this way we help teachers apply theoretical knowledge in practice and in their professional*

development; I am interested in improving the pedagogical quality of teaching practices, and that seems to be very difficult if teachers do not get support or if only individual teachers are trained or guided. The focus should be on school level change, and the role of principals is central". Additionally, mentors pointed out that the research claims that **mentors take an external view and their role is to support schools in changing**; e.g. *"The external support for improvements has been proven effective as adopting digital technology into existing practices, which is always challenging without external support and reflection."*

Mentoring also brings benefits to mentors. Some of the mentors reflected that mentoring **provides them with opportunities to learn and develop** because through the mentoring process, it is possible to see how things are done in other schools and there is a need to constantly adapt to other situations and cultures. For example: *"It was helpful in this process to get acquainted with the mentoring and coaching strategies and the specifics of its use"*.

Prerequisites for effective mentoring were (schools' and teachers') **readiness to change, openness to innovation and a basic level of teachers' digital competence**. Also, mentors' **professional knowledge, research-based methods and ability to answer questions** were perceived as being aspects that have supported their mentoring process.

All mentors agreed that the biggest challenge is related to the **mindset and the willingness to change**, and this applies to individual teachers as well as to the school leadership and the organisation in general. According to mentors, it is not enough for leaders to implement change in the school if teachers do not come along, nor is it enough for teachers to change their practices, if but leaders do not support them, e.g. *"It is difficult to change those who don't want to be changed", "If there is no innovation, motivation, encouragement from the leaders, then these projects are only the thing of some individual enthusiasts. It needs someone who is a leader and it is most successful if the leader is from the school management", "Involvement in such initiatives should be supported by the school administration, without which the school cannot develop"*. Such results highlight the importance of systematic leadership and change management in implementing whole-school level change.

A school's motivation in school development initiatives is the possible reason for the school to participate in mentoring initiatives. One of the incentives from the mentors' perspective is the **external recognition and acknowledgement** from the university or teacher training institutions, e.g., *"Many schools are motivated by the recognition of external sources like university or programme", "Schools and teachers, in addition to gaining experience, are focused on obtaining the relevant proof (certificate)"*. The

external pressure (national curriculum, nation-level strategies) set high expectations for schools and teachers, and **mentors can support teachers and leaders in meeting these expectations**; e.g., *“We help schools and teachers do what they need to do anyway but which they feel challenging to accomplish alone, for example, our national curriculum is rather advanced pedagogically and many teachers struggle with implementing all that they should”*.

From the practical perspective, **collaboration with the mentors gives schools new ideas, knowledge, tools and resources**. Teachers appreciate the introduction of good practices and examples that can be reused in the classrooms. It is important that besides introducing innovations, mentors help teachers to try out new ways of teaching and learning as well as to organise practical events that provide teachers with opportunities to reconstruct new knowledge in co-creation with others; e.g., *“it is important that we not only introduce the innovations, but it is about showing in practice how teachers can use different tools for different purposes and subjects, and teaching different skills”*. Finally, participation in mentoring initiatives **provides networking and peer-to-peer learning opportunities** for the teachers and leaders, which was considered by the mentors as a motivating factor; e.g., *“It is important for the schools to learn about the experiences of other countries”, “It is very important for some teachers to have an option to share what they have been achieving”, “I have an experience that the majority of teachers always get much more than they expected from the projects and for many teachers participation is a nice opportunity to learn from research and other schools and teachers”*.

The challenges of schools in school development initiatives are often related to the **culture, leadership practices and support**, e.g., *“There must be support from the school leaders, otherwise it is very difficult for teachers to participate. I think the most important part is to work with the school-leaders first”, “The principal is the key person and if they are not interested in advancing digital innovation, it is much more difficult to affect the school. We should listen to the schools, but have convincing arguments for taking digital innovation as a focus for development. Develop special methods to convince and support principals?”*. School improvement and the implementation of digital innovation have to be meaningful for all the staff members, top-down approaches very often do not lead to change.

Another challenge faced by the mentors is **limited time**. When something is prioritised, something else must be de-prioritised. Often schools jump between initiatives and projects and such decisions are not always goal-oriented or based on the needs and gaps. Therefore, the competence to understand why one or another initiative or intervention helps a school to improve, has to be supported, e.g., *“Having no time,*

being too busy - the seminars, webinars, and meetings should be as practical as possible”, “We consider the lack of time to be the biggest problem. Teachers have a lot to do, some of them even teaching at two schools”, “Time is crucial. When prioritising something, something else must be prioritised away. What you are offered must be goal-oriented, practical and constructive. A teacher must be able to take what they have learnt right back to the classroom. Then it is relevant to set aside time for that”. It is also important to **give teachers time to validate new knowledge in their practice** without worrying about whether post-curricular material will be taught. Time is also associated with opportunities for teachers to participate in seminars, document their innovative approaches, etc. Mentors suggest that participating in such initiatives should be part of the normal workload, or it should be additionally paid. Teachers’ lack of time may cause the situation in which only very practical tools and tips are valued, but no time for co-constructing knowledge or interest in theoretical research-based knowledge.

Mentoring and other means for supporting professional learning and development

School level learning and development can be conducted in several ways, as presented in the table below, in which we have summarised some most often used means for professional learning and development. They all can be used either face to face or online.

Various means to advance professional learning and development

<i>Means to advance professional learning</i>	<i>Aims</i>	<i>Participants</i>	<i>Process</i>	<i>Outcomes</i>
<i>Mentoring</i>	To support the mentee(s) in deep-level professional learning	One to a small group	Mentees learn by personal guidance, expert models and their own reflection. Mentee-centred approach. Longitudinal process.	New practices
<i>Training</i>	To share new information and skills to participants	Size varies between a few to a large group	Can be a learner-centred or a trainer-centred approach; only one training event or a longer process.	Depends on how the training is organised. Possible to inspire and share new knowledge, and also competencies and skills, if there is enough time and opportunities for the participants to practise.
<i>Peer-to-peer learning</i>	To learn from others that are in the same position (peers), within a school or between schools	One to a group	Learning from each other is organised informally or formally, e.g., visits, benchmarking. Kind of equality between the participants.	Sharing of knowledge and practices, in good conditions, improved practices, networking.
<i>Teachers' professional learning</i>	To improve teachers' professional competence as a group; connected to learning in the workplace	A group	Learning can be organised in various ways but integrated with work; longitudinal process.	New practices, improved collaboration between participants, improved consciousness through self-reflection and professional dialogue
<i>Coaching</i>	To support to achieve a specific personal or professional goal through empowering them to use their own strengths and expertise	One to one or one to small group	Coaches apply various methods (e.g., questioning, clarifying) to help those being coached to change their perspectives and thereby see alternative approaches to reach their goals; not direct answers or solutions	New solutions found and invented. The solutions might relate to attitudes, behaviours, practical methods, etc.

<i>Participation in development programmes</i>	To learn and develop something within the school or in the teaching community	Usually several teachers, not necessarily all	Longitudinal process, joint goals and activities, led by one person / organisation	New learning and new practices, inspiration to daily work, extended vision on education
<i>Independent study</i>	To learn something specific and urgent, e.g., an application, a new practice or method	Often an individual process	Motivation is based on the urgent need and thus an effective way of learning; supported or not supported; informal	New learning and new practices for the individual in question, not collaborative learning

Examples of school mentoring processes implemented in the iHub4Schools project

In the following section, we describe three school mentoring examples.

To achieve the general aims of the iHub4Schools project, we organised school mentoring cases in four partner countries (Estonia, Finland, Georgia, and Lithuania). Partner organisations had selected the schools, and they were also responsible for the mentors. In many cases, the mentors were active in the project and were well acquainted with the aims and goals of the project as well as the theoretical background and mentoring process. In some cases, the partner organisation trained the mentors and had continuous contact with the mentors. The practical mentoring aims varied between the participating schools, as natural. The contexts, needs, resources, role of the stakeholders and professional cultures differed from each other. In good and effective mentoring, it is essential to consider the participants' backgrounds and have them as starting points for the forthcoming practices. The following examples demonstrate differences in mentoring approaches and processes during the project.

Example 1: Mentoring two elementary schools to collaborate in improving the use of digital technology in teaching and learning

Liisa Ilomäki and Minna Lakkala

In Finland, two elementary schools participated in a two-year mentoring programme. The schools wanted to participate together because one of the initial aims was to improve their collaboration, although the teaching language in the schools were Finnish and Swedish, respectively. The schools are located in the same building. All teachers from the schools participated in the process. From

both schools, two teachers with digital responsibilities led the work in their own school and formed a joint coordination team together. They had regular meetings with two mentors who were from the University of Helsinki. Also, the principals often participated in the meetings. The mentors worked mainly with the coordination team (mentoring them), but they also participated as experts in some teacher meetings and workshops which they organised with the coordination team. In this sense, the process was mainly about mentoring, but also included some small-scale training by the mentors to all teachers about using digital technology for pedagogical practices.

The mentoring followed the phases of the School mentoring model (described later in these guidelines). During the mentoring process, the aims took shape little by little. In addition to increasing collaboration between the schools, development teams and teachers, the coordination team decided that the development work in the schools should concentrate on creating teaching scenarios for using digital technology in implementing “DigiPath”. DigiPath is a framework and service, which the local school administration had created at the same time as the mentoring started in the schools. The reason for defining this aim was that in this way, teachers became familiar with the requirements of digital technology at all class levels and by creating material with other teachers they also got engaged in using the materials. Furthermore, because teachers from the two schools worked in class-level teams, not language teams, they learnt to know each other naturally, connected to their work.

In general, the mentoring succeeded well, and no major problems eventuated. The mentors met the coordination team 13 times, about an hour at a time, during the two years. The coordination team and the mentors organised two joint workshops for all teachers from both schools. In addition, the mentors gave a short presentation about the mentoring process at two teacher meetings in both schools.

The evaluation feedback from the mentors and teachers was positive: teachers had learnt more about digital technology, and they felt more confident with it, the collaboration between the schools (and within the coordination team) was appreciated, and the outcomes - scenarios about digital technology in learning practices - were shared through the DigiPath repository of the local school administration.

Example 2: Mentoring at six schools to support the school teams' digital capability and readiness for implementing digital technology in everyday learning processes

Kerli Požogina

In Estonia, six schools, primary and secondary schools (up to 12th grade) and vocational schools for students with special needs, participated in educational technology mentoring during the six-month period. Three to six members from each management team (depending on how big the school was), 20 people, and 70-90% of the teaching staff from each school, participated in the mentoring process, totalling 205 people. Each participating school had one mentor, who was especially chosen according to each school's needs. All the mentors chosen had to have in-service teacher experience and they had to be part of the digital training network coordinated by the Education and Youth Board in Estonia.

The main task of the mentor was to demonstrate the opportunities which digital technology can offer to support learning processes by providing specific implementation guidelines for different teaching situations in different subjects. A list of the main topics to be covered by mentors was provided, along with guidelines for all the mentors by the Education and Youth Board project manager. Mentoring had two phases: (a) initial individual mentoring during which all school members evaluated their level of digital competence and were divided into basic and advanced groups for digital training; (b) the main mentoring sessions (individually or in groups) which focused on the specific needs of the pedagogical staff.

Educational technology mentoring was done individually and in groups for the teachers, school management, and also for the (potential) educational technologist. The goal of mentoring the teachers was to support methodology with purposeful use of technology, with the specific focus on digital safety issues. The goal of mentoring the educational technologist was to highlight the importance of the permanent role of educational technologist in the school team and show how it supports teachers. It also aimed to establish a solid foundation for ongoing support of the teaching staff, even after the mentoring programme. The purpose of mentoring the school management team was to provide support in mapping the school's development needs and making collective decisions regarding digital learning and technology. Special emphasis was placed on strategic planning for digital infrastructure, addressing digital safety concerns, and supporting the development of digital technology projects.

Altogether, 305 academic hours of educational technology mentoring was carried out for the participating schools. The mentors filled out a mentoring report

card, which consisted of the main mentoring topics, a SWOT analysis of implementing digital technology and development of students' digital competence at each school, and a description of the main successes and challenges during the mentoring process. The mentoring report was also provided for the school management and for the mentoring programme manager at the Education and Youth Board.

Example 3: Mentoring schools to support collaboration between schools in developing digital practices and improving the use of digital technology in teaching and learning

Madona Mikeladze and Tatia Nakashidze-Makharadze

In Georgia, five primary, elementary and secondary schools participated in the mentoring process. The schools were selected according to their experience, size, location, infrastructure and teacher achievements. Teachers' digital skill development is an important issue for the government, and it is supported by the government. The complexity of the field leads to several challenges. One of these challenges is teachers' low / inadequate digital competence. This factor defined the involvement of the schools in the mentoring process.

To support the process, Batumi Shota Rustaveli State University staff decided to create a hub of stakeholders: researchers, policymakers, school principals and teachers. The researchers contacted the Ministry of Education, Culture and Sport of Adjara, which had selected the five schools. Initially, university mentors introduced the mentoring procedure to schoolteachers who were selected from the teachers who had previously participated in digital technology pilot tests. Then the coordination teams were created in the schools, and the wider school community was invited to participate in the process. Regular meetings were held with all teachers. At the meetings, various practices of using digital technology were shared. Then teachers worked in groups and had discussions and made peer observations. At the meetings, teachers evaluated their application of the digital tools, shared feedback on each other's work, and discussed plans for improvement.

The aim of this case was to support collaboration between schools and within schools, with teachers of different abilities/achievements, subjects and school levels, in sharing the experience and supporting each other in applying digital technology in the teaching process. The schools wanted to increase collaboration, especially because they had to take on a new digital learning environment. During the implementation, they tried new teacher collaboration and

pedagogical practices. It was anticipated that the teachers would not show special interest in participating in the training events, so requesting assistance from the principals was planned from the beginning. However, teachers showed great interest and they attended training events and workshops with high motivation. At the final meeting, teachers positively evaluated the mentoring model and emphasised the need for and usefulness of cooperation between schools.

Mentoring sessions conducted by trained facilitators from each school supported the development of the following coaching and leadership skills: better understanding of the needs and goals of the school, strengthening cooperation and mutual agreement; forming a team with high performance and potential, knowledge sharing and transfer, increasing involvement and accountability, creating opportunities for raising the quality of teaching and learning, and strengthening the culture of professional growth and development.

The process model for school-to-school peer learning was particularly interesting for schools, as this model gave schools the opportunity to cooperate with each other. Most importantly, the model did not divide schools into "strong" and "weak" schools. It was a nice opportunity for schools to promote and share achievements and experience with each other.

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The school mentoring model: the conceptual background

Kairit Tammets, Minna Lakkala and Liisa Ilomäki

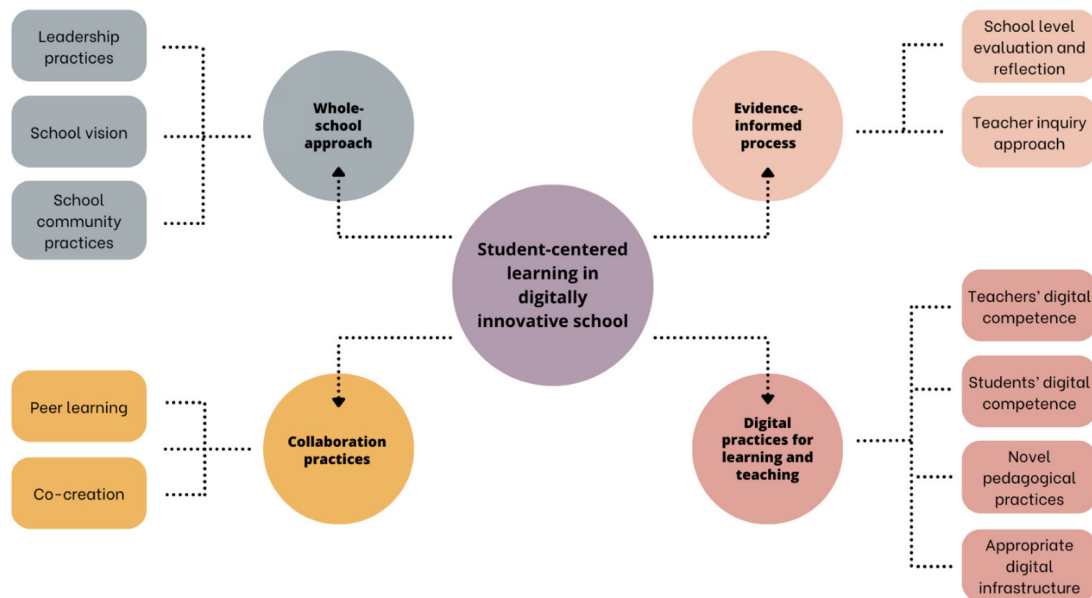
Turning schools into digitally-innovative institutions is an ongoing effort that faces many challenges. While a lot of focus has been put on teachers' digital competence as a key aspect, lessons show that success also needs careful planning and strong leadership [1]. This approach means that becoming digitally innovative is not just about using technology in lessons, but it is about completely changing the way we understand teaching and learning. In this chapter, we explore the theoretical foundations of digitally innovative schools. This exploration is crucial for demonstrating how various elements come together to form a comprehensive view, highlighting the interdependency of digital innovation.

The mentoring approach in these guidelines is based on the theoretical basis of digitally innovative schools. "The digitally innovative school" is an important concept for policymakers, researchers and practitioners. It refers to schools which have systematically integrated technological options at several levels of practices, from pedagogical practices in classrooms with students, to collaboration and leadership practices of the members of the organisation [2; 3]. The aim is naturally to develop innovative pedagogical practices with digital technology that improve students' learning and help them achieve the defined learning goals.

The Conceptual model for school mentoring (see the figure below) highlights the key components of sustainable adoption of digital innovation in schools to promote students' learning experience. We follow the approach that schools (and related communities) are environments for collaborative learning to share, develop and transform educational practices and values [3]. The model stresses the need for a comprehensive **whole-school** strategy that engages all stakeholders and is incorporated seamlessly into the school's management, vision, and collaborative interactions. Central to this is the **evidence-informed process**, which emphasises making decisions based on available information, knowledge and data, incorporating regular monitoring at school and classroom levels. **Collaboration practices** are important, as they bring together teachers, students, and the wider school community in a collective effort of peer

learning and co-creation, which is essential for developing a shared understanding of the innovation and addressing challenges. The implementation of **digital practices** for both learning and teaching requires the development of digital competence among teachers and students, the exploration of new pedagogical practices, and ensuring the availability of suitable digital infrastructure. At the core of this model is the **student-centred learning paradigm**, wherein all these elements synergise to create an environment that prioritises and adapts to the needs and interests of students, and integrates technologies into learning with the ultimate goal of improving the learning experience. These are the key concepts summarised from our earlier research in the field of the development of digitally innovative schools [3; 4].

Key components as central for sustainable adoption of digital innovations in schools to promote students' learning experience: the Conceptual model for school mentoring



In the following sections, we describe the elements of the Conceptual model for school mentoring in more depth.

