



# Using self-reflection to support teacher professional learning and development of their digital competence: A multi-case study using SELFIEforTEACHERS



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## Contents

|   |    |
|---|----|
| Abstract .....  | 1  |
| Acknowledgements .....  | 2  |
| Foreword .....  | 3  |
| Executive summary .....   | 4  |
| 1 Introduction .....  | 7  |
| 1.1 Problem statement .....   | 7  |
| 1.2 The research study .....  | 7  |
| 1.3 SELFIEforTEACHERS .....   | 7  |
| 1.4 Definition of teachers' digital competence .....  | 8  |
| 1.5 Factors affecting teachers' digital competence .....  | 9  |
| 1.6 Self-reflection as a driver for improving digital competence .....  | 11 |
| 2 Methodology .....   | 12 |
| 2.1 Research questions and theoretical propositions .....   | 12 |
| 2.2 Methods .....   | 12 |
| 3 Results .....   | 25 |
| 3.1 Did teachers find the SfT tool easy to use? .....   | 25 |
| 3.2 Did teachers perceive SfT as useful? .....  | 25 |
| 3.3 To what extent did SfT support teachers in developing agency to improve their digital<br>competence? .....  | 25 |
| 3.4 Which personal, institutional and systemic characteristics influence teachers' agency to act<br>upon the feedback received from the SfT tool? ..... | 27 |
| 4 Conclusions and policy implications .....   | 29 |
| 4.1 Discussion .....  | 29 |
| 4.2 Recommendations and policy implications .....   | 30 |
| 5 Individual case study summaries .....   | 32 |
| 5.1 Cyprus (CY) .....   | 33 |
| 5.2 Greece (EL) .....   | 42 |
| 5.3 Spain (ES) .....  | 49 |
| 5.4 Finland (FI) .....  | 56 |
| 5.5 Ireland (IE) .....  | 63 |
| 5.6 The Netherlands (NL) .....  | 69 |
| References .....  | 78 |
| List of abbreviations and definitions .....   | 83 |
| List of figures .....   | 84 |
| List of tables .....  | 85 |
| Annexes .....   | 86 |
| Annex 1. SELFIEforTEACHERS case studies synopsis .....  | 86 |
| Annex 2. SELFIEforTEACHERS case studies interview protocols .....   | 89 |



## **Abstract**

This report presents a multi-case qualitative research study on how to support teacher professional learning and development of their digital competence, through a self-reflection process using SELFIEforTEACHERS (SfT). The study investigated how SfT can be used in different settings and what factors, enablers and barriers affect its effective implementation. Moreover, it investigated how self-reflection using SfT can support teachers' agency and efficacy for their professional development in using digital technologies in teaching and learning. The report presents the theoretical assumptions that guided the research and discusses the main pertinent findings across the cases, based on the evidence amassed for the individual case studies. Findings are reported from 13 individual case studies conducted in six European Union Member States and are based on thematic analyses using an explanatory case study approach. Main findings indicate that SfT embedded in professional development activities can support teachers in developing digital competence, while at the same time collected aggregated data can support professional development planning. The report concludes with recommendations for teachers, school leaders, teacher trainers and educators, and policymakers.

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## Foreword

Educators across Europe face the challenge of how to integrate digital tools in their practice to enhance learning outcomes and prepare students for an increasingly digitalised world. The digital competence of teachers and trainers is crucial for a successful digital transition in education. Providing them with the right training and support for their specific context and needs is, however, an ongoing challenge. With the rise of Artificial Intelligence, the need for high-quality, effective and lifelong teacher education in the pedagogical use of technologies is more critical than ever before.

Self-reflection is increasingly used across Europe to help teachers understand the benefits, challenges and potential of using digital technologies in their practice. By engaging in active self-reflection, teachers can develop their own learning pathways and take steps to enhance their digital competences. SELFIEforTEACHERS, developed as part of the European Commission's Digital Education Action Plan (2021-2027), is a free online tool that guides teachers in identifying their strengths and areas for further development. It provides personalised feedback, tips and suggestions for planning their professional learning journey.

The tool, which is available in more than 30 languages, can be used by individual teachers, groups of teachers, teacher trainers and public authorities to meet their training, planning or diagnostic goals. This report explores how the tool is being used in various educational settings across Europe and offers suggestions on leveraging its potential to support digital capacity building.

The European Commission works hand-in-hand with policymakers across Europe to support the professional development of educators. We hope that the examples and insights included in this report will inspire and inform educators, teacher trainers and policymakers in their efforts to boost the digital competence and confidence of Europe's teachers.