Evidence-informed school improvement

The conceptual model, developed in the iHub4Schools project, is built on the idea that introducing digital innovation to schools is an evidence-informed process. Using evidence to guide school improvement ensures that changes are effective, or helps to understand why they might not work, leading to improved learning experience and outcomes for students. Previous studies have demonstrated that basing school improvement efforts on data, information, and other resources aids in understanding the current situation, identifying areas for development, and making informed

decisions [5; 6; 7]. This approach encourages innovative teaching methods and supports sustainable development in schools.

Evidence-informed school improvement is supported by various policy-level initiatives, with the development of [SELFIE](#) for schools by the EU being a prime example. SELFIE is a framework that encourages schools to identify their developmental needs and plan areas for improvement. Evidence-informed school improvement operates from a twofold perspective, where both dimensions support and enhance each other: the school and leadership level, and the teacher and classroom level. Such an approach recognises that effective change requires alignment and collaboration between the broader institutional strategies and the individual practices of teachers.

School level development and reflection. Numerous methods have been created to assist school teams with data, evidence, and information to enable well-informed decisions about enhancing their schools. Among these, the Data teams method, originating from the Netherlands, is recognised as one of the more established concepts; see more in [8]. These approaches emphasise the necessity for school improvements to be carefully grounded in identified needs and gaps, and that innovations are consistently observed and assessed at the school-wide level. This demands a school culture and leadership that values continuous reflection and evaluation, making use of a variety of data sources to inform their practices. Using the advice from Sun, Johnson, and Przybylski [9] about the importance of using information from a range of sources to set goals for improvement, show that to really make schools better, they must start with clear goals. These goals then inform the planning of innovations, which should be consistently monitored and evaluated at the school-wide level. Such a process is underpinned by a culture and leadership that are committed to ongoing reflection and the integration of diverse data sources to inform the decision-making processes.

The teacher inquiry approach. Since a lot of important information comes from what happens in the classroom, it is key for teachers to use evidence-based methods in their teaching. This allows them to see how students react to new ways of learning and to refine their teaching based on student feedback. It is also vital for teachers to use these data to support and match up with the broader goals for improving the school. Doing so makes sure there is a joint and planned effort to bring digital innovation into the whole school. The model by Hansen and Wasson [10] highlights the importance of teachers continuously refining their methods through inquiry to improve their understanding of the impact of their teaching on student learning. This leads to the synergy between school-level evaluations and individual teaching practices within the evidence-informed improvement process, as noted by Brown and colleagues [11]. Encouraging teachers to engage in reflective inquiry and evidence-based enhancements allows for effective monitoring and assessment of the role of digital technology in education, as argued by Roberts [12]. Agélii Genlott and colleagues [13] point out

that while digital innovation begins in the classroom, achieving sustainable change requires efforts at the school level to spread and implement successful innovations.

Whole-school approach

School vision. As previously discussed, an evidence-informed approach to school improvement enables both leaders and teachers to pinpoint developmental needs, which in turn facilitates the establishment of new goals and visions. These objectives are not only in harmony with broader school-level objectives but also align with national educational strategies, ensuring that the direction of school improvement is both targeted and reasoned with overarching educational policies. Using a school-level strategy is a key to adopting innovation effectively, with school leaders making sure teaching and school improvements match the school's goals [7]. The likelihood of success in school improvement initiatives significantly increases when the entire school community actively participates, builds the shared understanding of the innovation and receives support from the school leader, particularly in terms of allocating time and resources to teachers. Achieving this requires a shared vision that clearly outlines the rationale behind proposed improvements and the strategies for their realisation, as it embraces digital innovation and determines the nature of the transformation expected [14].

Leadership practices. We emphasise leadership in order to promote the development of digitally innovative schools from a whole school perspective. Earlier research has shown that leadership practice has a direct impact on the success of technology innovation in schools [15; 16]. Scaling up digital innovation calls for changes in several organisational and individual level processes: investments in infrastructure, structural changes to the school organisation, communication of change, time and space for teachers' collaboration, empowerment and shared leadership, allocating time for teachers to develop and pilot test innovations, and monitoring of the effects of changes [13]. Often the leader's mindset, digital competence, or beliefs are the obstacles to innovation adoption – or they can be the source of inspiration for teachers. This is the reason the importance of involving school leaders is crucial, especially in those schools in which teachers do not perceive the need for change to be important.

School community practices, and practices of teacher teams and learning communities, play an important role in whole-school improvement. The collaborative teams can be considered to be change agents at school, and they contribute to establishing visions and goals, providing individualised support, sharing knowledge, creating a climate for data use, engaging teachers in reflection and promoting networking to connect the various parts of the school organisation [17]. These are essential elements of a professional learning community, which according to recent opinions, improves school communities. Professional learning communities include organisational and

operational characteristics: the first ones include a positive school culture, distributed leadership, capacity building of the staff; the second ones include professional development, the use of data, and system-wide trust [18; 19]. These elements are implicitly included in the school mentoring model, in both the research-based background and in the practical methods.

Collaboration practices

Participation in professional learning programmes or training events support teachers in updating their digital technology skills and awareness of the pedagogical potentials of technology, but more is needed to bring about changes in teachers' actual classroom practices [20]. Practical support from colleagues and collaboration between teachers inside or between schools as part of everyday work are essential for promoting sustainable adoption of digital innovation in schools [21]. Because of rapid technological change, collaboration between schools and other relevant stakeholders, like researchers or EdTech professionals, is crucial for helping teachers to be updated about emerging technologies and their pedagogical options. This is also true the other way around: research and EdTech professionals should communicate and collaborate with educational practitioners in order to understand the needs and goals of the educational system [22]. Collaboration practices among teachers include peer-learning and co-creation which should be fostered through mentoring, emphasising the importance of social practices in innovation adoption [23].

Peer-learning. Peer learning can take place at different levels and in different forums: between individual teachers or teacher teams in one school or across schools, between whole schools in organised benchmarking or sharing events, or in professional networks catering for teachers with similar interests or backgrounds. Digital platforms enable sharing and dissemination of knowledge and materials more widely. It is relevant to promote peer learning in organised ways, not relying on teachers' spontaneous collaboration. We especially recommend implementing peer-learning activities between digitally advanced and less advanced teachers and schools.

Co-creation. For the digital and pedagogical innovations with digital technology in schools to be relevant and applicable, the teachers should participate as actors in developing and creating new solutions and practices with other stakeholders. Co-created ideas, plans, pedagogical scenarios and teaching/learning materials work as boundary objects between various parties to combine their expertise and develop innovations iteratively. In addition, co-creation methods that engage all teachers in the participating schools encourage bottom-up diffusion of innovation.

Digital practices for learning and teaching

Several issues have an effect on meaningful learning and teaching with digital technology. It is not enough to have just one element at a high level – for example, a high-level digital infrastructure – if teachers’ digital practices or pedagogical practices are not supported. All elements interact with each other and are dependent on each other.

Teachers’ digital competence. Teachers’ digital competence is one of the key aspects to support digitally innovative schools [4] and to promote the development of students’ digital competence [3]. A variety of frameworks have been created with the aim of defining the competencies teachers need to operate effectively in digitally-enhanced learning environments. The best-known is [DigCompEdu framework](#), which is integrated with the [SELFIE for TEACHERS](#) tool. However, teachers’ need to be mentored and guided in how to embed digital competence in their subject-specific domain knowledge, and this can be promoted through mentoring activities and peer-learning.

Students’ digital competence. Students’ digital competence is often an aim for pedagogical practices. A false assumption is that students are digitally competent compared to teachers and other adults. Students have heterogeneous competence, and they are often competent in issues other than those which academic performance requires. Digital competence is not only about using computers (see, e.g., [24]). For example, the PISA 2025 assessment Learning in the Digital World [25] focuses on two competencies that are essential to learning with technologies, namely self-regulated learning, which refers to the monitoring and control of one’s metacognitive, cognitive, behavioural, motivational and affective processes while learning; and computational and scientific inquiry practices, which refer to the capacity to use digital tools to explore systems, represent ideas and solve problems with computational logic.

Novel pedagogical practices. Learning assignments play a crucial role in influencing students’ learning experiences and outcomes. It is expected that schools, and in the daily work that means teachers, will be responsible for preparing students for the demanding needs of modern society, including digital competence. This includes not only technical skills but also having a critical understanding of how to participate in an interconnected and digitalised world safely, responsibly and ethically, as well as how to be an active and creative digital citizen [24]. Another key aspect is how digital technology can be harnessed to add value in education and to achieve qualitative changes in learning and studying. With digital technology, it is possible to improve pedagogical practices, but not necessarily. In a recent study, [26] found that only about a quarter of pedagogical practices in the Finnish upper secondary level lessons that were investigated represented truly novel practices which could support improving students’ general competencies, including digital competence. Digital tools should not be adopted only to support or substitute conventional teaching methods,

such as information delivery or doing simple exercises, but to enhance advanced and challenging student-centred practices like inquiry learning, collaboration and knowledge creation, or pedagogically meaningful use of emerging technologies like learning analytics or gamification.

Appropriate digital infrastructure, naturally, is one of the key cornerstones of a digitally innovative school. However, in these guidelines we will not focus on the issues of the technical infrastructure because the aim is to promote collegial and school-to-school practices that are applicable and improvable regardless of technical resources. Of course, individual schools might have technical infrastructure as one of the elements that they need or want to improve during the mentoring process.

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The Process model and individual methods

Minna Lakkala and Liisa Ilomäki

The practical part of these guidelines for mentoring school staff consists of two intertwined elements:

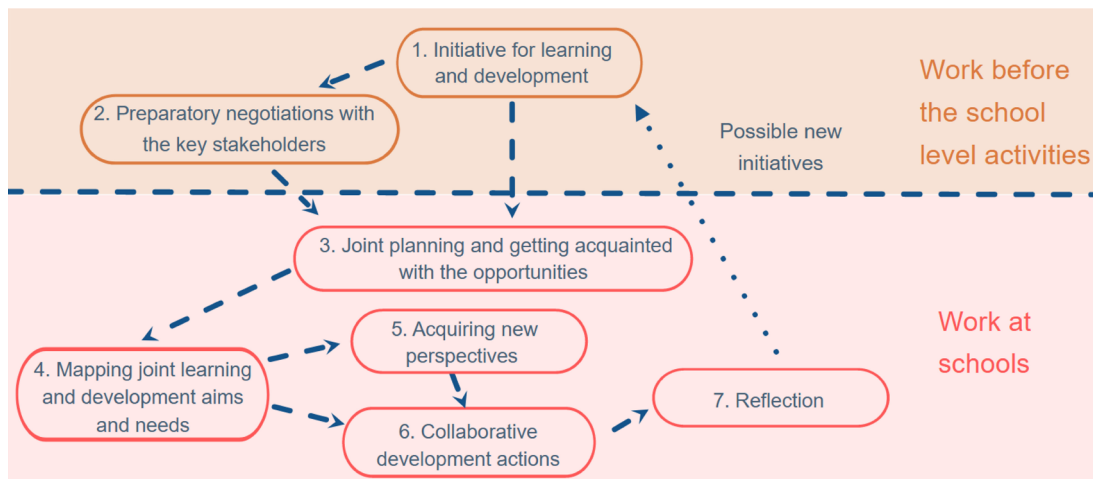
- ▶ *The Process model* helping to plan and structure the school mentoring process in successive phases.
- ▶ A collection of *Individual methods* that can be used in different phases of the mentoring process to organise events and activities in order to enhance whole-school development and between-school collaboration for digital innovation.

The Process model

The aim of the *Process model for school mentoring* is to provide school leaders, teachers, mentors and teacher trainers with a model for organising development or collaboration processes in schools. The focus is on supporting collaboration and peer learning inside or between schools and defining aims to implement and adopt digital innovation. The model promotes teachers and schools to learn from each other's digital practices and develop them together. The model emphasises evidence-based development and co-creation; to achieve this in practice, the implementation of the phases might need some adjustments. For example, some of the phases might consist of several events or a mentoring activity can focus on elements related to two phases.

The Process model consists of various phases of activity. The idea is that users (mentors and schools) choose which of the phases they want to apply; none of the phases are obligatory. The Process model with successive, numbered phases are illustrated in the following figure. As the figure shows, some of the phases will be conducted before starting the actual mentoring activities inside the school with teachers, and the role of these first phases is to prepare for the practical actions with the schools' responsible people. The phases following these are the ones conducted at school with teachers and other educational staff.

Structure of the Process models for school mentoring



The model is applicable for schools that want to start an improvement and development process in the use of digital technology in their pedagogical and community practices.

National differences, size of the school, educational level, the school's culture for development and innovation, as well as teachers' various competencies affect the implementation of the model. Also, the role of the mentor(s) has an effect on the goals, options and actual implementation of the mentoring process in schools (as discussed at the beginning of these guidelines).

Collaboration can be conducted within a school or between schools. Within a school, teachers, teacher teams or the whole educational staff can engage in joint activities. Collaboration between schools can take place in various combinations: between digitally advanced and less advanced schools, between schools with complementing digital competencies among their teachers, between "neighbour" schools, or between schools of different educational levels, and so on.

In the following, we describe the seven phases and their relationships with each other. In addition, we have raised some basic questions that need to be answered when conducting the phases and provided suggestions for answering them. After each major phase, the mentor(s), the mentoring team or the coordination team that is responsible for the mentoring process, should reflect on the realisation of the phase in order to make necessary corrections before the next phase or plans for continuation. These minor reflections are not included in the Process model picture.

Phase 1. Initiative for learning and development practices

Innovations in schools, particularly those aimed at improving through digital technology, can be initiated by a wide array of parties. These include school leaders, individual teachers or teacher teams, school owners and local administrators, extending to researchers, other schools, mentors, or EdTech companies. National policies and strategies significantly influence the initiation and direction of these innovations. By aligning school initiatives with broader educational goals, they provide a structured framework for innovation and also ensure that schools are supported with the necessary resources.

The reasons for suggesting the development work in a school may vary and there might even be contradictory opinion about the development needs within a school. The reasons for suggesting mentoring as a tool for school improvement vary, e.g., for school-to-school collaboration the reasons might be the proximity of schools, similar interests in digital practices, or differences in the digital maturity of the schools. No matter where the initiative comes from, it is important to find and recognise genuine benefits for the participating schools and teachers.

For successful mentoring, it is good to recognise where the initiative comes from, but even more important is that the initiative will be further discussed so that all the key stakeholders can accept it and commit to it.

Before initiating the next phase, *Preparatory negotiations with the key stakeholders*, the current state of digital practices might have been evaluated, e.g., by local policy-makers. This evaluation is sometimes the initiative for starting some mentoring activities.

What are the various options for initiating the mentoring process?

In formal school education contexts, the initiative for starting development work on digitalisation may come from the local or national administration related to changes in strategies or curriculums. In such cases, initiating some actions may even be compulsory for the schools, and then the school leader or principal is usually responsible for starting the development work. In such cases, the authorities might provide resources for the development work and mentoring.

If the initiation for developing digital practices or learning from each other come from the schools, a challenge might be to have resources for the development actions if there are no “official” channels for that.

One typical situation for initiating mentoring for digital innovation in schools relates to research and/or development projects for which researchers or other

external stakeholders have received external funding (national or international). In such cases, the funding usually covers at least the mentors' work, sometimes also some costs of the schools. Then the challenge is to find voluntary schools and teachers to accept the initiative.

How can the contact to and recruitment of schools be organised?

When researchers, trainers or other stakeholders working in the field of digital technology in education are the initiators of mentoring, they usually have wide contact networks and can recruit schools using those contacts. It is meaningful to make the first contact with the school leader or principal because their acceptance and commitment is crucial for school improvements.

Sometimes, in larger development programmes, the organisers and mentors might send invitations to schools through official or open online channels, and select schools based on formal applications.

If the purpose is to promote collaboration between digitally more and less advanced teachers and schools, the recruiters should be aware that naming teachers or schools as "less-advanced" might be a delicate issue. A better approach would be to emphasise equal sharing of ideas and best practices when motivating teachers and schools to participate. It is also important to take care that everybody, also the more-advanced participants, get something for themselves and not only share their expertise and experiences for others.

Phase 2. Preparatory negotiations with the key stakeholders

In order to create common understanding between the mentors and schools, and to discuss development needs or initial ideas and hopes for mentoring, it is important to have meetings between the relevant school representatives. The participants in such meetings can be, e.g., principals, vice principals, digital coordinators/tutors, interested teachers from the schools, and the mentors; maybe also other stakeholders, such as the local school administration. The aim is to get the representatives acquainted with the mentoring models and methods supporting school development and school-to-school peer learning, as well as to make agreements about participation in the process. To be effective, mentoring requires that all stakeholders involved in the process speak the same language, i.e. that they share the same vision and pursue the same goals.

A good result of well-conducted preparatory negotiations is that the process has a safe background and general acceptance of what further work might be required.

Who should participate in the preparatory negotiations?

It is recommended that schools participating in the development process should appoint a core team (2-3 people) to coordinate the schools' participation, as explained above. They should somehow be specialised in the use of digital technology in the school. It is important to have the principals at the meeting(s), because they are the key people to promote any kind of development work in the school.

If the mentoring focuses on collaboration between schools, it is important that the preparatory negotiations are already being held jointly, so that every meeting has representatives from each school.

Who has the leading role in organising meetings?

It is important to make joint agreements between the mentors, schools and other stakeholders about who will have the leading role in organising the meetings, sending invitations, writing meeting minutes, etc. Often schools are happy if external mentors take that responsibility because they do not necessarily have time, resources or expertise for that.

What should be discussed and decided at the preparatory negotiations?

At the preparatory negotiations, it is relevant to have preliminary discussions with the school representatives of the schools' current situation and needs to be related to digitality as well as the opportunities that the mentors can provide for supporting the development and collaboration activities.

An example: A description of first meetings from a process in Norway:

- ▶ First meeting (different selected teachers working on innovation or technology): Presentation of schools, expectations. How will we work: Present the model options (e.g., TISL, practice inquiry method). (2h)
- ▶ Second meeting: Needs, and suggested plan from the schools. Timeframe. (2h)
- ▶ Third meeting: Dates and planned schedule for the next study year. (2h)

Phase 3. Joint planning and getting acquainted with the options

The aim of this phase is to motivate the participants who are supposed to be the actors in the development activities (e.g., all or most of the teachers and other educational staff from the schools) to engage and participate in the development and collaboration actions as well as become aware of the options for actions. This phase could include an event or meeting at which the general idea of the process is introduced to all those who will somehow participate in mentoring activities such as all teachers from the schools. The participants can suggest preliminary ideas for continuing the work. The nature of the process is relevant for discussion because schools have a range of needs, and these needs are answered with a range of activities, models and tools. For this reason, various individual methods or digital tools (also described in these guidelines) could be applied in multiple ways.

Joint planning helps the educational staff to accept and engage in the process, to learn about the options, and to start thinking about the content and the process from their own perspective.

How to introduce the options?

For motivating teachers to engage in the development actions, it is important to introduce the outcome of the initial discussions, conducted earlier with the key stakeholders, for all teachers at the participating schools, or at least for all relevant people who will participate in the development and collaboration process;

- ▶ One easy way to introduce the development actions in a school is to give a short presentation during a regular teacher meeting, face-to-face or online. The mentors can arrange it with the coordination teams of the schools.
- ▶ A joint kick-off event can be organised to introduce a peer-learning initiative between schools to all teachers at the participating schools.
- ▶ If the participants are individual teachers from multiple schools, the mentors can arrange an online introductory webinar for the participants.

The presentation of the development and collaboration initiative could include a short introduction of the preliminary aims and timetables as well as examples of practical working methods (phases of the process, e.g., by using the Process model for school mentoring, or examples of Individual methods that can be used). It is also relevant to introduce the benefits of participation clearly for individual teachers and for the whole school.

How can the initial goals for the development and collaboration process of the participating schools be defined?

When introducing the options for the development and collaboration actions, it is relevant to allow time for questions, comments and ideas as well as to ask the participants for their preliminary thoughts about their learning and development needs related to digitality in their own work or in the whole school. This can be included in the lecture or webinar as an open discussion or a writing assignment in which a specific digital tool is used (e.g., chat in the video session or a virtual wall application). The participants could be asked to reflect on the current status of digitality in their work, and based on this, create ideas about how they would like to continue the development work or the joint peer-learning process. If the initiative, the goals and the process are introduced in a top-down way, it is difficult to get teachers engaged and motivated in the development process.

Phase 4. Mapping joint learning and development aims and needs

The reason for this phase is to base the development and collaboration work of using digital technology on evidence about the schools' current situation and new needs and interests. The focus of mapping and evaluation could be on various aspects from the perspective of individuals (e.g., teachers' or students' digital competence, teachers' pedagogical digital practices, learning new applications) or the whole school (e.g., visions and strategies, leadership practices, teachers' collaboration practices). The aim is to be able to define evidence-based joint goals for learning and development between teachers and schools participating in the mentoring process.

The information collected in this phase is meant to direct decisions about the actions that should be taken in the subsequent phases of the mentoring and development process.

How can a school's digital maturity be evaluated?

There are several tools with which to evaluate a school's digital maturity. In these guidelines, we introduce one option in the Individual method description *11. Self-assessment of digital maturity of the school*. It introduces a method including a self-reflection framework to be used for evaluating the whole school's digital maturity.

How can various digital practices in a school be evaluated?

Also, for evaluating digital practices, several tools have been created. For example, the European Commission offers a survey tool called [SELFIE](#) to evaluate their digital practices from the perspective of teachers, students and leaders. Institutions in many countries have also created their own national survey tools for this purpose, such as Opeka for schools, Ropeka for principals and Oppika for students in Finland (available in Finnish, Swedish and English).

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used for evaluating digital practices at a school:

- ▶ Method 6. *Evaluating whole-school digital practices* can be used in this phase to engage teachers in evaluating their schools' digital practices in teacher teams.
- ▶ Method 14. *Combining individual and school-level reflection of digital practices* in which teachers' self-reflection results of their digital competence are used to produce ideas for developing digital practices in the whole school.

How can teachers' digital competence and pedagogical practices be evaluated with digital technology?

With the European Commission survey tool [SELFIEforTEACHERS](#), individual teachers can independently self-reflect on their digital competence and practices. Answers can also be collected as aggregated group results.

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used for evaluating teachers' competencies and mapping development needs:

- ▶ Method 4. *Digipeda workshop* engages teachers to self-reflect on their own pedagogical practices with digital technology and to discuss joint development aims and needs.
- ▶ Method 5. *Digital Accelerator* is a long-term training and development programme, as the example below describes.
- ▶ Method description 9. *Measuring teachers' digital competence* describes how SELFIEforTEACHERS can be used to map teachers' learning needs to plan future training actions in digital practices.

An example: In the Estonian mentoring case in the Digital Accelerator programme, the focus is on whole team development and on individual learning goals. The initial mentoring was put in place specifically to create a safe and anonymous environment for each teacher to address their fears and insecurities. Since a digital practice survey is filled out by every participating teacher before the beginning of the programme, 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 gives a more detailed overview about the level of digital competence within the school team and is a good basis for four key components and activities that are crucial in the programme:

1. Specifying the digital development project goals and contents.
2. Main topics and learning outcomes in teachers' digital training.
3. Division of teachers into training groups based on their level of digital competence and learning goals.
4. Setting up the main mentoring sessions individually, in groups and in different topics in a way that it is complementary for the digital training programmes and overall school needs.

Phase 5. Acquiring new perspectives

The aim of this phase is for teachers and schools to search for new information, examples and inspiration with the help of chosen methods for their development work related to digital practices. When multiple schools collaborate, they can get acquainted with each other's digital practices and share their own best practices.

New knowledge, skills or examples of practices acquired in this phase provide information for deciding where to focus the participants' own development actions in the next phase. This phase can also be a source of motivation and engagement for the participants and is especially important for "advanced" teachers and teachers responsible for activities with digital technology who might not get new ideas in their own schools.

How can ideas and expertise be shared between teachers inside a school or between schools?

Multiple methods embedded in the schools' everyday practices can be used to support sharing ideas and expertise between teachers, such as short presentations in teacher meetings, pedagogical cafés, peer lesson observations or digital

repositories for sharing links and pedagogical scenarios. School-level peer-review and benchmarking visits can be used in inter-school collaboration projects. The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used for sharing between teachers:

- ▶ Method 3. *Combined training and peer learning* describes activities in which teachers study new pedagogical methods with digital technology and share and reflect on their experiences in small groups.
- ▶ Method 7. *Generating ideas for promoting students' digital competence* introduces a workshop at which teachers from two schools write, in a shared repository, their pedagogical scenarios about teaching digital competence, and then examine them in small groups.

How can teachers be promoted to acquire new perspectives through various channels?

A conventional way for teachers to acquire new perspectives on digitality is to participate in in-service teacher training events and programmes. They can be organised inside a school, between several schools, by municipalities or the government, or by training organisations. Other means that are typical especially for active pioneer teachers are participation in competitions, seminars and conferences, or teacher networking through meetings and social media channels. One task for a mentor could be to share information about various opportunities and encourage all teachers to participate in training, collaboration and networking activities.

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used to help teachers acquire new perspectives on digitality:

- ▶ Method 5. *Digital Accelerator* is a longitudinal training programme that offers new perspectives for participants through training and virtual tours within digitally excellent schools.
- ▶ Method 8. *Innovative technologies and computational thinking through unplugged activities* engages teachers in a workshop at which they are introduced to the basics of computational thinking by experts before they start creating and sharing their own pedagogical scenarios.

Phase 6. Collaborative development actions

In this phase, schools and teachers need to decide about the actual development and peer-learning actions, make the practical implementation plan, and organise the development work between the members of participating teachers and schools.

The nature and goals of development actions in this phase define which methods to use in the next phase for evaluating whether the development efforts have been successful and whether the goals have been met.

How can the development of teachers' digital competence be supported?

Teachers can be supported in developing their digital competence through various training and mentoring activities, as described in the *Mentoring and other means for supporting professional learning and development* section.

Individual method description 5. *Digital Accelerator* (described in the *Individual methods for mentoring* chapter) is a longitudinal programme that includes mentoring, basic training and advanced training activities to support teachers in developing their digital competence.

How can teachers be helped to develop their pedagogical practices through peer-learning?

Teachers collaborate and learn from each other all the time through informal encounters and discussions as part of everyday schoolwork, but it is important to also establish more systematic methods to support peer-learning inside a school. Peer-learning between teachers from different schools is really possible only if the opportunities are deliberately organised. Good ways for teachers to learn from each other include co-teaching or joint development projects. The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used for organising peer-learning activities addressing pedagogical practices with digital technology:

- ▶ Method 2. *Collegial tutoring* introduces a systematic model to organise a peer-learning process between digitally more- and less-advanced colleagues.
- ▶ Method 3. *Combined training and peer learning* introduces activities at which teachers share their experiences about new pedagogical practices with digital technology in small teams.

- ▶ Method 7. *Generating ideas for promoting students' digital competence* includes a process at which teachers write pedagogical scenarios in a shared repository and then examine and improve them in small teams.
- ▶ Method 12. *Teacher inquiry into student learning* includes an active inquiry phase during which the teachers conduct development projects in groups.

How can teacher learning be supported through training events?

In-service teacher training can be organised in many ways: it can be an event during which individual teachers or teacher teams from different schools can register or it can be targeted at teachers from one school or from selected schools. The training may be a short-term event or a longitudinal process including multiple meetings and activities. After the COVID-19 pandemic, online and hybrid modes of training have become popular, but it is important to consider the value of contact meetings for collaboration, sharing and networking.

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce some methods to be used for supporting teacher learning through training events:

- ▶ Method 5. *Digital Accelerator* is a programme in which the participants receive basic or advanced training in digital pedagogy or in digital leadership based on their professional role and previous competence.
- ▶ Method 8. *Innovative technologies and computational thinking through unplugged activities* is a short-term training event at which the participants are introduced to the basics of computational thinking.

How can professional development through collaboration between various stakeholders be supported?

Collaboration of teachers and schools with external stakeholders such as trainers, researchers, or experts in EdTech companies is an effective way to promote teachers' professional development in digitality and to create local networks for further collaboration. Development projects with external funding provide schools with resources that they could not otherwise access, but collaboration can also be embedded in everyday school practices without the need for additional resources.

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) introduce methods to be used for organising collaboration between various stakeholders:

- ▶ Method 1. *Co-designing collective processes for digital competencies for leaders and mentoring teachers* describes a practice where university staff members help leaders and mentoring teachers to design development activities in their schools.
- ▶ Method 10. *School-university collaboration for deepening teachers' digital competencies* is a series of workshops and practical experimentation where university experts support teachers in implementing computational thinking in their teaching.
- ▶ Method 13. *Teacher innovation laboratory* includes activities in which teachers and researchers co-create innovative lesson designs for using digital technology.

Phase 7. Final reflection

In this phase, the participants should evaluate the achievement of aims by assessing the development work and peer-learning activities conducted. Evidence could be collected about the success using similar methods as those used in phase 4. *Mapping joint learning and development aims and needs*. In addition, based on the evaluation result, plans can be made about how to proceed with continuous development, school-to-school collaboration and peer learning in the future.

This phase is important, but often neglected, because it helps to consolidate the results and motivate the participants: “We did this, we managed.” Of course, it also provides information and ideas about how to continue, what to improve and show which goals have still not been achieved.

How can the outcomes of the development efforts and lessons learnt be evaluated?

The methods for evaluating the success of joint learning and development efforts should be based on the goals, plans and activities of the process: what was developed and why. In addition to evaluating the development efforts, it is important to collect evidence for deciding how to proceed in the future. Evidence and perceptions should be collected widely from all relevant stakeholders, if possible: from leaders, teachers, students, external collaborators, and mentors themselves. The following are instruments used in the iHub4Schools project for collecting data for evaluation:

- ▶ The knowledge appropriation survey and interview protocols for teachers and school leaders are made available in D4.2 [1; 2].
- ▶ The mentor questionnaire for understanding mentors' experiences is made available in D4.2 [1].

The following Individual method descriptions (described in the *Individual methods for mentoring* chapter) include some methods to be used for reflecting on the success of joint learning and development actions:

- ▶ The process in method 5. *Digital Accelerator* ends in the Impact phase, in which the participants complete the same digital practice survey as in the beginning of the process. Its results are used to evaluate the impact of mentoring and to plan future actions in the school.
- ▶ Method 9. *Measuring teachers' digital competence* engages teachers in completing the SELFIEforTEACHERS survey again after the training programme to evaluate how their digital competence was enhanced.

As stated, the questions and methods described in the *Phase 4. Mapping joint learning and development aims and needs* section are also relevant in reflecting on how the joint learning and development aims were achieved. Actual change can be examined if the same instruments (e.g. the SELFIE survey) for collecting evidence are used at both the beginning for mapping development needs (Phase 4), and in reflection (Phase 7).

An example about implementing the mentoring process phases

The background for development interests in the case was that the two participating schools wanted to increase their collaboration, to develop their digital practices. The premises of the schools are close to each other.

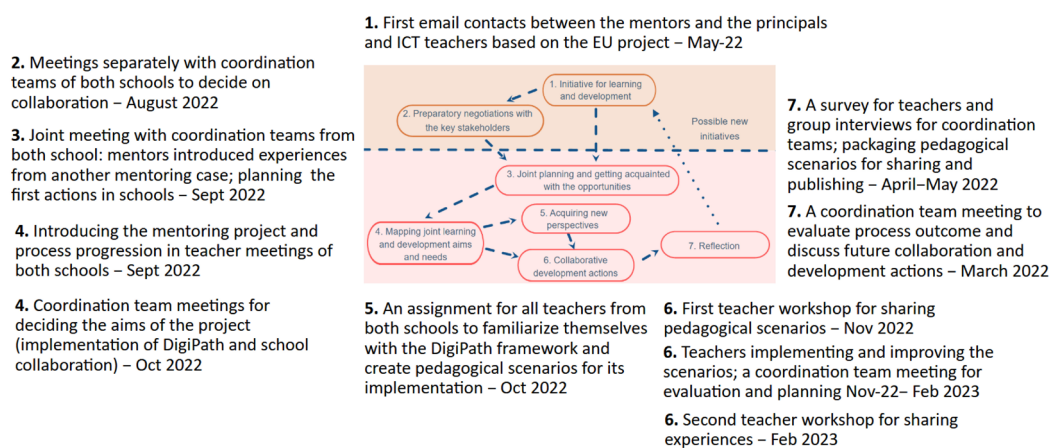
- ▶ *School 1*: Finnish-speaking school, about 20 teachers and other staff, an ICT tutor and the principal in the coordination team.
- ▶ *School 2*: Swedish-speaking school, about 10 teachers and other staff, an ICT tutor and the principal in the coordination team.

The development goals selected by the school principals: 1) practical implementation of the city's new DigiPath framework; 2) increasing collaboration between the schools.

- ▶ The DigiPath framework defines students’ learning goals at each grade level in primary school about media literacy, competence in information and communications technology (ICT), and programming skills. The framework is based on the New literacies programme defined by the Finnish Ministry of Education and Culture.

The phases of the process in this case are described in the figure that follows and in the text below.

Activities and events in different process phases in the DigiPath case.



The phases in detail

Phase 1. Initiative for development and collaboration

May 2022: **First contact by email** between the mentors and ICT teachers and principals. Schools were aware of a similar mentoring project in two other schools and were interested in starting something similar. The schools also had to start to use the DigiPath framework of the city.

Phase 2. Preparatory negotiations with the key stakeholders

August 2022: **Meetings at which collaboration was decided and settled.** Both schools had a coordination team with a principal and a digital teacher. Two researchers from the University of Helsinki worked as mentors.

Phase 3. Joint planning and getting acquainted with the possibilities

September 2022: **Joint planning meeting of the coordination teams** to discuss and plan the first activities and events.

The researchers introduced the activities and experiences in the mentoring process of the other two schools, which had started a few months earlier.

Phase 4. Mapping development needs and joint learning aims

September 2022: **Introduction of the mentoring project and process progression** in teacher meetings at both schools.

October 2022: Coordination team meetings for **deciding the aims** of the project (practical implementation of DigiPath and collaboration between schools) and planning the first workshop.

Phase 5. Acquiring new perspectives

October 2022: **Instructions for teachers** to 1) familiarise themselves with the DigiPath framework and choose two themes that they want to implement their teaching, and 2) think of the pedagogical scenarios for the implementation.

Phase 6. Development and collaboration actions

November 2022: A 1.5-hour **joint workshop** for the two schools at which teachers created written pedagogical ideas for DigiPath implementation and discussed the ideas in grade-level teachers teams (see method description *7. Generating ideas for promoting students' digital competence* in the Individual methods for mentoring chapter). All ideas were shared through Team channels.

January 2023: A coordination team meeting **to evaluate the workshop outcomes and plan the second workshop**.

January 2023: **Instructions for teachers** to modify the written pedagogical scenarios before the second workshop based on experiences and new ideas.

February 2023: Second 1.5-hour **joint workshop** where two teachers introduced good examples of implementing DigiPath and then all teachers discussed their experiences in grade-level teacher teams.

Phase 7. Final reflection

March 2023: A coordination team meeting to **evaluate the outcomes** of the process and discuss the continuation of collaboration and development actions.

April/May 2023: A survey for all teachers, and group interviews for coordination teams. Checking and packaging the best written pedagogical scenarios for sharing and publishing in the DigiPath repository.

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Individual methods of mentoring

In this chapter, we introduce a collection of Individual methods for the mentors and schools to apply for actual development and collaboration actions. They are practical methods which are developed in various mentoring and development projects. They can be used to implement digital innovation through peer learning and evidence-based development inside and between schools. The methods are like toolbox tools from which mentors and schools choose the appropriate approaches during the development process, based on their needs and goals. The methods were already mentioned briefly in the previous section associated with the phases of the Process model for school mentoring.

Some of the methods (e.g., *Digipeda workshop*, *Collegial tutoring*) describe individual, small-scale methods that are easy to implement as part of a wider set of methods during the school mentoring or peer learning processes. Other methods (e.g., *Teacher inquiry into student learning*) covers a longitudinal procedure, which itself contains many phases of the process, and may need more resources to implement as such. An individual method is often useful for several phases of mentoring. We wanted to include this wide variety of examples, because all methods have proven useful in practice, and they can be used as an inspiration for creating new methods. Experts who mentor the development actions inside or between schools are in a key role to apply the methods flexibly depending on the situation and context.

In the following, we first briefly list in the table the Individual methods collected or developed during the iHub4Schools project, and after this list, we describe each method in more depth.

In addition, in the previous section introducing the mentoring process phases we mentioned some other methods (e.g. an existing survey instrument) that might be useful in the mentoring phases in question. For those methods, a link for further information in external sources has been provided in the text.

A list of individual methods in alphabetical order.