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## **Executive summary**

### ***Policy context***

The digital transformation of education for quality teaching and learning remains high on the European policy agenda, with almost all Member States having national and/or regional strategies for digital education (European Commission, 2019). The European Digital Education Action Plan (DEAP 2021-2027) constitutes a key enabler for the adaptation of the education and training systems of Member States to the digital age. It aims at fostering a high-performing digital education ecosystem and enhancing digital skills and competences for the digital transformation (European Commission, 2020). In this context, teacher-specific digital competences are needed to support and improve teaching and learning. Teachers should be empowered to act as transformation agents to successfully support their students in developing their own digital competence, hence contributing to the goals of the European Skills Agenda<sup>1</sup> and the Digital Compass: the European path for the Digital Decade.<sup>2</sup>

### ***SELFIEforTEACHERS***

SELFIEforTEACHERS (SfT)<sup>3</sup> provides a self-reflection tool and a process to support teachers' professional learning and the development of their digital competence. Based on the European Framework for the Digital Competence of Educators (DigCompEdu)<sup>4</sup>, SfT transforms the framework descriptors into 32 self-reflection items to help teachers self-assess their digital competence (Economou, 2023). On completing their self-reflection, teachers receive a personal report with their results, and suggestions on how to develop further. Based on their report, teachers are prompted to design their professional learning paths, addressing the identified digital competence needs. Moreover, when the individual self-reflections are anonymously compiled in a group report, the aggregated results can support education stakeholders in planning teacher professional development programmes.

While reflection upon one's interpretative assumptions can result in a novel understanding of oneself (Mezirow, 2000), reflection is not an automatic process, and it can be difficult for teachers to sustain a reflective approach (Risko et al., 2002) amidst their many professional responsibilities. Such challenges have resulted in an increasing need for research related to effective tools and processes in support of teachers' reflection (Mosley Wetzel et al., 2017; Sableski et al., 2019; Sydnor et al., 2020). SfT is such a tool, supporting a continuous learning process. To better understand how SfT can be effectively used, a number of use cases have been identified to describe how SfT can be employed in different contexts, ranging from the use of SfT at the individual level through to institutional and systemic levels.

### ***A multi-case research study***

A multi-case research study was designed and conducted by JRC and a consortium partnership of six universities. The study was implemented between November 2022 and October 2023 and

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<sup>1</sup> <https://ec.europa.eu/social/main.jsp?catId=1223&langId=en>

<sup>2</sup> [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en)

<sup>3</sup> <https://educators-go-digital.jrc.ec.europa.eu>

<sup>4</sup> [https://joint-research-centre.ec.europa.eu/digcompedu\\_en](https://joint-research-centre.ec.europa.eu/digcompedu_en)

investigated different use cases of SfT, providing evidence-based insights for the conditions, enablers and hindrances, for its effective application in supporting teachers' agency and efficacy for their professional learning and use of digital technologies.

Qualitative data on the use of SFT were collected in six EU Member States: Cyprus, Finland, Greece, Ireland, Spain and the Netherlands. The main research question "How can SELFIEforTEACHERS be effectively used to help teachers develop their digital competence?" was approached through the following investigative questions, within a multi-case, multi-site, and multi-researcher design of 13 qualitative studies:

- How did the teachers perceive SfT, in terms of usability and usefulness?
- What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?
- What are the main conditions, enablers and barriers, for the effective use of SfT to support teachers' development of their digital competence?
- How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?

### **Main findings**

Findings from these case studies indicate that multiple variables interact to influence teachers' willingness to act after they complete SfT. In response to the main research question "*How can SELFIEforTEACHERS (SfT) be effectively used to help teachers develop their digital competence?*", the findings indicated that participants perceived SfT as a helpful and thought-provoking instrument that triggered a self-reflection process that may not have happened otherwise. It helped most teachers broaden their conceptualisation of digital competence as a construct that is not limited only to "teaching and learning", the dimension that is of most interest to their everyday work as teachers. Furthermore, the SfT tool helped them benchmark the level of their digital competence against the levels of competence conveyed through the self-reflection questions provided by SfT. However, when examining the reports from each of the case studies, we see that teachers requested additional guidance from that provided upon the completion of the self-reflection, to support them in proceeding to the next step of their self-reflection, i.e., to develop professional learning plans to improve their digital competence. The findings indicate that the best use of the tool might be in conjunction with a carefully designed professional development programme, in which teachers can be provided with just-in-time personalised support to develop selected aspects of digital competence. At the same time, the SfT-aggregated data triggered discussions on professional learning needs, expectations and targets within educational contexts that supported additional activities for teachers' professional development. Based on the findings, several recommendations are suggested, ranging from recommendations for individual teachers, to school leadership and teacher educators, up to recommendations for policymakers. Two key recommendations refer to: (1) supporting individual teachers' use of SfT for self-assessment and benchmarking of their digital competence, as well as providing more contextual and actionable feedback to guide them design and implement their professional learning activities; and (2) integrating SfT into experiential, scaffolded professional programmes, fostering communities of practice, and recognising SfT as a part of a broader strategy for digital competence, including certification.