Title of the method	Description	Usable in the following process model phases
1. Co-designing collective processes for digital competencies for leaders and mentoring teachers	Leaders and mentor teachers from different schools come together to share how they work with digital competence, and further investigate how they can develop collective learning processes in their own schools.	<i>6. Collaborative development actions</i>
2. Collegial tutoring	An easy method for organising collegial support about digital pedagogies between two teachers embedded in everyday school-work. A more-experienced teacher supports a less-experienced colleague through example scenarios and tutoring.	<i>6. Collaborative development actions</i>
3. Combined training and peer learning	Teachers introduce good examples of using digital technology in teaching and help colleagues to design and implement their own scenario. The process and the implementation are evaluated together in joint reflective discussions in small groups.	<i>5. Acquiring new perspectives 6. Collaborative development actions</i>
4. Digipeda workshop	A 3-hour workshop (face-to-face or online) for teachers to evaluate their own pedagogical digital practices and make joint proposals for training and development needs.	<i>4. Mapping joint learning and development aims and needs 7. Reflection</i>
5. Digital Accelerator	During the six-month-long programme, school teams get basic and advanced training in digital technology as well as leadership training and educational technology mentoring to support the digital capability and overall readiness for digital and distance learning.	<i>4. Mapping joint learning and development aims, 5. Acquiring new perspectives, 6. Collaborative development actions 7. Reflection</i>
6. Evaluating whole-school digital practices	During a 1.5-hour workshop (face-to-face or online) all teachers of a school evaluate the school's digital practices and their development needs in teams. Reflection is supported by an evaluation form.	<i>4. Mapping joint learning and development aims and needs 7. Reflection</i>
7. Generating ideas for promoting students' digital competence	A short (1.5 hours) and effective workshop at which teachers generate individually one or two pedagogical scenarios about advancing students' digital competence, discuss the scenarios in small groups and share scenarios through an online document.	<i>5. Acquiring new perspectives 6. Collaborative development actions</i>

<p>8. Innovative technologies and computational thinking through unplugged activities</p>	<p>A short (40-60 mins) workshop for teachers to learn about computer science topics and educational tools as well as to improve their ability to implement digital innovation and computational thinking in their teaching practice through brainstorming.</p>	<p>5. <i>Acquiring new perspectives</i> 6. <i>Collaborative development actions</i></p>
<p>9. Measuring teachers' digital competence</p>	<p>The SELFIEforTEACHERS tool is used to measure teachers' digital competence and whole school digital practices, such as teachers' knowledge about innovative technologies, the use of modern technologies in teaching, the difficulties they face and the support they need.</p>	<p>4. <i>Mapping joint learning and development aims and needs</i> 7. <i>Reflection</i></p>
<p>10. School-university collaboration for deepening teachers' digital competencies</p>	<p>During workshops, teachers' implementation periods (two-three months) and a reflection workshop, teachers improve skills of teaching mathematics and computational thinking in using a virtual learning environment ViLLE (or Eduten) based on learning analytics.</p>	<p>6. <i>Collaborative development actions</i></p>
<p>11. Self-assessment of digital maturity of the school</p>	<p>The digital maturity assessment model focus is in school' digital innovation of pedagogy, leadership and infrastructure.</p>	<p>4. <i>Mapping joint learning and development aims and needs</i></p>
<p>12. Teacher Inquiry into Student Learning</p>	<p>Teachers in small teams design their own inquiry project, implement it and share their experiences.</p>	<p>6. <i>Collaborative development actions</i></p>
<p>13. Teacher innovation laboratory</p>	<p>During a 3-12-month long programme, teachers and university researchers co-create and pilot test innovative lesson designs as well as monitor the process and reflect on the experiences.</p>	<p>6. <i>Collaborative development actions</i></p>
<p>14. Combining individual and school-level reflection of digital practices</p>	<p>The method consists of a short process organised within one school, using the SELFIEforTEACHERS tool, to reflect on the current needs of the teaching community in developing their digital competence and practices.</p>	<p>4. <i>Mapping joint learning and development aims and needs</i> 7. <i>Reflection</i></p>

1. Co-designing collective processes for digital competencies

Cecilie Hansen, Rosaline Barendregt and Christina Gkini

Aims

When teachers go to courses and workshops outside the schools, new ideas and knowledge are difficult to share or implement in their own schools. The aim of this workshop is to co-design a method for collective knowledge sharing among the participants and to enable them to bring back new knowledge from courses, seminars or workshops and share or implement new knowledge in the schools. Participants are school leaders and school mentors. The method is suitable for use in phase 6. *Collaborative development actions* in the school mentoring process.

Description

The method starts with a design thinking process in a whole-day workshop. Participants, leaders and mentor teachers from different schools come together to share how they work with digital competence, and further investigate how they can develop collective learning processes in their own schools. In the workshop, leaders and mentor teachers design the collective knowledge sharing process. The designed method is brought back to the schools to do the workshop again, with input from schoolteachers and adjust the method for local needs.

Context

School leaders and mentor teachers from different schools come to the university for design workshops (multiple school workshops). The participants carry on the similar workshop again in their own schools (local workshops).

Requirements for implementation and the resources needed

Material: Presentation for introduction. Presentation about the design principles. Printed posters with steps for the design thinking process. Post-it notes. Printed playing cards.

The participants do not bring anything with them.

Structure

The schools come to the university and investigate school practices using design principles through co-design.

Step 1. Presentation

Background and purpose presented by the university representative.

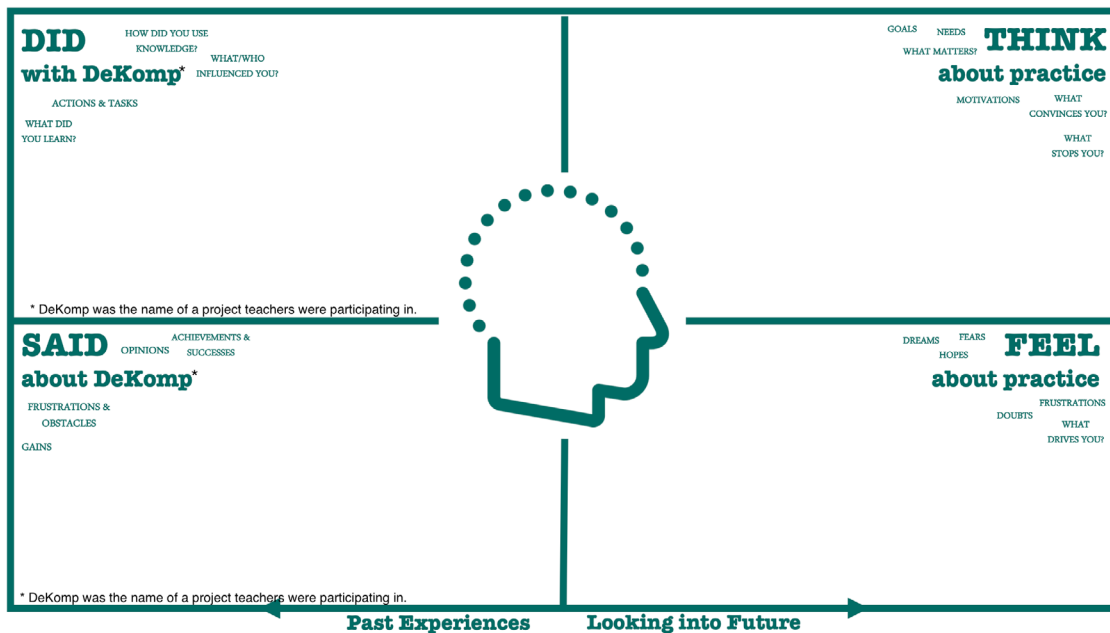
Step 2. ExperienceMap

Leaders and mentor teachers are put into separate groups.

Each group gets a poster (The ExperienceMap) to share thoughts about practices:

- ▶ What they have done in the school to develop practice.
- ▶ What is said about how they have been working.
- ▶ What they think about practice.
- ▶ What they feel about practice.

Experience map



Step 3. Presentation

Introduction about design principles and what the participants should pay attention to when designing for Collective learning processes in their schools.

Step 4. JourneyMap

In groups, the participants use the JourneyMap for the post-it notes and write down what knowledge they have got from the university, and what they will take back to the schools.

Journey map

	Receiving Knowledge from University		Sharing with the Teachers		Application of Knowledge by teachers		Share Experiences within School		Share Experiences with Partners	
ACTIONS What do you need to move to the next step?										
QUESTIONS What do you need answering before moving to next step?										
HAPPY MOMENTS positive, enjoyable things that improve the experience										
PAIN POINTS frustrations and annoyances that spoil the experience										
RESOURCES How can resource teacher contribute or what can they contribute with?										
DESIGN PRINCIPLES Which design principles are relevant to remember for this step?										
OPPORTUNITIES design enhancements that address any of the problems identified.										

Step 5. Local workshop

The schools organise the same kind of workshop in their own school but adapting its implementation to local needs.

Step 6. Sharing school experience with other schools

The schools will come back to the university, and present how the local workshop went. The schools adjust the design, to make an aligned design.

For the second workshop, the schools are also presented with a new topic to learn more. New knowledge is brought back to the school and shared and implemented using the co-designed method for collective knowledge sharing. For example, interaction design, algorithmic thinking, and ethics.

Actions after implementing the method

A collective knowledge sharing process on how to transfer knowledge from university workshops, on a range of topics, is taken back to schools.

Recommendations

When the participants bring the workshop back to the schools, it must be clear that they should develop a local design for collective knowledge sharing.

2. Collegial tutoring

Minna Lakkala and Liisa Ilomäki

Aims

Collegial tutoring provides a method to disseminate experienced teachers' pedagogical practices with digital technology. The method is designed to be a practical and easy method for organising collegial support inside school, embedded in everyday schoolwork. It is suitable for mentoring process phase 6. *Collaborative development actions*.

Description

In the process, a digitally experienced teacher introduces good examples of using digital technology in teaching and then helps the less-experienced colleague to design and implement their own scenario. The process and the implementation are evaluated together in joint reflective discussions.

Context

It can be used in any educational institution between two colleagues who have differing expertise in practices of using digital technology in teaching. The same teacher can be a tutor in some practices and a guided teacher in others, depending on their level of competence.

Requirements for implementation and the resources needed

The teachers have to be able to reserve some working time for joint planning, guidance and reflection discussions and/or supervision in the classroom.

Structure

The phases of the tutoring process are described below.

A. Orientation: the guided teacher examines the tutor's pedagogical practices with digital technology.

The tutor shares material about their teaching practices with digital technology with the guided teacher. The material can be written scenarios, teaching material, student assignments (instructions, working templates), online platform content, videos, etc.

The guided teacher examines the material before the first meeting.

The guided teacher can also observe the tutor's lessons during which the tutor uses digital technology in teaching.

- B. First meeting:** the tutor helps the guided teacher to start planning the teaching experiment.

The tutor and the guided teacher meet and discuss questions and comments raised by the materials shared about the tutor's pedagogical practices with digital technology. The tutor and the guided teacher start creating ideas for the guided teacher's teaching experiment based on the guided teacher's interests and goals. The tutee starts writing down the ideas for their teaching experiment in a planning document using a template provided by the tutor (see the example below). The guided teacher continues writing the plan and preparing the teaching experiment after the meeting.

An example of the planning template

TITLE OF THE PLAN:

Author:

School:

Development needs:

Preliminary ideas:

Pedagogical sequence/unit: [Theme]	
Subject(s)	
Class level/students	
Duration of sequence/unit	
Digital tools	
Tool 1	
Tool 2	
Tool 3	
Materials	
Material 1	
Material 2	
Material 3	
Preparations before starting	
To-do 1	
To-do 2	
Description of the sequence/unit	
Learning objectives	
Description of the phases of the sequence	Phase/lesson 1: Phase/Lesson 2: Phase/Lesson 3:
Assesment	

- C. Second meeting:** the tutor provides help for improving the plan and preparing for implementation.

The tutor answers the guided teacher's questions and gives recommendations about what to consider and how to improve the plan and continue with the preparations. The discussion can relate to pedagogical approaches and solutions, digital tools and the skills required to use them, task designs, classroom management etc. depending on the needs of the guided teacher.

The guided teacher modifies and improves the plan based on the discussions and continues with preparing the implementation.

- D.** Supported implementation: the guided teacher runs the lessons in the classroom, with the help of the tutor.

The guided teacher implements the teaching experiment in their classroom according to the plan.

The tutor helps the guided teacher when needed. The guidance methods are agreed on case-by-case, depending on the resources of the tutor and the wishes of the guided teacher. They can be short face-to-face discussions between lessons, the tutor's presence in the classroom, communication via phone, e-mail or other forums, etc.

- E.** Final discussion: evaluating the success of the teaching experiment and lessons learnt.

The tutor and the guided teacher discuss and analyse the experiences of the teaching experiment, to reflect on the classroom implementation as a whole and find points for improvement in it.

The tutor and the guided teacher should also discuss what the guided teacher learnt from the experiment and what the next steps are to develop their competencies in using digital technology in teaching further. The reflection may focus on both the digital and pedagogical competence of the guided teacher.

Actions after implementing the method

The tutoring process can include a follow-up some weeks later, and the tutor can observe the guided teachers' teaching during a different activity with digital tools to give additional advice.

It is recommended that the collegial tutoring practice is linked with the general teacher learning strategies of the school, like competence mapping or performance appraisals and development discussions.

Collegial tutoring practice can be used as a systematic and established common method in the whole school so that the tutoring pairs are agreed together in teacher meetings annually.

Recommendations

It is relevant to direct the tutoring discussions towards pedagogical improvement (not just on using digital tools) by making the deeper pedagogical ideologies, reasons, and solutions in the scenarios explicit.

It is also recommended that the guided teacher be offered the option to observe the tutor's teaching, because it is not easy to describe all the details of the pedagogical practices through discussions.

The original collegial practice transfer model was developed in an EU-funded FICTUP project and a scholarly journal article [1] has been written about the experiences.

Reference

[1] Lakkala, M., & Ilomäki, L. (2015). A case study of developing ICT-supported pedagogy through a collegial practice transfer process. *Computers & Education*, 90, 1–12. <https://doi.org/10.1016/j.compedu.2015.09.001>

3. Combined training and peer learning

Madona Mikeladze, Nana Makaradze, Tatia Nakashidze, Nino Nakashidze, Mikheil Donadze, Tamar Siradze and Guladi Phartenadze

Aims

The aim of the method is to disseminate experienced teachers' pedagogical practices with digital technology, encourage peer learning and sharing culture of good experience as well as to introduce the method which will be a practical and easy method for organising collegial support inside school embedded in everyday schoolwork. The method is suitable for use in phases 5. *Acquiring new perspectives* and 6. *Collaborative development actions* of the school mentoring process.

Description

In the process, a digitally experienced teacher introduces good examples of using digital technology in teaching and then helps colleagues to design and implement their own scenario. The process and the implementation are evaluated together in a joint reflective discussion in a small group.

Here the teachers play a leading role. The teacher chooses how their colleagues should help. The method is based on partnership principles and the teachers should never feel that they are being dictated to or brainstormed on how to use this or that strategy during the lesson.

Context

In our case, five public schools were selected in the same region. School levels were primary, elementary and secondary. The schools were selected according to the following criteria: experience, size, geographical area, infrastructure and teacher achievements, etc. A total of 49 teachers participated in the survey. After that, several types of training were planned and given to the teachers. The teachers then shared the knowledge and skills gained during the training with each other. After the training, the teachers were again surveyed to determine how much their competencies improved through the training. The results of the survey are communicated to the teachers.

Schoolteachers involved in pilot testing begin the process of implementing the acquired knowledge and skills in the classroom. For this, they form small groups. There are five or six teachers in the group, who have differing (uneven) expertise in the practices of using digital technology in teaching.

Teachers meet periodically and share their experiences, talk about the strengths and weaknesses of the lessons/strategies used, and if desired, demonstrate the practices with video recordings of the lessons.

Being in the role of facilitator and organising the meeting is assigned to all teachers in turn.

Requirements for implementation and the resources needed

Teachers have to be able to reserve some working time for joint planning, guidance and reflection discussions and/or supervision in the classroom.

Structure

The method includes the following phases:

- A.** The representatives of the mentoring team (project staff) met with the principals of the schools about mutual cooperation in the process.
- B.** The representatives of the mentoring team - personal mentors of the project are distributed into schools in order to observe the process and help teachers.
- C.** Teachers form a small group (five or six teachers) and agree on cooperation strategies.
- D.** Teachers are introduced to one of the strategies in training and/or also watch a video recording as a teaching resource (example, model) and/or have a colleague demonstrate the strategy in the classroom.
- E.** Teachers are placed in groups (maximum number of three in a group) and through mutual participation they observe how other teachers implement and use the strategy in the classroom.

- F. During the feedback session, teachers reflect on how they used this or that strategy in the learning process, discuss the strengths and weaknesses of the lesson/strategy used, and discuss future plans/changes to be implemented, based on the feedback received from colleagues.

Actions after implementing the method

After the introduction of the method, a meeting was held at the university, the purpose of which was to receive feedback from teachers, evaluate the method and share experiences with teachers from other schools. The meeting was attended by teachers from all five schools involved in piloting, school principals and university staff. The teachers involved in the piloting process gave presentations to the teachers at the other schools about the activities implemented in their schools, talking about the positive aspects of the method, challenges, and results. In the course of the meeting, it was agreed that the schools would organise internal workshops within the framework of the teachers' study groups to share their experiences, and would involve other teachers from the school in these processes.

Recommendations

Introduce the models and methods developed within the project to schools/school directors, so that they can develop their schools according to this model and make them digitally innovative.

It has been clearly identified that the teachers are more motivated and ready for development when they have had opportunity to evaluate their own competence and to identify their own needs.

Models and methods give the school more independence.

Coaching sessions conducted by trained facilitators from each school facilitated/ can facilitate:

- ▶ Development of coaching and leadership skills of teachers.
- ▶ Better understanding of the needs and goals of the school.
- ▶ Strengthening cooperation and mutual agreement.
- ▶ Forming a team with high performance and potential.
- ▶ Knowledge sharing and transfer.
- ▶ Increasing involvement and accountability.
- ▶ To create opportunities for raising the quality of teaching and learning.

- ▶ Strengthening the culture of professional growth and development..

The experience gained within the project and the results achieved determine its sustainability. Although the piloting process has ended, the schools have agreed to continue working together to share experiences. In addition to continuous cooperation with the mentoring team and using the acquired experience in the educational process, the five public schools in the region will constantly take care of supporting other schools in the region with digital technology and innovative approaches in order to provide a rich teaching-learning process.

4. Digipeda workshop

Minna Lakkala and Liisa Ilomäki

Aims

The aim of the Digipeda workshop is to start discussing how to improve the pedagogical use of digital technology in the whole school. Suitable for mentoring process phases 4. *Mapping joint learning and development aims and needs* and 7. *Reflection*.

Description

The Digipeda workshop is a three-hour workshop, preferably for all teachers and leaders of a school. The participants reflect on their own pedagogical practices with digital technology and develop together suggestions for common training and development needs.

Context

The workshop is designed to be a starting point for long-term development actions, but the subsequent actions may vary. It is suitable for all school levels, all school types, and teachers with varying levels of competence in the pedagogical use of digital technology. It can also be applied to smaller teacher groups if needed.

Digipeda workshops can also be organised as a remote session in which individual tasks can be integrated with breaks, and breakout rooms can be used for small group discussions.

Requirements for implementation and the resources needed

Before the workshop, it is useful to discuss with the principal about the current state of the school's ICT use.

All participants need to have a laptop or tablet for individual work.

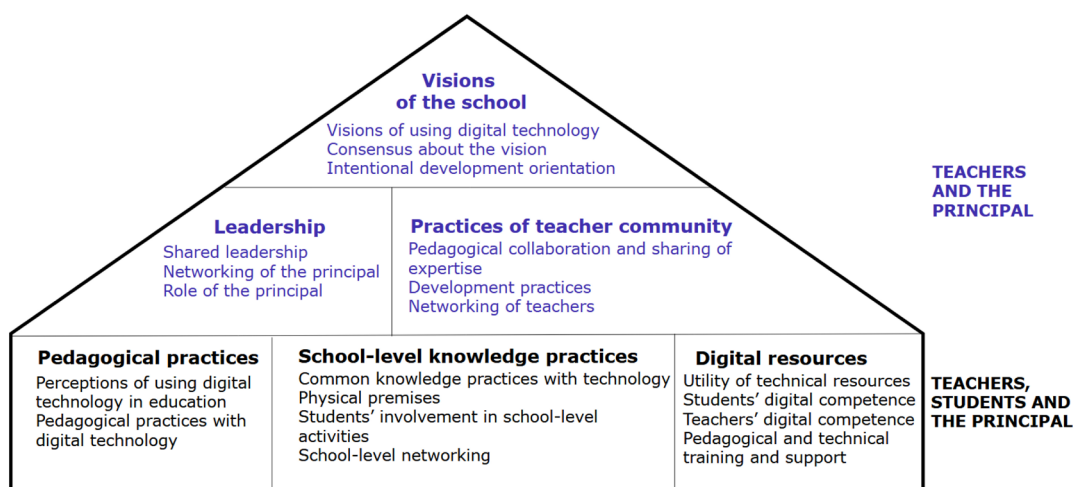
Structure

The phases and content of the Digipeda workshop are the following:

A. Brief orientation (about 15 mins)

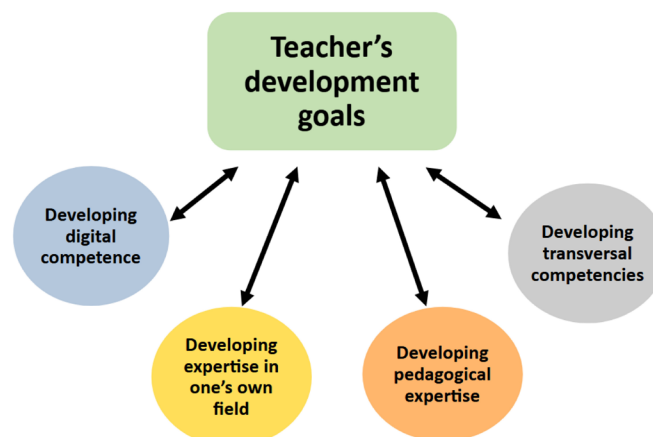
An introductory lecture about the goals of the workshops; the innovative digital school model; and areas of teacher competence development. The innovative digital school model is used for explaining that the use of digital technology in teaching is the responsibility of the whole school and teachers should have joint plans, decisions, and actions for development.

Innovative digital school model [1]



We used a picture, presented below, to explain the four areas of teacher competence to emphasise that the focus of the development goals should not be only on digital competence, but also on a broader perspective.

Areas of teacher competence



- B.** Group discussion: Current ways of using digital technology in teaching (about 30 mins)

The participants should be divided into small groups (three or four participants) to discuss their current ways of using digital technology in teaching.

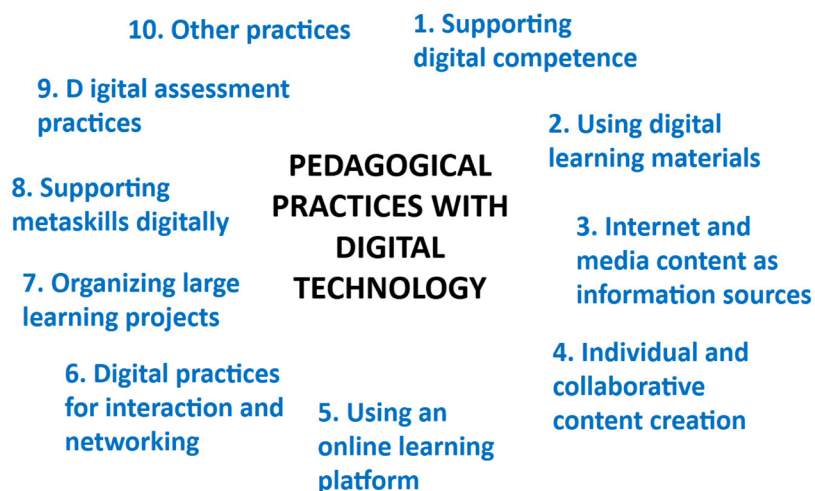
It is preferable to divide teachers into groups randomly for group discussion. Otherwise, teachers easily go into the same familiar groups in which they already work a lot.

If the workshop is organised remotely, the participants can be divided into small groups by using breakout rooms.

- C.** A lecture: A framework of the ways digital technology in teaching should be used (about 20 mins)

The reason for presenting the framework about the pedagogical practices with digital technology is to provide a conceptual tool to reflect on one's own practices, and to offer new information and ideas for further development. The picture below presents the framework. Each category is presented with a slide explaining the practices in more detail with links to examples, additional information, or guidelines.

A framework about pedagogical practices with digital technology



- D.** Individual task: Current ways of using digital technology in teaching (about 40 mins)

- a.** Reflecting on one's own practices in using the framework of pedagogical practices with digital technology and writing a personal document using a template.

A template following the framework of pedagogical practices with digital technology is provided for individual self-reflection (below). The participants

are directed to record 1) their good current practices and 2) the practices that they would like to develop.

A template for self-reflection about pedagogical practices with digital technology

Pedagogical practices with digital technology - Reviewing own practices and planning development goals

Copy the template for you 1) as a Google document with *File -> Make a copy* and choose a folder in Google Drive or 2) as a Word file with *File -> Download -> Microsoft Word* and choose a folder from your computer.

Author:

1. Supporting digital competence	
<ul style="list-style-type: none"> • Basic skills about the meaningful and appropriate use of conventional applications • Safe and responsible behaviour in the web • Copyright issues • Broader skills about the meaningful and appropriate use of rare applications • Programming skills, coding, computational thinking, robotics • Information management skills, data handling 	
What practices do I master and use	What I would like to try and develop

Participants make their own copy of the document and save it for their own individual use. The documents can be shared if everybody agrees to do so.

b. Answering a survey about training needs and interests.

After reflecting on the use of digital tools from the point of view of pedagogical practices, teachers will fill in a survey that asks for more detail about their training needs and interests concerning digital tools and applications that are used in the city. The survey includes two main themes, experience and interests, and they both consist of several items; see the following examples:

- 1) Experience: What is your current skill level?
 Spreadsheet (Microsoft, Google)
 Limited experience 1 - 2 - 3 - 4 - 5 I manage well
- 2) Interests: Interest in participating in training events about the topic
 Programming (and robotics)
 This topic does not interest me 1 - 2 - 3 - 4 - 5 I am very interested in this topic

The answers will be used later to facilitate the sharing of knowledge within the school and to plan training events.

E. Group work: Sharing individual development needs and listing joint development targets (about 30 mins)

The participants are divided into small groups in which they will share the results of their individual reflections and together suggest joint development goals and training needs for the whole school.

Each group answers the following questions:

- ▶ What could our joint development targets be?
- ▶ What support and training do we need?
- ▶ Who can train others and about what inside the school?

Group work results are collected and shared using an online tool (e.g., Padlet, Google presentation).

F. Joint discussion: Examining the suggested development targets together (about 15 mins)

The mentor trainer leads a joint discussion in which the group work results, documented in the shared online document, are discussed.

The focus could be on the most frequently mentioned issues that seem to be shared by all groups. In addition, the expertise inside the school (who could train others) can be highlighted.

It might also be relevant to ask the school's principal and/or the IT specialist to comment on the group work results.

G. Summarising: Suggestions about the next steps, and final reflections (about 10 mins)

The workshop should end with a summary including:

- ▶ An introduction of the subsequent steps for the development work, e.g., the city's support services and options for actions for the school's development work concerning the pedagogical use of digital technology.
- ▶ Final reflections from the participants, e.g., by asking everyone to describe briefly their impressions and thoughts, or write them in the online chat one-two words.
- ▶ Other remarks that have emerged as relevant during the workshop.

Actions after implementing the method

Inform the teacher trainers of the city about the results of the workshop. They will contact the schools later for tailored support actions.

Recommendations and additional information

It is relevant to emphasise the idea of having all teachers from the school to present at the workshop. This is for the principal, when agreeing about the organisation

of the workshop. It is not necessarily clear to everybody that this is not a training event for individual teachers, but an opportunity to advance shared understanding and joint decisions about how to develop the school in the pedagogical use of digital technology.

The Digipeda workshop was originally designed for the City of Espoo in collaboration with researchers Minna Lakkala and Liisa Ilomäki (University of Helsinki), developing trainer Laura Korpela in collaboration with Tero Toivanen, Pauli Vinni and Leena Määttänen as well as coordinating developing trainer Mikko Löyttyniemi (Teaching Development Service Area, City of Espoo Finnish Basic Education Unit, Growth and Learning Division), trainer Aino Korhonen (Heuristica Oy) and the Centre for Continuing Education HY+.

Reference

[1] Ilomäki, L., & Lakkala, M. (2018). Digital technology and for school improvement: innovative digital school model. *Research and Practice in Technology Enhanced Learning*, 13(1), 25. <https://doi.org/10.1186/s41039-018-0094-8>

5. Digital Accelerator

Kerli Požogina

Aims

The aim of the Digital Accelerator programme is to support the digital capability and overall readiness for digital and distance learning of school teams through intensive training and educational technology mentoring. It combines the mentoring process phases 4. *Mapping joint learning and development aims*, 5. *Acquiring new perspectives*, 6. *Collaborative development actions* and 7. *Reflection*.

Description

During the six-month programme, school teams get basic, advanced and leadership training and educational technology mentoring.

Training and educational technology mentoring focuses on creating a united platform for each school to implement the digital learning and tools within everyday teaching and learning processes.

Requirements for implementation and the resources needed

Schools must have a computer lab or provide laptops for teachers to participate in the training.

Preparations for the programme have to include the readiness to switch the training events and the mentoring sessions online at any time to continue the programme, e.g., during the COVID-19 pandemic.

Structure

The phases of the Digital Accelerator programme are the following:

A. Preparation phase: Focus

The preparation phase is to put in place the main focus of training and mentoring for each school team in general, and for each individual teacher.

- ▶ Short individual interviews with principals and local government representatives to get an overview of the digital learning situation and specific needs for training and mentoring.
- ▶ Surveys about the digital practice of teachers and the digital infrastructure of schools provide detailed input for the mentoring and training events.
- ▶ Individual educational technology mentoring to follow up the survey results, to assess the level of expertise of each teacher, and to identify specific topics for the training events.

At the beginning of the first phase, there are also preparations for the whole programme, for example, training about counselling for educational technology mentors, a seminar for educators and educational technology mentors and preparing an online work environment for the educators and educational technology mentors.

B. Main phase: Empower

The main phase for mentoring and training events at each participating school with special attention to be paid to cooperation and digital safety.

- ▶ Educational technology mentoring (individual and group) for teachers and for the school management, mentoring varies from 35 to 80 academic hours, based on the size of the school team.
- ▶ Basic training (32 hours) for teachers is in the fundamentals of integrating digital technology into the learning process to develop students' digital competence.
- ▶ Advanced training (30 hours) for teachers focuses on teachers who are more experienced in the field of educational technology addressing the specific topics based on school needs.
- ▶ In addition, management is schooled in digital leadership (39 hours), which consists of key topics about digital technology (digital safety and infrastructure, digital competence in school curricula etc.) and digital

development project implementation.

- ▶ Virtual tours within digitally excellent schools to learn from best practices.

During the intensive mentoring and training period, special attention is paid to digital safety and cooperation between teachers, to empower grass roots-level innovation.

C. The follow-up phase: Extend

The follow-up phase for final mentoring seminar with local government to assess the overall progress at each school.

- ▶ Mentoring seminar for the school management and local government representative to assess the school digital development project and overall progress in the Digital Accelerator programme, also to make suggestions for further developments and training events.

The purpose of the additional mentoring module is to ensure the success of the implementation of the digital development project, which is initiated during digital leadership training, and to give school management the opportunity to analyse the whole process, and to get feedback about the whole programme.

D. The conclusion phase: Impact

- ▶ The conclusion phase is to analyse the survey results of all participating schools, to make changes to the programme and make additions to the compendium of best practices
- ▶ School pedagogical staff and management fill out a digital practice survey before the programme and again a year later. During the fourth phase, there is thorough analysis of the data collected, to improve the programme for the next period and to assess its overall impact.
- ▶ The programme has its own compendium, which describes the main topics which are important for the development of digital learning and technology within each school: mapping school needs, strategic planning of digital learning, new learning and teaching discourse, digital safety and digital infrastructure. During the impact phase, new chapters are created for the compendium, based on the good practices from the schools, which have been identified during the programme.

The survey analysis provides validated proof for the effectiveness of the programme and the best practice compendium adds value in the sense that it creates an important framework to be followed by each school interested in improving its digital technology implementation and distance learning.

Related actions

Schools describe their experience and development by creating the timeline for the whole process. Timelines are public and shared with other schools.

After each six-month programme period, there is a webinar to introduce the school projects and the experiences with other schools.

During the programme, there is also an underlying activity, which is to support the mentors' and trainers' learning community by sharing experiences, digital tools and materials.

Further reading

[Click these links to find examples and additional information:](#)

[Digital competence: teaching 21st-century skills](#)

[Digital Competence: Empowering teachers and students](#)

[Teachers improve their digital competence in Digital Accelerator](#)

[Estonia: insights from the digital training programme for teachers](#)

[Virtual tours for the schools](#)

6. Evaluating a school's digital practices

Minna Lakkala and Liisa Ilomäki

Aims

The aim of the workshop is 1) to evaluate the current state of the digital practices of a school through the perceptions of teachers and other school members, in order to recognise the strengths and to work out what is needed for improvement and 2) to engage all members of the school community in the evaluation effort. The method is suitable for use in phase 4. *Mapping development needs*, and phase 7. *Reflection* of the school mentoring process. If the method is used in both phases of the process, it provides an opportunity to make pre-post comparisons of the change.

Use this method if you (as a school leader or mentor) want to evaluate the current state of whole-school practices with digital technology in your school, to find out what practices are worth preserving and what changes or improvements are needed.

Description

The method is a 1.5-hour workshop for teachers at a school to evaluate the whole school's practices in using digital technology. The evaluation is conducted in teacher teams using a framework that describes the key elements of a school, e.g. an Innovative Digital School model. The workshop can be organised face-to-face or online, and the teams can use online documents in reporting the evaluation results.

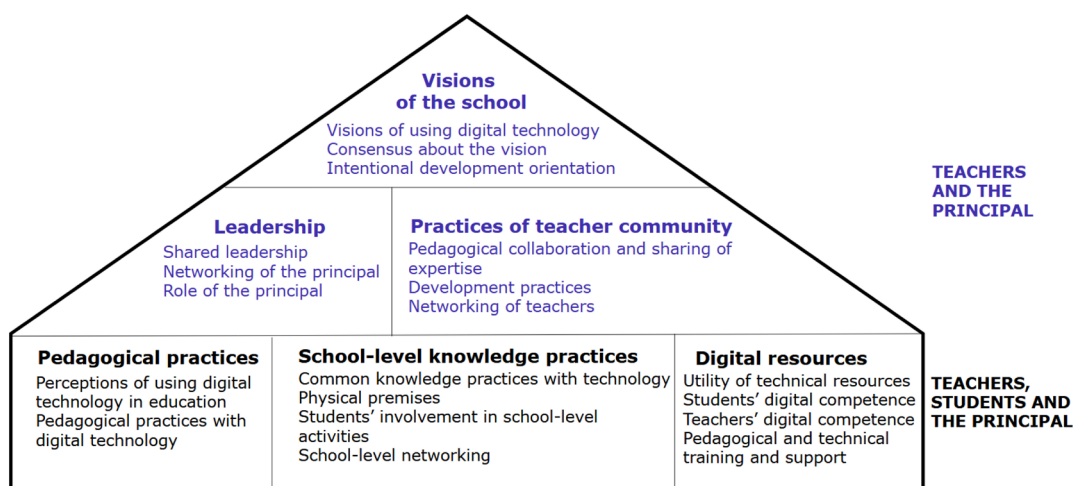
Context

We organised the workshop as a joint event at two primary schools that participated in the Finnish mentoring pilot project that focused on increasing collaboration between the schools in digital practices. About 30 teachers participated. In the workshop, the introductory and summary sessions were shared, but the group work was done in school-based groups, because the purpose was to evaluate the practices of the participants' own school. In this case, teachers used their own language (Finnish or Swedish), and the materials were in both languages. The method can also be used in other ways, e.g., the school's leading team or ICT team can evaluate the elements of the school and then receive feedback from other members of the school.

Requirements for implementation and the resources needed

Before the workshop, the mentors need to prepare a presentation about the principles and elements of the framework used for evaluation. In our case, we used the Innovative digital school model (see the picture below) and also presented some examples of good practices related to each element. The presentation should also include instructions for the group work.

Innovative digital school model [1]



A document template as an online document (see the example below) for group work that teachers will use is needed, to evaluate their schools' current digital practices and the need to improve them. Create a separate document for each group.

A template for evaluating digital practices in a school.

Evaluating schools' digital practices - iHub4Schools

Group x

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

A digital platform could be used for sharing the materials and online documents. In our case, we used the school's Microsoft Teams area.

- ▶ Presentation materials were available in the files of the General channel.
- ▶ A separate channel was created for each teacher group (7 + 3 groups) in the team area. The ICT team members from the schools made the grouping. An empty evaluation template was added for each group's channel.
- ▶ The General channel was used for plenary sessions and the group channels for group discussions in the workshops.

The workshop can be organised either face-to-face or online. For the online workshop, you need a video conferencing application (e.g. Teams or Zoom) with breakout room functionality. In our case, we used Teams.

Structure

Before the workshop, the mentors need to prepare a presentation about the principles and elements of the framework used for evaluation.

Main phases of the workshop were:

- A.** Orientation
 - ▶ Opening the workshop and explaining its purpose
 - ▶ The presenter could be a representative of the school (e.g. the principal, an ICT teacher)
- B.** Introduction of the evaluation framework
 - ▶ Lecture about the whole-school evaluation framework (e.g. the Innovative Digital School model)
- C.** Evaluation of whole-school practices in teacher teams
 - ▶ Evaluating the school's digital practices in teacher teams (2-5 participants).
 - ▶ Teams can be formed randomly or based on some relevant criterion (grade level, subject, existing team structure, etc.)
 - ▶ Each team has an online document that includes a template based on the evaluation framework.
 - ▶ The teams organise their work for themselves: organise the discussion, fill in the document.
- D.** Summary
 - ▶ Summarising the evaluation results from teams and discussing subsequent steps.
 - ▶ The mentor can construct a quick summary slide based on team documents when the teams are working.