## **Related JRC work**

The JRC has developed several reference frameworks for competence development. These are the Digital Competence Framework for Citizens (DigComp)<sup>5</sup>, the Entrepreneurship Competence Framework (EntreComp)<sup>6</sup>, the Personal, Social and Learning to Learn Competence Framework (LifeComp)<sup>7</sup>, the European Sustainability Competence Framework (GreenComp)<sup>8</sup>, the European Framework for Digitally Competent Educational Organisations (DigCompOrg)<sup>9</sup> and the European Framework for the Digital Competence of Educators (DigCompEdu)<sup>10</sup>. These frameworks can provide a common reference for policymakers, researchers, regional authorities and other stakeholders, and serve as a starting point for discussing, planning, designing and developing different instruments, actions, policies, strategies and research for developing a competence.

Based on the conceptual frameworks, two self-reflection tools were developed: (i) SELFIE for schools and work-based learning based on DigCompOrg to support building schools' digital capacity, and (ii) SELFIEforTEACHERS (SfT) based on DigCompEdu to support building teachers' digital competence.

## **Quick guide**

This report aims to contribute to the efforts of supporting teachers' professional learning and development of their digital competence with meaningful and effective programmes. The main target audience comprises national and regional authorities' policy makers, teacher trainers, school leaders and researchers. It consists of a comprehensive report of the multi-case, qualitative investigation of SfT, summarising the most pertinent findings across the cases, based on the evidence amassed from the individual SfT case studies. These findings support several recommendations, which are presented at different levels: at the teacher level, school leadership level, teacher education and training institution level, strategic and policy level, and in relation to the tool. At the same time, the findings of each case study can provide specific situated practices that might apply to similar contexts and could provide useful practices for education stakeholders to implement in their own settings.

The report is organised as follows: presentation of the conceptual framework guiding the work; description of the multi-case study methods; presentation of the cross-cutting patterns and findings; and discussion of the lessons learnt and the implications of this work. A brief description of each of the 13 case studies is presented under the country context, along with a summary of the key findings, recommendations and lessons learnt from the sites of investigation.

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<sup>5</sup> [https://joint-research-centre.ec.europa.eu/digcomp-old/digcomp-framework\\_en](https://joint-research-centre.ec.europa.eu/digcomp-old/digcomp-framework_en)

<sup>6</sup> [https://joint-research-centre.ec.europa.eu/entrecomp-entrepreneurship-competence-framework\\_en](https://joint-research-centre.ec.europa.eu/entrecomp-entrepreneurship-competence-framework_en)

<sup>7</sup> [https://joint-research-centre.ec.europa.eu/lifecomp\\_en](https://joint-research-centre.ec.europa.eu/lifecomp_en)

<sup>8</sup> [https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework\\_en](https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en)

<sup>9</sup> [https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg\\_en](https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en)

<sup>10</sup> [https://joint-research-centre.ec.europa.eu/digcompedu\\_en](https://joint-research-centre.ec.europa.eu/digcompedu_en)

# 1 Introduction

## 1.1 Problem statement

The European Commission Digital Decade policy programme “2030 Digital Compass: the European way for the Digital Decade”, sets concrete targets and objectives for 2030 and guides Europe’s digital transformation: a minimum of 80% of the population across Europe is expected to have basic digital skills by 2030 and 20 million ICT specialists to be employed with convergence in numbers of women and men. Despite these aspirations, the existing situation points to a low level of digital literacy among the general population. For instance, results from the Digital Economy and Society Index (DESI) 2023, indicate that 53.9% of the EU population has at least basic digital skills, while only 26.5% of the EU population has above basic digital skills.

Such findings highlight the need for a transformation of educational systems. To achieve this goal, teachers’ digital competence should be reinforced so that they can act as transformation agents to successfully support their students in developing their own digital competence. However, according to the OECD Teaching and Learning International Study (TALIS), in 2018 just over half of teachers (56%) across the participating countries had received training in the “use of ICT for teaching” and only 43% felt well or very well-prepared for this aspect (OECD, 2019).