The following is an example programme of an online workshop implemented between two schools in Finland:

15:00	Opening the workshop (the principal of one school)
15:05	The need for change as the digital environment changes (ICT coordinator)
	Introduction of the schools' ICT team members
15:15	A few words about the research (mentors)
15:20	Introduction of the Innovative digital school model to structure the evaluation (mentors)
15:40	Evaluating the digital practices and the need for improvement in one's own school
	Working in teacher groups

16:15	Summary and the next steps
16:30	End of the workshop

Actions after implementing the method

It is important to have some follow-up actions after the workshop, either for all participants, or with the leaders / representatives of the school. Follow-up actions could include continuing the evaluation in teacher teams, and holding a meeting between the school representatives and mentors to examine the workshop outcomes, and to make future plans.

In our case, after the workshop the participants could complete the group documents after the seminar. Then the mentors compiled the contents of the groups' evaluation documents into one document for each group, uploaded them to Teams, and sent an email to the ICT team members of both schools so they could look at them.

The mentors and the ICT team members had a meeting about 1.5 months after the workshop to examine the outcomes and make decisions about subsequent steps. The mentors had made a one-slide synthesis and some recommendations for each school, based on the workshop outcomes. The outcomes were discussed and decisions were made about future development actions.

Recommendations

In our case, the workshop was useful because it highlighted a need that was then chosen as a development aim for the schools (to explain and construct a practical digital path description for students' digital skill learning). Time was a bit short for group work. Either the lecture should be shorter to save more time for group work, or the workshop should be longer. Continuing the work after the session did not happen, so perhaps more explicit allocation of responsibilities to teacher teams could have helped.

It is important that the groups can really reflect on the practices from their point of view, so that comments from the principal on the evaluations are not needed, for example.

Reference

[1] Ilomäki, L., & Lakkala, M. (2018). Digital technology and for school improvement: innovative digital school model. *Research and Practice in Technology Enhanced Learning*, 13(1), 25. <https://doi.org/10.1186/s41039-018-0094-8>

7. Generating ideas for promoting students' digital competence

Minna Lakkala and Liisa Ilomäki

Aims

The aim of this activity is to engage the whole teaching community to generate and share ideas about advancing students' digital competence in teaching according to a defined digital strategy. The method is suitable for use in phase 5. *Acquiring new perspectives* and phase 6. *Collaborative development actions* of the school mentoring process.

Description

The method is a short but effective workshop (from 1.5 to 2 hours) at which teachers, first, generate individually one or two pedagogical ideas or scenarios about how to advance students' digital competence in their own teaching and, second, introduce and discuss ideas in small groups. Teachers write the ideas in a shared online document (e.g. a PowerPoint presentation) for further use. The duration is short so that it is easy to implement in schools' everyday practice, e.g. using the time used for regular teacher meetings. The participants can be from one or from several schools.

Context

The method was used in a Finnish mentoring case in which the aim was to increase collaboration between two elementary schools (Finnish and Swedish speaking) and to implement the city's Digi Path model in teaching practices to promote students' digital competence. About 30 teachers participated, and they worked in three groups (groups based on the grades 1–2, 3–4 and 5–6). The method can be used in various contexts: in individual schools, with several schools, in a teacher training programme, etc. Also, the number of participants is flexible, because the participants are divided in small groups.

Requirements for implementation and the resources needed

Teachers' brainstorming for promoting students' digital competence can start openly without any framework, but it is more effective if it is supported by a shared model. In our case, all the teachers knew the city's "DigiPath" beforehand, which defines digital competencies that students should acquire at different grade levels.

The idea is to share the pedagogical ideas between all participants and create them also for further use, which means that the mentors need to prepare digital spaces to enable that. In our case, we created an online PowerPoint presentation for each group in Teams channels with a template in each slide for writing down the individual ideas before sharing them.

Structure

The overall structure of the activity, including a pre-task for the participants, is the following:

A. A pre-task to choose two topics individually

The process starts before a joint meeting by instructing all teachers to choose two themes from the digital competence strategy that they could implement in their own teaching (e.g. teaching to use the Internet as a knowledge source or to use tablets to create videos for digi stories).

B. Generating and sharing ideas in teacher teams

A joint session (1.5 hours) is organised either face-to-face or online for all teachers. The structure of the session is the following:

a. A short introduction (programme, goal, some pedagogical viewpoints, instructions).

b. Division into teams of 4-6 participants (e.g. according to grades or subjects; in this case, according to grades).

▶ First, each participant writes down their own ideas (10 minutes) in the team's online presentation, one idea / slide, empty slides with a template created in advance.

▶ Then, all ideas are presented and discussed together, and based on the discussion, the authors can revise their slides. One participant works as the chair, to keep to the timetable and organise the discussion.

c. Back to a joint meeting. Each team briefly reports their teamwork results. A short reflection in which participants use a show of hands to express how useful the group work was for getting new ideas about implementing the method, and how much they had learnt something new.

Actions after implementing the method

Teachers are encouraged to implement their ideas into practice after the meeting. A follow-up meeting can be organised after two or three months for updating the descriptions on the slides and for sharing experiences. The slides can later be moved into a more permanent, shared repository of pedagogical ideas.

Recommendations

Reserve as much time as possible for the group work, avoiding lengthy lectures or explanations before that. It is relevant to have a joint reflection session at the end of the workshop, to promote the sense of community among the participating teachers and schools, but it can also be short, just a few minutes.

8. Innovative technologies and computational thinking through unplugged activities

Valentina Dagienė, Vaida Masiulionytė-Dagienė and Agnė Šimkienė

Aims

The aim of this method is to brainstorm ideas about digital innovation and computational thinking based on teachers' and schools' individual pedagogical practices and experiences. The Innovative Technologies workshop is important for introducing new themes on computational thinking or new educational tools to primary and secondary school teachers. The method is suitable for use in phase 5. *Acquiring new perspectives* and phase 6. *Collaborative development actions* in the school mentoring process.

This method of brainstorming ideas about digital innovation and computational thinking based on individual pedagogical practices and experiences is useful in a variety of ways for supporting teachers' professional development and improving students' learning outcomes.

Here are a few examples:

- ▶ **Professional learning communities:** The workshop can be a starting point for professional learning communities (PLCs) in which teachers can continue to collaborate and share ideas about digital innovation and computational thinking.
- ▶ **Project-based learning:** Teachers can use the ideas generated during the workshop as the basis for project-based learning activities that allow students to develop their computational thinking skills while exploring new technologies.
- ▶ **Student-centred learning:** By incorporating new technologies and computational thinking concepts into their teaching practice, teachers can create more student-centred learning experiences that allow students to engage with digital content in meaningful ways.
- ▶ **Assessment and evaluation:** The workshop can also be used to develop new assessment and evaluation strategies that consider the use of immersive technologies and computational thinking concepts.

Overall, the Innovative Technologies workshop is a valuable tool for introducing computer science topics and educational tools to teachers and supporting their ongoing professional development. By following a structured process that includes mapping development needs, acquiring new perspectives, and reflecting on their practice, teachers can improve their ability to incorporate digital innovation and computational thinking into their teaching practice and support student learning outcomes.

Description

Innovative technologies have the potential to revolutionise the way we interact with digital content and the world around us. As these technologies continue to develop and become more accessible, we can expect to see them used in an increasing number of applications in education.

The Innovative Technologies workshop is designed for teachers who want to learn about computer science topics and educational tools and improve their ability to incorporate digital innovation and computational thinking into their teaching practice. The workshop is a valuable tool for teachers who want to support student learning outcomes through the use of technology in the classroom. The workshop is also suitable for teachers who are interested in ongoing professional development and want to learn new perspectives on teaching with technology.

The duration of the activity is 40 to 60 minutes.

Context

This method could be implemented face to face or online or using a hybrid method, but it is important to create small groups. If the teachers participating in the workshop come from different schools, we recommend mixing group members, because it gives teachers an opportunity to share their own practices. We organised workshops based on this method in Lithuania. Six schools from several regions participated in the same workshops. Participants were primary school teachers with no computer science background.

Requirements for implementation and the resources needed

You need to prepare a presentation about the idea and principles of the workshop, because teachers should be aware of the content at the start. Also, the steps of the workshop should be clear, so that the participants know how to work during the workshop and why it is important.

The workshop can be organised as face-to-face meetings or in virtual spaces (using, e.g., Zoom or Teams) but virtual participation is much more exhausting. It is important to have material for virtual groups about how data in the group work will be collected (worksheets and other applications like Padlet tables, Microsoft Word documents, PowerPoint, etc.). These tools allow working in groups. The presentation should also include instructions for the group work.

A lot of resources can be found and adapted from the [Computer Science without a computer](#) website.

Computer Science Unplugged adopts a constructivist methodology through which students are presented with challenges based on simple rules, allowing them to discover powerful ideas on their own. This approach not only enhances retention, but

also fosters a sense of empowerment among learners, by demonstrating that the concepts are within their reach. Additionally, the activities involve a lot of physical movement, and the large enough space is needed.

The constructivist approach enables teachers to learn alongside the students. It is necessary to familiarise oneself with the activity before presenting it to the class. Also, videos are available for many of the activities, which can help teachers visualise them. As students explore and comprehend the principles behind the computer science topics, teachers can identify the patterns and ideas they are uncovering.

Structure

The structure of the Innovative technologies and computational thinking workshop is the following:

- A.** Introduction to the topic, presentation of the topic and discussion with the teachers. In our case, we collected participants' comments and questions using Padlet, then as mentors, we answered some questions, and other questions were answered by the teachers.
- B.** Short tasks, to deepen the knowledge of the presented topic.
- C.** Participants are divided into pairs; each pair gets the material (printed tasks) for the unplugged activity.
- D.** The rules of unplugged activity are explained and shown on the screen.
- E.** The unplugged activity starts, the duration is 40 to 60 minutes. During the activity, the members of the mentoring team mentor the participants.
- F.** Reflection on all the activities and workshop topics.

Each team discusses the difficulties and challenges that they had in completing the tasks. It is important for teams to be able to share their feelings about how they started to understand new ideas, which ideas the teachers got for applying the theme/tool in their own teaching etc. Each team could describe one highlight, or the teams can share their results in pair teams if there is no time to go through all presentations with the whole group.

Actions after implementing the method

After implementing the Innovative technologies and computational thinking workshop method, some actions that can be taken are:

- 1. Collect feedback:** It is important to collect feedback from the participants to evaluate the effectiveness of the workshop. Feedback can be collected through surveys, questionnaires, or focus group discussions.

- 2. Analyse the feedback:** The feedback collected should be analysed to identify the strengths and weaknesses of the workshop. This analysis can help in improving the workshop in the future.
- 3. Review the material:** The material used for the workshop should be reviewed to ensure it is up-to-date and relevant. Any outdated or irrelevant material should be replaced with current and relevant material.
- 4. Revise the tasks:** The tasks used for the short tasks and unplugged activity should be reviewed and revised according to the feedback received from the participants. This can help in improving the learning outcomes of the workshop.
- 5. Plan for follow-up:** After the workshop, it is important to plan for follow-up activities that can help the participants apply the knowledge and skills they learnt during the workshop. Follow-up activities can include online support, additional resources, or further training sessions.
- 6. Share the results:** The results of the workshop, including the feedback received, improvements made, and follow-up activities planned, should be shared with relevant stakeholders such as management, supervisors, or funders. This can help in demonstrating the impact of the workshop and securing support for future workshops.

Recommendations

We would like to provide some recommendations for organising the workshop:

- 1. Determine the mode of delivery:** Depending on the availability of resources, the workshop can be organised as a face-to-face meeting or in virtual spaces. If the workshop is held virtually, it is important to ensure that all necessary tools and materials are provided to facilitate group work and interaction.
- 2. Provide clear instructions:** To ensure that all participants understand the purpose and format of the workshop, it is important to provide clear and concise instructions on how to participate. This can include guidelines for accessing the virtual space, instructions for using the tools and materials provided, and an overview of the activities and their objectives.
- 3. Adapt materials to suit the audience:** The workshop materials should be adapted to suit the level and needs of the teachers from example primary education.
- 4. Use a constructivist approach:** To maximise learning outcomes, the workshop should adopt a constructivist approach, in which learners are presented with challenges based on simple rules and are encouraged to discover powerful ideas on their own. This approach fosters a sense of empowerment and helps learners retain the concepts they learn.

5. **Use physical movement and interesting materials:** To enhance engagement and participation, the workshop should involve physical movement and the use of interesting materials for example Bebras tasks or Bebras cards (<https://www.bebas.org/>).
6. **Collect feedback:** To evaluate the effectiveness of the workshop, it is important to collect feedback from participants. This feedback can be used to identify areas for improvement and to refine the workshop for future iterations.

9. Measuring teachers' digital competence

Madona Mikeladze, Tatia Nakashidze, Nana Makaradze, Nino Nakashidze, Mikheil Donadze, Tamar Siradze and Guladi Phartenadze

Aims

The aim of the method is to measure teachers' digital competence. In particular, the aim is 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, and what support they need, in order to increase their digital competencies. The method is suitable to be used in phase 4. *Mapping development needs* and phase 7. *Reflection* of the school mentoring process. If self-evaluation is made in both phases of the process, it makes it possible to make pre-post comparisons of the change.

Description

In the method, the SELFIEforTEACHERS tool is used to measure teachers' digital competence and whole school digital practices.

[SELFIEforTEACHERS](#) is a survey tool provided for teachers by the European Commission. It is free of charge for every school. It is provided to teachers so they can review and get feedback on how they are currently using digital tools and technologies in their work.

The SELFIEforTEACHERS survey includes the following main areas and items (questions) under them:

- ▶ Area 1 - **Professional Engagement.** Using digital technology for communication, collaboration and professional development.
- ▶ Area 2 - **Digital resources.** Sourcing, creating and sharing digital resources.
- ▶ Area 3- **Teaching and learning.** Managing and orchestrating the use of digital technology in teaching and learning.

- ▶ Area 4 – **Assessment**. Using digital technology and strategies to enhance assessment.
- ▶ Area 5 – **Empowering learners**. Using digital technology to enhance inclusion, personalisation and learners' active engagement.
- ▶ Area 6 - **Facilitating learners' digital competence**. Enabling learners to use digital technology creatively and responsibly for information, communication, content creation, wellbeing and problem-solving.

According to the description given in the European Framework for the Digital Competence of Educators ([DigCompEdu](#)), the core of the DigCompEdu framework is defined by Areas 2 to 5. Together, these areas explain educators' digital pedagogic competence, i.e. the digital competencies educators need to foster efficient, inclusive and innovative teaching and learning strategies. Areas 2, 3 and 4 are anchored in the stages which are characteristic in any of the teaching process, whether supported by technologies or not. The competencies listed in these areas detail how to make efficient and innovative use of digital technology when planning (Area 2), implementing (Area 3) and assessing (Area 4) teaching and learning. Area 5 acknowledges the potential of digital technology for learner-centred teaching and learning strategies. This area is transversal to Areas 2, 3 and 4 in the sense that it contains a set of guiding principles relevant for and complementary to the competencies specified in these areas [1].

Context

In our case, five public schools were selected to participate. The school levels were primary, elementary, and secondary. The schools were selected according to the following criteria: experience, size, geographical area, infrastructure and teacher achievements, etc. A total of 49 teachers participated in the survey. According to preliminary data (various surveys conducted throughout the country), it was certain that a large number of teachers faced difficulties in using digital technology in the teaching process. By interviewing school principals and teachers, it became clear that their desire and motivation to increase their competence was great.

Requirements for implementation and the resources needed

The method can be used twice, at the beginning of the process and at the end to measure the achieved progress; that can be done in three ways:

- ▶ Teachers fill out the questionnaire independently. In this case, the teacher needs a computer and the Internet and access to the questionnaire.
- ▶ Teachers are assisted by mentors when filling out the questionnaire in a face-to-face meeting format. In this case, an audience should be equipped with

computers and Internet access, and the translation of the questionnaire into the participants' language is needed if not available in the tool.

- ▶ Teachers are helped by mentors when filling out the questionnaire in an online session. In this case, the teacher needs a computer and the Internet, and the translation of the questionnaire into the participants' language is needed if not available in the tool.

Structure

The process in our case included the following phases:

A. School selection

A meeting was held with the region's representative, to get acquainted with the goals and objectives of the project, as well as to clarify the details of cooperation within the project. As mentors, it was requested of us to select five schools based on geographic location (city school, rural school), number of students, and teachers' achievements. The five schools that were selected according to these criteria were presented by the region's representative.

B. Teacher selection

Meetings of the mentors and the principals of the five schools selected, and the heads of educational resource centres were held:

- ▶ The school principals were introduced to the goals and objectives of the project by the mentoring team.
- ▶ An agreement was reached with the principals of the schools about cooperation within the project.
- ▶ The mentoring team conducted an interview with the principals to determine the needs of the school and teachers in terms of implementation and development of digital innovation.
- ▶ School principals were asked to select teachers from all levels and from different subjects (target group).
- ▶ With the help of school principals, 49 teachers from a range of subjects at elementary, basic and secondary schools were selected.

C. Introducing the purpose

A meeting was held with the teachers from the five schools. The mentoring team explained the project goals, tasks, objectives of the research to be conducted, and research tools and methods.

Due to the fact that the SELFIEforTEACHERS tool was in English, language competencies were identified with the teacher at the meeting.

D. Preparation for the self-assessment

The mentoring team developed a strategy for conducting a survey of teachers' needs through SELFIEforTEACHERS, which included individual meetings with teachers (both face-to-face and online), familiarisation with the principles of SELFIEforTEACHERS, and translation of the questions from English.

The mentoring team pre-tested the SELFIEforTEACHERS questionnaire with two participants. A purpose of this was to measure the time each teacher would need to complete the questionnaire, and to clarify the essence of all the questions, in order to avoid unexpected difficulties during the survey.

E. Conducting the self-assessment

Using SELFIEforTEACHERS to measure teachers' digital competence and identify their needs. Responding to the survey was carried out according to the planned strategy:

- ▶ Teachers were allocated mentors from the mentoring team;
- ▶ 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.

F. Analysing data

After completing the survey, the mentoring team analysed the results. After completing the questionnaire, the report was sent to each teacher by the tool. Teachers shared the reports with the mentors.

Actions after implementing the method

A face-to-face meeting was conducted with the participating teachers and the results of the survey were outlined. A short group interview was conducted to get feedback on the self-assessment tool. The need for further steps was identified, and training events were planned according to the teachers' needs.

A. Training and workshops

- ▶ A workshop based on the data and the feedback received from the teachers.
- ▶ Training session N1 given by an expert in the field of education and digitalization on using digital tools in teaching.
- ▶ Training session N2: one schoolteacher shared experiences of using the Padlet platform in teaching.
- ▶ Training session N3: The second schoolteacher shares their experiences.

- ▶ Training session N4: The expert conducted a training session on innovative methods and the tools used in the teaching/learning process.
- B.** After the interventions (in the form of training events) were implemented in schools, another survey was conducted through SELFIEforTEACHERS to find out the extent to which the teachers enhanced their competence.

Recommendations

The iterative process was much easier because the teachers were already familiar with the specifics of SELFIEforTEACHERS and did not need any technical help. They were also much more motivated and self-critical because they realised that the evaluation focused on their (the teachers') development and not only on the evaluation of their competencies.

The experiences of this method showed that:

1. In contrast to the first stage of using SELFIEforTEACHERS, the digital competencies of the teachers involved increased.
2. The SELFIEforTEACHERS survey proved to be relevant for measuring teachers' competencies and identifying needs.
3. The participation of the teachers in the training sessions after using SELFIEforTEACHERS for the first time was active, because the topics of the training sessions were specifically planned according to their needs, as a result of their own self-evaluation.
4. Confidence in the SELFIEforTEACHERS method was high on the part of teachers because the questionnaire is individual, and all respondents were able to assess their competence independently.
5. Schools gained experience in using the SELFIEforTEACHERS method, which allows them to conduct similar research at other times and with other teachers.

Conclusions from using the method:

1. Self-assessment as part of the school development process - why and how, focus on school autonomy.
2. Data are not available to third parties.
3. A variety of tools is available.

Moreover, the important circumstance is that the teachers are more motivated and ready to improve when they have the opportunity to evaluate their own competence and to identify their own needs. This has been clearly identified.

The SELFIEforTEACHERS method gives the school more independence. When the school/teacher has been labelled from the outset as being of low capacity, and when they are directed to the training sessions they should take to raise their competence, the human and financial resources spent on such professional development of teachers have not been wasted.

The SELFIEforTEACHERS method is easy to use and as an evaluation instrument it can be used by all schools, with all teachers and at different stages for different purposes.

References

[1] Redecker, C. (Ed. Punie, Y.) (2017). [*European framework for the digital competence of educators: DigCompEdu*](#). Luxembourg: Publications Office of the European Union.

10. School-university collaboration for deepening teachers' digital competencies

Valentina Dagienė, Vaida Masiulionytė-Dagienė and Agnė Šimkienė

Aims

The aim of this method is to improve the teaching of mathematics and computational thinking (CT) in primary and lower secondary education by using a virtual learning environment ViLLE (or [Eduten](#)) based on learning analytics, developed by University of Turku. The method is suitable to for use in phase 6. *Collaborative development actions* of the school mentoring process.

Description

At the beginning, several workshops were organised for schools about integrating ViLLE/Eduten into schools. The first workshop was devoted to introducing computational thinking (CT) and ViLLE in general. Several short tasks on CT were given to teachers, which they had to solve and discuss. Then several CT concepts were described and samples are presented using ViLLE. After the teachers had become familiar with the CT concepts and the tool, they were invited to start to use it during their lessons. Teachers could get individual support at any time by asking questions online or watching prepared videos on different issues of ViLLE.

After two or three months (depending on the number of lessons at each school), the feedback forms were provided and collected, and a reflection workshop was organised.

Vilnius University researchers collaborated with the University of Turku on the developments of ViLLE. The Vilnius University team is developing a special track (lessons and tasks) in ViLLE on CT for grades 3 to 9.

Context

The introduction to CT and ViLLE is suitable for primary and lower secondary grade levels. This can include students in grades K-8, or ages 6 to 14.

The method of integrating ViLLE into schools can be useful for a wide range of schools and teachers, including those who want to incorporate technology and computational thinking into their curriculum. This can include public and private schools, as well as educators who teach mathematics and technology.

Primary and lower secondary school teachers can use ViLLE to help students develop CT skills by introducing them to coding and programming concepts in a fun and engaging way. ViLLE offers a variety of educational resources that have been specifically designed to help students to understand beyond digital technology.

ViLLE/Eduten is suitable for all types of schools, including public, private, and charter schools. The workshops can be adapted to meet the needs of all grade levels and subject areas, making it a flexible tool for educators who want to incorporate CT into their curriculum.

Requirements for implementation and the resources needed

For the primary workshop, only face-to-face meeting is possible, but later, online meetings can also be used. All the participants have to have computers to connect to the ViLLE environment.

Structure

The activities involved in the method include the following phases:

- A.** Method implementation begins with a general workshop on the virtual learning environment – ViLLE or Eduten:
 - ▶ A discussion about computational thinking: how it is introduced in the updated curriculum. (A mentor will organise a whole group discussion, inspiring round-table activity for all participants).
 - ▶ A discussion about ViLLE: schools' plans on how to use this environment (schools have their own plans, but this discussion helps to develop these plans according to experiences of members from other schools). Teachers learn how to use the ViLLE environment (during face-to-face or online meetings).

- B.** Teachers start to use the ViLLE environment in their lessons (over a period of 2 or 3 months). Before this stage, will teachers have had a general workshop for ViLLE (see A).
- C.** A workshop about the reflection on the experiences from lessons with the ViLLE environment.

Actions after implementing the method

After implementing the method described, the following actions can be taken:

- 1.** Monitor and evaluate the use of ViLLE or Eduten in the classroom: It is essential to monitor and evaluate the use of ViLLE to identify the effectiveness of the virtual learning environment in improving students' learning outcomes. This can be done through surveys, assessments, and feedback from students and teachers.
- 2.** Provide ongoing training and support: As teachers start to use ViLLE in their lessons, it is crucial to provide ongoing training and support to ensure that they use the platform effectively. This can be done through online resources, webinars, and coaching sessions.
- 3.** Share best practices: Schools can share best practices and experiences on how they are using ViLLE to enhance students' learning outcomes. This can be done through forums, conferences, and newsletters. Teachers can be asked to create their own exercises and explanatory material in ViLLE.
- 4.** Address any challenges or issues: There may be challenges or issues that arise during the implementation of ViLLE. It is essential that these issues are addressed promptly and effectively, to ensure that the platform is used to its full potential.
- 5.** Update the curriculum: As computational thinking is introduced into the curriculum (in most cases in an integrated way), it may be necessary to update the curriculum to reflect the use of ViLLE. This can ensure that students are receiving the best possible education, and that the virtual learning environment is being used to its full potential.

Recommendations

Based on the method implementation described, the following recommendations can be made:

- 1.** Prioritise teacher training and support: The success of using ViLLE in the classroom depends on how well teachers are trained and supported in using the

platform. Schools should prioritise ongoing training and support for teachers to ensure that they can effectively integrate ViLLE into their lessons.

2. Foster a culture of collaboration: The discussion on ViLLE and computational thinking can be an opportunity to foster a culture of collaboration among teachers from different schools. Schools should encourage teachers to share their experiences, best practices, and challenges with each other to learn from one another and improve their use of ViLLE.
3. Emphasise evaluation and monitoring: As teachers start to use ViLLE, it is essential to monitor and evaluate its effectiveness in improving students' learning outcomes. Schools should prioritise this evaluation to ensure that the virtual learning environment is having a positive impact on students' learning.
4. Address technical issues promptly: Technical issues can arise when using any new technology, including ViLLE. Schools should have a plan in place to address any technical issues promptly and effectively to minimise disruptions to the learning process.
5. Update the curriculum as needed: As computational thinking is introduced into the curriculum and ViLLE is used in the classroom, it may be necessary to update the curriculum to reflect these changes. Schools should prioritise updating the curriculum as needed to ensure that students receive the best possible education.

11. Self-assessment of digital maturity of the school

Kerli Požogina

Aims

The aim of implementing a self-assessment digital maturity model is to give the schools a basis for determining the focus of the digital development project, in addition to the whole school assessment. The method is suitable for use in phase 4. *Mapping development needs* of the school mentoring process.

Description

The theoretical basis for the creation of the digital maturity assessment model is based on the concept of the three areas of school digital innovation, developed in parallel and closely interlinked, by Michael Fullan, a Canadian professor of school innovation. These areas of digital maturity are:

- ▶ Pedagogy: change in the way we learn, pedagogical innovation through the use of digital technology.
- ▶ Leadership: change management at the 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.

The elements of the Estonian digital maturity self-assessment model are introduced in the table below.

The Estonian digital maturity self-assessment model

1. Pedagogical innovation	
1.1 Digital age practices	Changing and widening pedagogical repertoire, including inquiry, discovery, problem- and project-based, self-directed, creative and collaborative learning practices. Orchestrating digital age learning in the classroom and outside.
1.2 Digital competencies	Redefining and developing the digital competence of teachers and students in the context of teaching and learning; continuous professional development and organisational learning on digital competence.
1.3 Changing teachers' role	Enhancing networking and collaboration among teachers to conduct, analyse, share, and evaluate innovative practices. Interdisciplinary peer teaching. Learners are engaged in self-directed, creative, and collaborative learning, they take responsibility for designing and implementing learning experiences, resources and environments as well as assessments
1.4 Changing learners' role	Creative, collaborative, self-directed learning
1.5 Structural changes in curriculum, learning environment	Systemic and sustainable structural changes in physical and digital learning environments, learning resources, time management, scheduling, workflows
2. Change management	
2.1 Strategic planning	Consensus-based, well-defined strategy and action plan for implementing innovation that guides the decision-making both in shorter and longer timescale
2.2 Participatory management, Partnership	School leaders involve continuously teachers, students, parents and external partners in decision-making processes related to planning, implementing and evaluating educational change
2.3 Learning organisation	School leaders, teachers, and students learn from each other; they document and disseminate good practice related to ongoing change process
2.4 Monitoring and analytics	School is using a set of valid and reliable indicators, data collection instruments and methods/practices for continuous monitoring and analytics of the change process

2.5 Leadership stimulates	School administration provides leadership, support, and incentives to facilitate the implementation of change
3. Digital infrastructure	
3.1 Networks	Well maintained functioning and security of the school's network(s), regularly reviewing and enforcing the digital safety regulations (e.g., Acceptable Use Policy)
3.2 Digital devices	One-to-one computing anywhere anytime, ubiquitous access to digital devices (tablets, laptops, robotics), connected presentation and communication tools
3.3 IT management	Strategic planning of digital infrastructure, continuous monitoring and analysis of implementation of the plan
3.4 User support	Technical and pedagogical support to all users of digital technology provided by school
3.5 Software and services	Well-maintained, licensed, up-to-date and interoperable ecosystem of software, services, and information systems that supports the pedagogical change

Context

This method was used in an Estonian mentoring case and was carried out as an assignment during the school leaders' digital training programme (39 hours) 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. Twenty people from six schools participated in the assignment to analyse their school's digital maturity.

Requirements for implementation and the resources needed

The digital maturity self-assessment online survey has to be set up with following options:

- ▶ Since the analysis is based on specific measurements and scales, it takes time, and the school team has to be able to save their in-progress survey answers.
- ▶ For the chosen online platform, there should also be an option to send the results to the team, so they can carry on working with the analysis of the school's digital maturity regularly after the digital training.

Structure

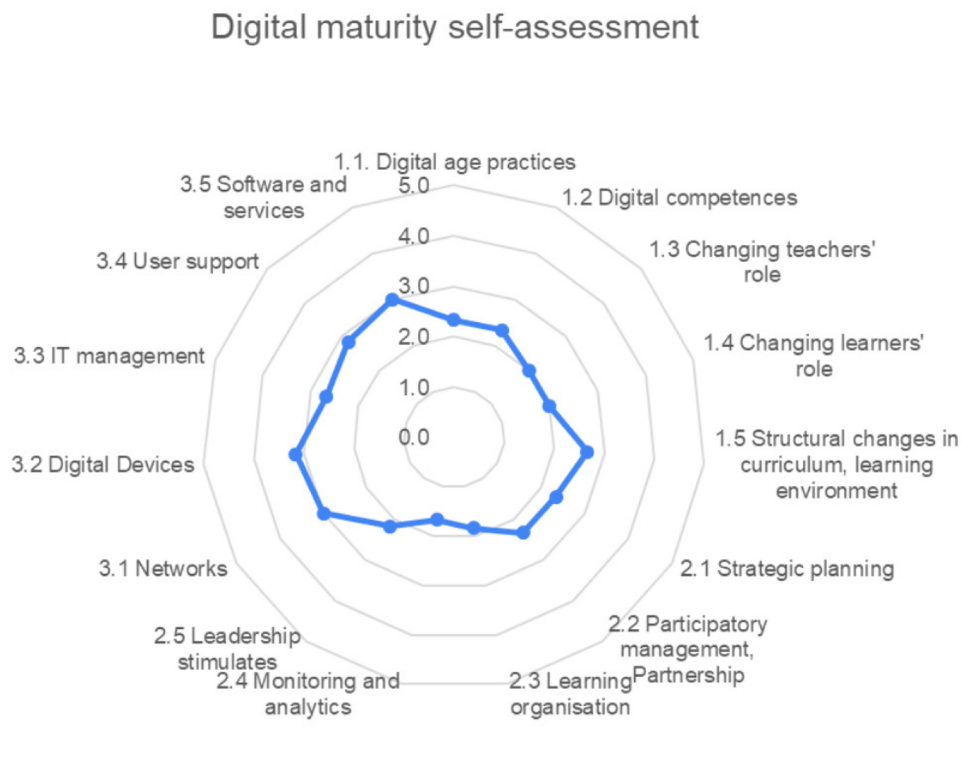
The method includes the following phases:

- A.** Introduction of the assignment for the school teams (in this case, at the end of the first contact seminar).
- B.** Working in groups within their school teams for two weeks to fill out the self-assessment survey.
- C.** Overview of the results from the educator at the beginning of the next contact seminar.
- D.** Working in groups to finalise their school projects ideas based on the digital maturity self-assessment survey results.
- E.** Group presentations about the project ideas and the lessons learnt from the digital maturity self-assessment assignment.
- F.** Schools carry on working on the digital development projects between and during the next three contact seminars.

The figure below gives an overview of Digital maturity self-assessment results (arithmetic average) based on online survey answers from six schools. School teams assessed previously described items on the scale 1-5, where:

- 1. Exchange**—refers to episodic implementation of digital innovation, rare cases of using digital technology.
- 2. Enrich**—refers to the coordination within the school, digital technology is used to experiment with new teaching and learning methods; teachers share their experiences.
- 3. Enhance**—refers to the changes in the learning and teaching processes, systematic, evidence-based changes at a school level.
- 4. Extend**—refers to widening the digital culture, combined technologies are a normal part of the school, students are creators and leaders of their personal digital spaces.
- 5. Empower**—refers to leverage and acting as a regional leader in some aspects of digital innovation. The school's digital learning services are being extended beyond the school, with the introduction of agile (adaptive, flexible) ways of learning, students taking responsibility for their own learning pathways and to some extent, for the learning of others.

Digital maturity self-assessment results (arithmetic average) based on online survey answers of six schools



Actions after implementing the method

Digital maturity self-assessment should become a tool for each school's educational technologist, who will use the model to analyse the various aspects regularly, based on the overall strategic purposes of the school.

Recommendations

Digital maturity self-assessment analysis has to be a group effort, consisting of the key people 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 emphasised 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 identify the areas that need improving and/or changes.

There should be some focus 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 in itself.

12. Teacher Inquiry into Student Learning

Cecilie Hansen

Aims

The aim of the Teacher Inquiry into Student Learning method (TISL) is to improve awareness of teachers' professional development through systematic, intentional, self-critical, planned investigations of one's own teaching practice. It is suitable for mentoring process phase 6. *Collaborative development actions*.

Description

Through the method, teachers will work in teams, design their own inquiry project, implement it and share their experiences. The length of the process may vary. The teachers will conduct their inquiry projects based on the plan drawn up in the workshop. The teachers will get guidance to implement the project. Teachers will reflect on findings and work together on a presentation for the other groups.

Teachers who have conducted projects find teacher inquiry useful and will continue to follow the method, in order to use data to improve their own practice.

Context

The method is suitable for any school level, teacher experience or teaching subject.

TISL workshops can be organised as either face-to-face or as remote sessions, with presentation and group work integrated with breakout rooms.

Requirements for implementation and the resources needed

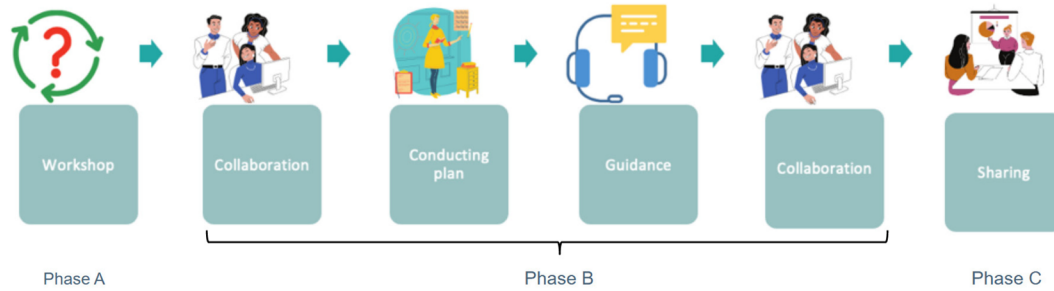
Before the workshop: Discussion with the principal on ICT and background.

All participants need to have a laptop for their use. The groups can conduct several inquiry projects during the semester. Schools should have time during the week for collaboration. Time spent depends on the project.

Structure

The main phases of the process are the following: A workshop (Phase A), an inquiry phase (Phase B), and a sharing session (Phase C).

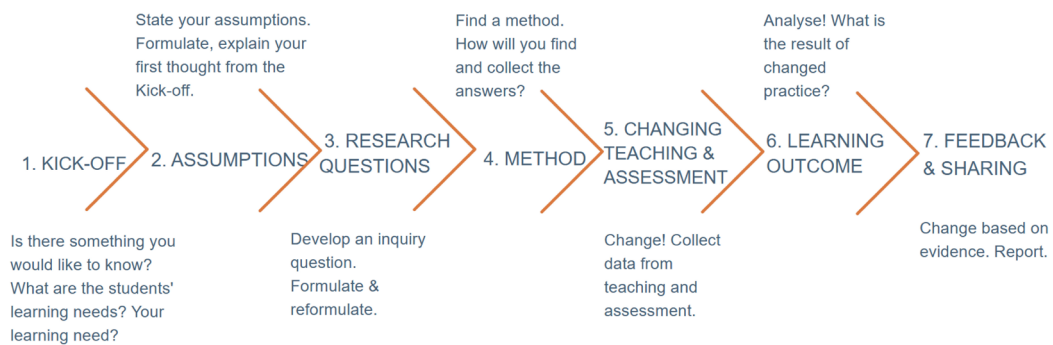
The main phases of the Teacher Inquiry into Student Learning process



A. Workshop

The duration of the workshop may differ depending on how much time the school has for it. The workshop includes the activities presented in the picture below.

A figure introducing the steps of the TISL method



- Introduction of the seven steps of the TISL method by the facilitators (about 30 mins).
- Group work (about 150 min) includes two tasks: 1) Finish TISL steps 1-4 and 2) Make a plan for TISL steps 5-7.

In the group work, teachers should be divided into groups. They identify an inquiry question and draw up a plan for the inquiry process. The groups can use a tool (example picture from Flīnga) for collaboration, planning and documentation, when they discuss their projects.