The European Digital Education Action Plan (DEAP 2021–2027) addresses the need to enhance digital skills and competences for the digital transformation as one of its two priorities and recognises teachers’ digital competence as a core element in a high-performing digital education ecosystem (European Commission, 2021). DEAP anticipates actions to support building teacher-specific digital skills to enhance teaching and learning, and proposes the development of a tool to support teachers self-assess their digital competence. Hence, the SFT self-reflection tool has been designed and developed based on the European Framework for Digital Competence of Educators (DigCompEdu).

## 1.2 The research study

The goal of the research study was to investigate how a self-reflection process using SELFIEforTEACHERS (SFT) can be used in different contexts in order to constitute a meaningful and effective way to support building teachers’ digital competence. Hence, a multi-case research study was designed and conducted between November 2022 and October 2023 to investigate different SFT use cases and provide evidence-based insights for the conditions, enablers and hindrances to its effective application to support the development of teachers’ digital competence. The study findings aim to provide recommendations for education stakeholders on how to support teachers’ agency and efficacy in the use of digital technologies in their professional context for quality teaching and learning in the digital transition of education.

## 1.3 SELFIEforTEACHERS

SELFIEforTEACHERS (SFT) is an online tool, which aims to support teachers in building their digital competence through a self-reflection process. Based on the European Framework for the Digital Competence of Educators (DigCompEdu), SFT guides teachers to self-assess their teacher-specific digital competence through 32 self-reflection items (Fig. 1). DigCompEdu describes educators’ digital competence with 22 descriptors under six areas (professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners’ digital competence) in three pillars: professional competences, pedagogic competences, and learners’ competences (Redecker,

2017). It also provides a progression model with six proficiency levels: A1-Newcomer, A2-Explorer, B1-Integrator, B2-Expert, C1-Leader, and C2-Pioneer.

Upon completing their self-reflection using SfT, teachers receive a personal report with their results along with suggestions on possible next paths. Based on their report, they are prompted to design their professional learning paths, addressing their needs. Moreover, the tool's aggregated results can support education stakeholders plan teacher professional development programmes. A number of use cases have been identified to describe the use of SfT in different contexts, ranging from the use of SfT at the individual level to institutional and systemic levels.

SfT was designed and developed by JRC on behalf of DG EAC and is an action under the European Commission Digital Education Action Plan 2021-2027.

**Figure 1.** SELFIEforTEACHERS areas and items



Source: SELFIEforTEACHERS tool infographics, 2021

## 1.4 Definition of teachers' digital competence

It is reported that the successful integration of digital technologies in the classroom depends on teachers' own digital competence (Suárez & Colmenero, 2021; Spiezia, 2011). While teachers are expected to integrate digital technologies into their classroom practices to enhance student learning (Krumsvik, 2014; Redecker, 2017), the COVID-19 pandemic directly exposed the need for enhancing teachers' digital skills (Damsa et al., 2021; Gewerc et al., 2020). Highly qualified teachers are essential to the digital transformation of educational systems, via mastering the technological and pedagogical knowledge and skills needed to effectively integrate digital technologies into their everyday teaching practices (Castaño Muñoz et al., 2021). Krumsvik (2014) urged that teachers should reach adequate levels of digital competence and develop their pedagogical digital competence. In addition, various European Commission documents have acknowledged the vital role of teachers' digital competence in assuring the quality of education in the 21st century (European Commission, 2018). We will next present a brief overview of how digital competence is conceptualised in general, and then present how this construct is being discussed in relation to teachers.

The term “digital competence” is, perhaps, one of the most overused terms in the literature (Ala-Mutka, 2011; Ferrari & Punie, 2013; Ilomäki et al., 2016; Spante et al., 2018). The abundance of definitions seeking to capture what digital competence entails has resulted in the emergence of a nebulous landscape around the concept: the use of alternate terms such as “digital literacy” and “digital skills” have made the situation even more complex (Fernández-Batanero et al., 2020; Spante et al., 2018). In

addition, the constant evolution of technology necessitates a regular updating of the definition of “digital competence” to accommodate new tools, skills, behaviours, understanding, etc. This changing landscape is reflected in various reports and frameworks, such as the ones published by the European Commission (e.g., Redecker (2017)), the OECD (2019), and the World Economic Forum (2023).

In this work, we adopt the following conceptualisation of digital competence based on definitions that delineate the skills, knowledge and attitudes that a digitally competent citizen should have:

“The safe, critical, and sensible use of digital technologies to learn at work and to participate in society, as well as to interact with them. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), security (including digital well-being, and cybersecurity-related skills), intellectual property issues, problem-solving, and critical thinking” (European Commission, 2018, p. 9).

Furthermore, over the years several frameworks have been developed to describe teachers’ digital competence as well as to help teachers themselves assess their digital competence (Bocconi & Panesi, 2018; Brynildsen et al., 2022; Nagel, 2021; Štemberger & Konrad, 2021). Some of these frameworks include the “Technology, Pedagogy, and Content Knowledge” (TPACK) framework by Mishra and Koehler (2006), the Spanish Government’s “Common Digital Competence Framework for Teachers” (INTEF, 2017, 2022), which was based on DigComp and DigCompEdu and the Norwegian “Professional Digital Competence Framework for Teacher” (Kelentrić et al., 2017).

The European Framework for the Digital Competence of Educators (DigCompEdu) describes educators’ digital competence as professional competences, pedagogical competences, as well as competences related to their learners’ competences (Redecker, 2017). The framework is structured around 22 different specific digital competences, classified within six different areas: (a) professional engagement, (b) digital resources, (c) teaching and learning, (d) assessment, (e) empowering learners, and (f) facilitating learners’ digital competence. In this work, we adopt the DigCompEdu perspective with respect to teacher-specific digital competence, which also aligns with From’s (2017) argument that teachers’ digital competence should not be perceived as a separate set of skills pertaining to the teacher alone but should be situated within and across the wider school organisation and institutional context.

## 1.5 Factors affecting teachers’ digital competence

Various factors have been hypothesised to affect teachers’ digital competence. Key factors influencing teachers’ use of technologies, as drivers or barriers or both, can be approached from different perspectives such as teacher characteristics, school factors and systemic factors (Law et al., 2008), or extrinsic and intrinsic factors (Ertmer, 1999). Lucas et al. (2021) argue that these factors are usually classified as *personal factors* (i.e., age, gender, teaching experience, attitudes towards technology) and *contextual factors*, which relate to both *institutional factors* (related to the school context where teachers work), and *systemic factors* (different aspects and levels of the educational system such as infrastructure and access to technology). In a study of over 1,000 Portuguese in-service teachers, Lucas et al. (2021) investigated the relative contribution of personal or contextual factors to teachers’ self-reported digital competence. Their findings emphasise two important issues: firstly, that personal factors seem to be more decisive in teachers’ digital competence, and secondly that the two types of factors (personal and contextual) are closely related and that, in order to be understood, their relationship should also be examined.

An overview of the main personal, institutional and systemic factors reported in the literature as affecting teachers’ digital competence is presented next.

### 1.5.1 Personal factors

Research on personal factors has discussed the impact of factors such as *age* (Cabezas-González et al., 2021; Cattaneo et al., 2022; Guillén-Gámez et al., 2021; Lucas et al., 2021), and *gender* (Andreasen et al., 2022; Cabezas-González et al., 2021; Guillén-Gámez et al., 2019, 2021). Other personal factors explored were teachers' *academic degree/qualifications* (Cabezas-González et al., 2021; Cattaneo et al., 2022), *educational level of teaching* (Guillén-Gámez et al., 2021; Palomino, 2017; 2018), *discipline/professional field* (e.g., Cabezas-González et al., 2021; Fernández-Batanero et al., 2019), *teaching experience* (Benali et al., 2018; Cabezas-González et al., 2021; Fernández-Batanero et al., 2019; Hinojo-Lucena et al., 2019), *prior experience/confidence in using digital tools* (Andreasen et al., 2022), *attitudes towards technology* (Andreasen et al., 2022; Guillén-Gámez et al., 2019), *professional workload* (Cattaneo et al., 2022) and even *teachers' self-reflection/self-evaluation skills* (Merrit et al., 2005; Talja, 2005).

### 1.5.2 Institutional factors

Institutional factors are defined as those directly related to a teacher's school, such as whether the school climate is supportive and open to innovation, or whether it promotes a sense of collegiality, collaboration and community among teaching personnel. Research on whether institutional factors affect teachers' digital competence has reported, for instance, on the potential impact of factors such as *school support/strategic leadership* (Eickelmann, 2011; Gellerstedt et al., 2018; Gil-Flores et al., 2017; Hatlevik & Hatlevik, 2018; Lucas et al., 2021), *school culture* (Cattaneo et al., 2022), or the existence of *collegial networks* within and beyond school (Bocconi & Panesi, 2018; Fraillon et al., 2020; Frank et al., 2011). In addition, according to Ilomäki and Lakkala (2018) to improve teaching with digital technology, multiple school-level elements should be considered simultaneously in the evaluation and development processes. More specifically, Ilomäki and Lakkala proposed the innovative digital school model and argue that the following elements should be taken into account when seeking to develop digital competence: school vision, leadership, practices of the teaching community including pedagogical practices, school-level knowledge practices, and digital resources.