An example of a group result for planning the inquiry process made in the Flinga application:



c. Wrap-up. Inform the groups that they have to follow the steps to conduct the inquiry phase.

B. Inquiry phase

The teachers work with their groups and use their plan from the workshop in TISL steps 1-4. The teachers will conduct the project in accordance with their plan. They will collaborate, decide, implement, and make a presentation on the project and the findings.

The groups that need guidance will get this from the facilitators during the inquiry phase (15-20 mins).

C. Sharing session

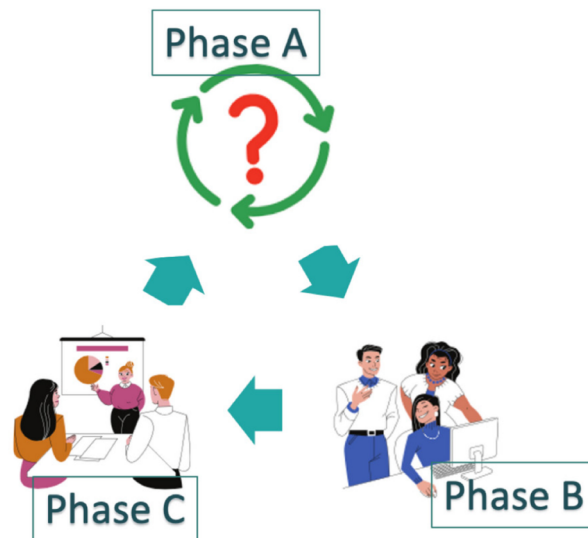
The groups will reflect on findings and present their projects for the other groups (about 90 min). This can be done in several formats, as a longer session or as speed presentations before the start of a new project.

Actions after implementing the method

After the workshop it is useful to inform to school owners about the results of the workshop for tailored support actions.

The teachers can start a new project when they have presented the project, being inspired by their community.

Succession of projects using the TISL method



Recommendations

The Introduction can start with a theme the school is focusing on at the moment. Perhaps they will need some knowledge and background to set the stage for this.

Further reading

Hansen, C. J., & Wasson, B. (2016). Teacher Inquiry into Student Learning: The TISL heart model and method for use in teachers' professional development. *Nordic Journal of Digital Literacy*, 11(01), 24–49. <https://doi.org/10.18261/issn.1891-943x-2016-01-0>

13. Teacher Innovation Laboratory

Tobias Ley and Kairit Tammets

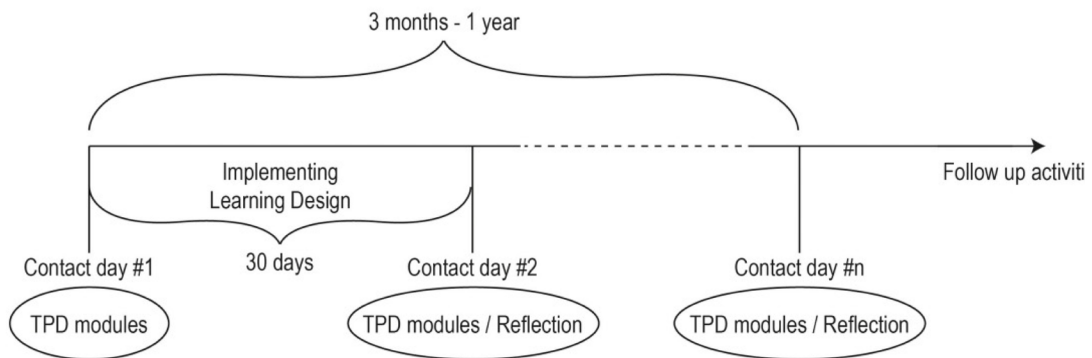
Aims

The aim of the Teacher Innovation Laboratory is to support teachers' adoption and scaling of the educational innovation in classroom settings in school-university partnership. Suitable for mentoring process phase 6. *Collaborative development actions*.

Description

Through a 3–12 month-long programme, the teachers will co-create innovative lesson designs with the researchers, pilot test these, monitor the process and reflect on the experience.

The structure of the Teacher Innovation Laboratory method



The programme should be divided into contact days and intermittent implementation cycles.

During the implementation cycles, teachers should be encouraged to pilot test their designs, conduct inquiry activities and reflect on the experience.

Depending on the TIL format, it should be suggested that teachers pilot test one or two lessons each month, based on co-created lesson designs, monitor the process, gather evidence about what happened in the classroom, and analyse the data to understand the effectiveness of the implementation.

Context

Having a monthly contact day for the training is about co-creation by focusing on aspects of digital innovation, didactics, educational psychology, and inquiry. Between the contact days, teachers should pilot test the lesson design with their students.

Requirements for implementation and the resources needed

Before the introductory workshop: Discussions with the management team to understand the need for such digital innovation at the school level. When possible, teacher teams should be established.

Teachers need to have a laptop or tablet for co-design sessions.

Structure

The structure of the Teacher Innovation Laboratory programme is described below.

- A.** Introduction workshop (6 hours)
 - a.** Introduction to the digitally innovative method with the focus on integrating novel technologies and the pedagogical approach (e.g., digital learning resources enhancing students' engagement, educational robots for motivation in mathematics; outdoor learning technologies for conceptual understanding in science).
 - b.** Introduction to the digitally innovative method with the focus on integrating novel technologies and the pedagogical approach (e.g., digital learning resources enhancing students' engagement, educational robots for motivation in mathematics; outdoor learning technologies for conceptual understanding in science).
 - c.** Introduction to the theoretical underpinnings of students' learning processes.

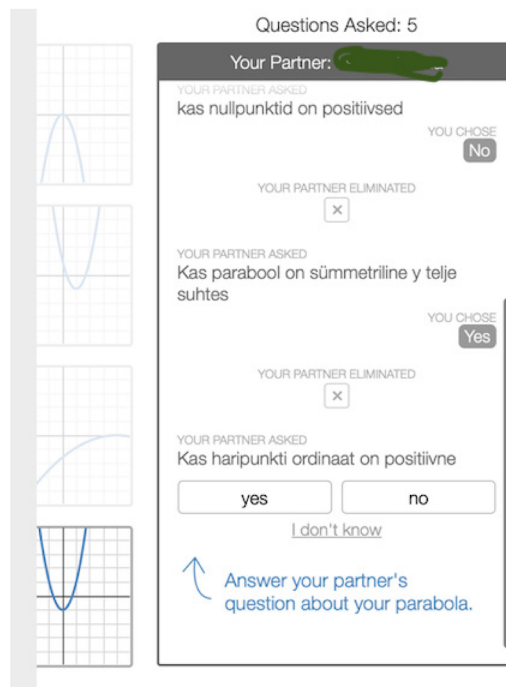
- B.** Development actions (3–12 months)
 - a.** Co-design of the lesson designs.
 - b.** Iterative piloting, monitoring of the lesson designs in own practice.
 - c.** Reflection about own experience.

The teachers co-design learning designs based on the pedagogical framework of innovative learning scenarios: Flipped Classroom, Project-based learning, Task-based learning, Gamified learning.

The teachers co-design digital tasks with online authoring tools to foster the development of students' higher-order thinking skills and conceptual understanding.

Teachers collect process-oriented data from the students after piloting lesson designs and tasks to understand the effect of the designs to students' learning.

Examples of using digital tools in digital tasks



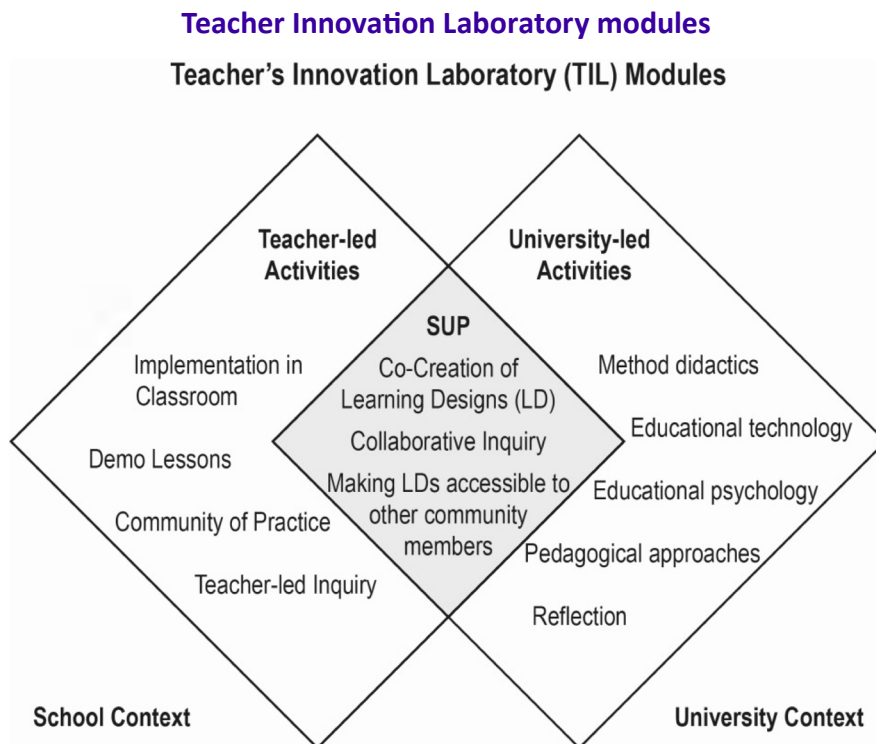
Matemaatilise induksiooni meetod								Notifications	
No.	Name	Mastery level	Total score	Q1	Q2	Q3	Time taken	A	
	Class	●	5/8	1/1	1/1	3/6	10m		More than half the class answered Q3 incorrectly.
1.	Student 1	●	8/8	1/1	1/1	6/6	12m	1	Student 4 made many rapid and incorrect attempts at more than half the tasks - they might be guessing at answers.
2.	Student 12	●	8/8	1/1	1/1	6/6	10m	1	
3.	Student 7	●	6/8	1/1	1/1	4/6	11m	2	
4.	Student 9	●	6/8	1/1	1/1	4/6	9m	1	
5.	Student 10	●	6/8	1/1	1/1	4/6	8m	2	

- C.** Reflection seminar(s) (one per month, 6 hours)
- Co-design sessions between teachers, researchers, and university didactics experts to create lesson designs based on the didactic, psychological and technical underpinnings.
 - Collective reflection based on the individual piloting experience with other teachers and university researchers.

In each seminar, the university researchers will cover the following topics:

- ▶ Didactical innovation: integration of pedagogical, content and technological knowledge.
- ▶ Teacher inquiry: how to understand the effect of innovation on my students.

Joint co-design session will follow each seminar.



D. Final event

Presentation of the final lesson designs.

Teachers

- ▶ share their final lesson designs piloted with their students to demonstrate their understanding of the appropriated technology-enhanced method.
- ▶ share their experience to collect student data during the piloting process and learn from evidence-informed teaching practice.

Actions after implementing the method

After the workshop: Inform school leaders about the results of the training for sustaining and scaling up the training experience and co-created learning designs.

Recommendations

Teacher Innovation Laboratory training programme can be organised as a remote session in which both co-design sessions and joint seminars are conducted online.

The Teacher Innovation Laboratory training programme could be for individual teachers, but also for teacher teams from a school.

Before the workshop, it is important to discuss the need for such digital innovation at the school level with the management team. When possible, teacher teams could be established.

Further reading

Ley, T., Tammets, K., Sarmiento-Márquez, E. M., Leoste, J., Hallik, M., & Poom-Valickis, K. (2022). Adopting technology in schools: modelling, measuring and supporting knowledge appropriation. *European Journal of Teacher Education*, 45(4), 548–571. <https://doi.org/10.1080/02619768.2021.1937113>

Leoste, J., Tammets, K., & Ley, T. (2019). Co-Creating Learning Designs in Professional Teacher Education: Knowledge Appropriation in the Teacher's Innovation Laboratory. *Interaction Design and Architecture(s) Journal*, 42, 131–163. http://www.mifav.uniroma2.it/inevent/events/idea2010/doc/42_7.pdf

14. Combining individual and school-level reflection of digital practices

Minna Lakkala

Aims

For individual teachers, the aim is to become aware of their own and their colleagues' digital competence and practices and together define development targets. Simultaneously, school leadership receives relevant evidence-based information to plan future support and development actions for digital transformation in the school. It is suitable for mentoring process phase 4. *Mapping joint learning and development aims and needs* and phase 7. *Reflection*.

Description

The method consists of a short process organised within a school to reflect on the current needs of the teaching community in developing their digital competence and practices. All teachers at a school complete the [SELFIEforTEACHERS](#) survey developed by EU and participate in a workshop at which suggestions for developing digital practices in the school are defined in small teams based on individual and aggregated survey results. The leadership team of the school will use the workshop outcomes and survey results to plan further training and development actions inside the school.

Context

The method can be applied in any school, at all school levels. SELFIEforTEACHERS is a tool for primary and secondary school teachers to self-assess their digital competence and it is available for free in all EU languages.

A leading principle behind the method has been to design a simple practice that can easily be implemented in everyday schoolwork without many extra resources. Short regular teacher team and whole-school teacher meetings can be used to complete the SELFIEforTEACHERS reflection and organise the workshop for joint discussions.

Requirements for implementation and the resources needed

It is important for the school's leadership team to be introduced to the idea and content of the SELFIEforTEACHERS tool beforehand, so that they can plan the goals and activities of the teacher workshop with the mentors better.

In order to get aggregated results from SELFIEforTEACHERS that combine individual teachers' self-reflections, a group has to be created in the SELFIEforTEACHERS tool and an invitation to complete the survey as a group member has to be sent to the teachers. The mentor or a school leadership team member can create the group in SELFIEforTEACHERS and send the invitation. Further instructions about using SELFIEforTEACHERS can be found from the [SELFIEforTEACHERS Toolkit](#).

Structure

The overall structure of the process, including the leadership teams' planning and evaluation actions, is the following:

- A.** Planning the practical organisation of the evaluation process.
The schools' leadership team makes detailed plans with the mentors about how to organise the evaluation process and the teacher workshop.
It is recommended that the leadership team suggests the best ways to organise the activities in their school and for them to inform teachers about the activity.
- B.** Teachers complete the SELFIEforTEACHERS self-reflection.
All teachers of the school complete the SELFIEforTEACHERS reflection to evaluate their own digital competence and practices. Even though each teacher makes an individual reflection with SELFIEforTEACHERS, a good solution is to guide teachers to do it in small team meetings so that teachers get collegial support. This is because the use of the tool or some concepts in the survey can be difficult. Detailed instructions for completing the reflection are needed.

In order to make sure that all answers are included in the aggregated results for whole-school reflection, it is best to send a link to the group survey, e.g., by email.

C. Planning a workshop based on results.

The mentor helps the leadership team of the school to examine the aggregated SELFIEforTEACHERS results and to plan a whole-school workshop based on the results: the goals, content, timetables, and activities of the workshop.

D. Teacher workshop for whole-school reflection.

A teacher workshop (e.g., 1.5 hours) should be held in the school, attended by the whole teaching staff.

The workshop programme should include:

- a.** Introduction of the aggregated SELFIEforTEACHERS results.
- b.** Group work for creating suggestions in groups for digital transformation efforts in the school. Groups write their suggestions in a shared digital space for further use; for example, an online PowerPoint presentation with a slide for every group could be used.
- c.** Joint discussion of group work outcomes and experiences of the reflection activity.

E. Plans for further development actions

The leadership team makes plans for future actions based on the outcomes. The mentor participates in the discussions with the leadership team. For example, in a Finnish case in which the method was applied, the leadership team created the following ideas to promote transformation of digital practices in the school: focus on pedagogical development with digital technology, not on technical issues; organise teacher training events and pedagogical cafés inside the school; and reserve time from regular teacher meetings for digital issues.

Actions after implementing the method

It is the responsibility of the leadership team to ensure that the results of the SELFIEforTEACHERS reflection activity are used and that the suggestions are taken into account and implemented when possible. It is also important to inform teachers about the measures taken.

Recommendations

A good solution is to use a regular teacher meeting for the teacher workshop, because schools have few opportunities to organise joint meetings for all teachers. For example, in the Finnish case, the school has reserved 1.5 hours for a teacher meeting every week, and that time was used for the joint workshop.

This reflection activity can be repeated regularly, such as at the start or end of every school year, to guide the planning and implementation of future digital development actions.

Lessons learnt about mentoring during the iHub4Schools project

Liisa Ilomäki, Minna Lakkala and Kerli Požogina

The following summary consists of those practical issues that we have learnt about during the mentoring processes of the cases in the iHub4Schools projects.

About the change

- ▶ Changes are slow and schools do not have many resources (personnel, joint time, etc.) to allocate in one development area. Mentoring should respect that and take it into account.
- ▶ It is important that also the schools, teachers and responsible teams understand this slowness instead of expecting solutions too quickly.
- ▶ There are no standard solutions or models to follow with every school. The situations vary and change, so the mentoring has to be adjusted flexibly.
- ▶ For sustainable changes, mentors should be active at the beginning, and their support should gradually fade away.
- ▶ Mentors should put their focus on advocating the profession of educational technologists in school. They could identify for the school principal the teachers who are able to carry on supporting teachers after the external mentors have finished their work.
- ▶ The principal is a key person for accepting the change aims and for organising time and resources for teachers to participate.
- ▶ Principals need special support on communication strategies and skills about how to prepare a school team before major changes. Poor communication can significantly lessen the results.

School level responsibility about the development for sustainable changes

- ▶ Digital development work should be coordinated by school teams in which teachers and other key staff should be engaged. These teams should be responsible for school-level activities, not the mentors.

- ▶ When the responsibility is in schools, the development actions best serve the needs of each school and are more likely to lead to permanent changes.
- ▶ Also, the responsible teams and people in schools need to have a chance for learning and getting inspiration for themselves. For example, participation in meetings with teams from other schools, or participation and presentations in practice-oriented conferences and workshops are motivating events to them.
- ▶ Mentors need to be skilful in implementing digital technology in pedagogical practices and they should also know the mentoring theory and practice. They need to lead the change by their own example and inspiration. For example, it is important that mentors have regular training on skilful mentoring and for mentors to be in-practice teachers or teacher trainers themselves, and have a lot of different examples on methodology.
- ▶ One key focus should be the development of school leaders' digital competence and their involvement in supporting teachers in implementing new practices and technology. Leaders leading by example are the most effective support for change to happen.

School-level collaboration

- ▶ Collaboration between schools should include collaboration at all levels; for example, the coordination teams from the schools could have joint meetings (also including the mentors). Other activities should similarly be joint, such as teacher workshops or training events.

Digital innovation

- ▶ The use of digital technology in pedagogical practices is a sensitive issue to many teachers, because it challenges their existing teaching practices, and even their pedagogical approaches.
- ▶ Teachers do not have time to learn new technologies or try beta versions unless it is organised and supported.
- ▶ Teachers' time for adopting innovations vary; some are pioneers and examples to others, some come after others. That is how it goes.

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Figures

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