### 1.5.3 Systemic factors

Systemic factors related to educational systems have also been discussed in the literature as potential factors contributing to, or hindering, the development of teachers' digital competence. For instance, Bećirović (2023) stressed the need for having appropriate educational policies and strategies, which are regularly updated to reflect the pace of technological change. In addition, research on systemic factors has also focused on factors related to the school's infrastructure, such as *network infrastructure/internet access* (Gil-Flores et al., 2017), *classroom equipment* (Lucas et al., 2021), *software availability* (Gil-Flores et al., 2017) or *students' access to technology* (Lucas et al., 2021). Likewise, school calendar and curriculum support/facilitation (Cattaneo et al., 2022; Lucas et al., 2021) have also been explored as potential factors affecting teachers' digital competence development. Nonetheless, whether aspects like classroom equipment, access to technology, or school calendar and curricular support may be considered as institutional or systemic factors, or might partially contribute to the issue, is governed largely by the type of educational system (which in Europe ranges from centralised to de-centralised governance systems), which has control over the decision-making relating to technological and human resources, and the funding model adopted.

## 1.6 Self-reflection as a driver for improving digital competence

SELFIEforTEACHERS (SfT) builds on the idea of self-reflection as a mechanism for improving one's digital competence. Reflection, perceived as a personal process that can deepen one's understanding of self and lead to significant discoveries or insights (Desjarlais & Smith, 2011), can trigger self-assessing one's capacity to improve. The importance of reflection for both pre-service and in-service teachers is well documented (Schön, 1987; Calderhead, 1989; Korthagen & Vasalos, 2005). At the same time, it has been argued that reflection and transformative learning are related, and that this relation can positively affect teachers' agency. More specifically, according to Jones and Charteris (2017, p. 497) "agency is an embedded element in reflective professional learning where deeply held beliefs can be unravelled and reravelled". This argument is also supported by Mezirow's (2000) theory of Transformative Professional Learning, in which reflection upon one's interpretative assumptions can result in a novel understanding of oneself. Reflecting on one's own practices can support the adoption of a more agency-based and action-oriented perspective aiming at fostering digital competence.

Despite these arguments, it is known that it is difficult for teachers to sustain a reflective approach (Risko et al., 2002) amidst their many professional responsibilities. Reflection is not an automatic process. It is questionable whether teachers are adequately trained to successfully engage in reflective practices, as they are often not provided adequate support to do so in their everyday teaching practice. According to Saric and Steh (2017, p. 70) "expecting that teachers will take time at their own initiative to integrate the process of reflection in their work deliberately is unrealistic". All these challenges have resulted in an ever-increasing corpus of research focusing on the need to provide effective tools in support of teachers' reflection (Mosley Wetzel et al., 2017; Sableski et al., 2019; Sydnor et al., 2020).

SfT has been designed to support teachers in reflecting on their digital competence by responding to 32 items based on the DigCompEdu conceptual framework. Moreover, after completing their self-reflection, teachers receive a personal report with their proficiency level for each of SfT's 32 items, as well as suggestions for next steps for further developing their digital competence. In this way, "SELFIEforTEACHERS follows a professional learning approach using critical self-reflection to support teachers identify their own needs through guided self-reflection items and to take action based on their results to further develop their digital competence" (Economou, 2023, p. 6).

Critical reflection can lead to self-awareness, with the latter being a component of self-development (Cheng, 2015; Jones & Charteris, 2017; Saric & Steh, 2017). Under certain conditions, which will be examined as part of the SELFIEforTEACHERS (SfT) case studies, critical reflection may lead teachers to a more accurate awareness of their digital competence, and this improved self-awareness can then lead to motivation to take action. Critical reflection can be a result of several reflective activities, with one of the primary ones for this study being self-reflection, which is defined as teachers' capacity to examine their beliefs, attitudes, knowledge, competences and professional practices with a critical view oriented towards self-improvement.

## 2 Methodology

### 2.1 Research questions and theoretical propositions

The study is a multi-case qualitative research which aimed to explore, from both a “process” and an “outcome-oriented” viewpoint, how self-reflection using SfT can support teacher agency and efficacy for their professional learning and development of their digital competence. The analysis included identifying key factors, both enablers and barriers, for the effective use of SfT for self-reflection in support of building teachers’ digital competence. The current study examined influencing factors from the perspective of the teachers’ specific experience (i.e., the tool and the process), personal characteristics, and institutional and systemic factors. Analysis of the outcomes included the extent to which teachers were actively engaged in designing their learning paths and the use of digital technologies in their professional practice. Hence, the main research question guiding this work was “How can SELFIEforTEACHERS (SfT) be effectively used to help teachers develop their digital competence?”.

To answer this question, we analysed the data to address the following four sub-questions, which can be seen as the investigative questions (IQ) of the multi-case study:

- IQ1: How did the teachers perceive SfT in terms of usability and usefulness?
- IQ2: What personal, institutional and systemic characteristics influence teachers’ agency to act upon the feedback received from the SfT tool?
- IQ3: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers’ development of their digital competences?
- IQ4: How can teachers’ agency and self-efficacy in their digital competence be supported through the use of SfT?

The main theoretical research proposition is that, under certain conditions, the SfT can support teachers’ digital competence through the process of self-reflection. Adopting an explanatory, multiple-case study design, this research sought to collect evidence on whether this proposition can be supported or refuted, and under which conditions.

### 2.2 Methods

#### 2.2.1 A multi-case, multi-site, multi-nation and multi-researcher design

Multiple-case studies enable the analysis of data within and across various contexts, for the extraction of differences and similarities across the case studies (Baxter & Jack, 2008; Stake, 1995; Vannoni, 2015). Such a research design can result in stronger and more reliable evidence (Baxter & Jack, 2008), while also allowing wider and more convincing insights grounded on enriched and diverse empirical evidence.

Multiple-case studies, as opposed to the single-case study design, focus on understanding a phenomenon through comparative and contrasting work. Since multiple-case studies draw their conclusions from different levels of analysis, which include single-case study analyses, they are considered more robust (Yin, 2018). Following Yin (2018) we adopted an explanatory focus and a replication logic in this work: in this methodological approach, each case study of the multiple-case study approach can be seen as analogous to an experiment and can either lead to literary replication

(predicting similar results) or theoretical replication (predicting contrasting but anticipated and explainable results). The cross-case analysis and synthesis of the individual case studies can yield findings that respond to analytic generalisation (Yin, 2018), and which correspond to what Payne and Williams (2005) refer to as “moderatum generalisations”, that is, generalisations that take the form of “testable propositions that might be confirmed or refuted through further evidence” (p. 297). These moderatum generalisations are also referred to in the literature as “assertions” (Stake, 2013).

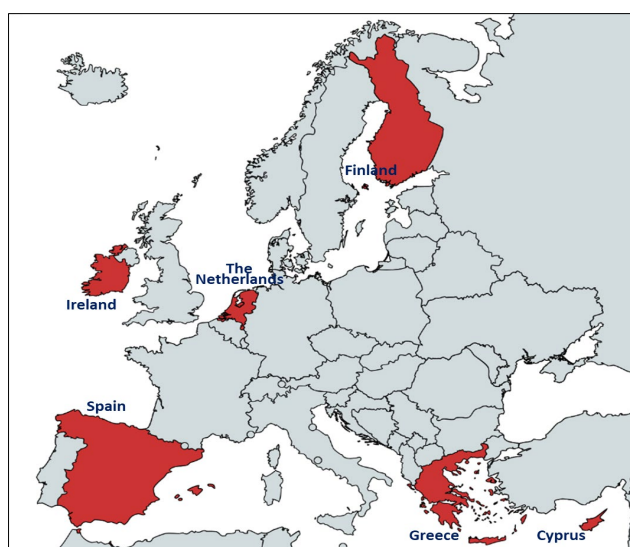
## 2.2.2 Overall methodological approach

We investigated the main research question, and the four investigative questions, through a multi-case, multi-site, and multi-researcher design consisting of 13 qualitative studies in the six participating EU Member States, (two case studies in each country – Finland, Greece, Ireland, Spain, the Netherlands – and three in Cyprus). The researchers at each site first analysed the case studies individually. Following this, they engaged in the analytical process of comparatively examining the cases at each site and developing cross-case conclusions, while also checking their interpretations with each other during dedicated research team meetings. This yielded detailed, dense descriptions of the case studies (Geertz, 1973), described in the individual reports submitted separately to JRC. The within-site and within-case analyses led to cross-site and cross-case syntheses, using analytical strategies suggested by Yin (2018), such as pattern matching, explanation building, and attending to rival explanations. The next section describes the research design of the individual case studies.

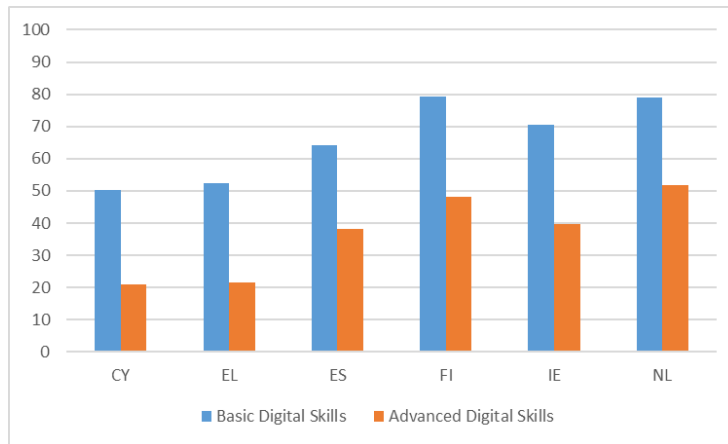
## 2.2.3 The individual case studies

The case studies were conceptualised to respond to the study needs. Member States were purposefully selected considering their geographical location (Figure 2), as well as their Digital Economy and Society Index (DESI) profiles (Figure 3) and their educational systems, in order to maximise diversity and plurality within the provided timeframe and available resources. Geographically, Cyprus and Greece are located in Southern Europe, Finland in Northern Europe, the Netherlands in Central Europe, Spain in Western Europe, and Ireland in North-western Europe. In addition, while Cyprus and Greece were ranked in the lower end of DESI 2023, Spain, the Netherlands, Finland and Ireland were ranked at the higher end, with Finland and the Netherlands scoring at the top two positions in terms of basic and advanced digital skills among individuals aged 16-74 years.

**Figure 2.** Geographical distribution of the SELFIEforTEACHERS case studies participating countries



**Figure 3.** DESI 2023 data for the SELFIEforTEACHERS case studies participating countries



The six countries also allow varying degrees of educational autonomy in their national educational systems. As described in the Eurydice report (based on data from 2022), Cyprus and Greece have a centralised educational system, whereas Finland and Spain have a decentralised system. The educational system in the Netherlands reflects some centralisation, with the State having the overall responsibility, but with the organisation and the management of primary and secondary education being a local responsibility. Finally, the Irish educational system has a large number of very small and rural schools, and its organisation is governed through collaborations between the State and private agencies. As seen above, the countries participating in these case studies are highly differentiated in terms of their geographical, digital and educational profiles, and include representatives from the higher, middle and lower end of the DESI 2023 range.

Figure 4 provides an overview of the individual case studies to capture additional details, such as the main actors, the educational levels addressed, who initiated the use of SFT, and in which cases a co-design approach was adopted.

**Figure 4.** Overview of the SELFIEforTEACHERS case studies' main characteristics

|                 |                              | CY1 | CY2 | CY3 | EL1 | EL2 | ES1 | ES2 | FI1 | FI2 | IE1 | IE2 | NL1 | NL2 |
|-----------------|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Main actors     | Pre-service                  |     |     |     |     |     | ■   |     |     |     |     |     |     |     |
|                 | In-service                   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   | ■   |
|                 | Leadership team              |     | ■   |     |     |     |     |     | ■   | ■   | ■   | ■   |     |     |
|                 | Policy maker                 |     |     | ■   |     |     |     |     |     |     |     |     |     |     |
| Education level | Primary                      | ■   |     |     |     |     |     |     | ■   | ■   | ■   | ■   | ■   | ■   |
|                 | Secondary                    |     | ■   | ■   | ■   | ■   | ■   | ■   |     |     |     |     | ■   | ■   |
| Initiator       | Researcher-driven            | ■   |     |     | ■   | ■   | ■   | ■   |     |     |     |     | ■   | ■   |
|                 | Teacher-driven               |     | ■   |     |     |     |     |     |     |     |     |     |     |     |
|                 | Joint efforts                |     |     | ■   |     |     |     |     | ■   | ■   | ■   | ■   |     |     |
| Method          | Co-design                    | ■   | ■   |     |     |     |     |     | ■   | ■   | ■   | ■   |     |     |
| Setting         | School                       |     | ■   |     |     |     |     |     | ■   | ■   | ■   | ■   |     |     |
|                 | University / Training centre | ■   |     |     | ■   | ■   | ■   | ■   |     |     |     |     | ■   | ■   |
|                 | National / Regional          |     |     | ■   |     |     |     |     |     |     | ■   | ■   |     |     |

The case studies provide evidence on how SfT can be used to support the development of teachers' digital competence in each context, representing a variety of use cases. The use cases addressed the following scenarios:

- Teachers from different schools register for a professional development course offered by a university or other professional development organisation on fostering digital competence through the use of SfT;
- A school leadership team decides to use SfT to support teachers' digital competence and instructional practices;
- An in-service teacher takes the initiative to integrate SfT in her school to empower the digital competence of her colleagues;
- A Ministry of Education Inspector introduces SfT to support chemistry teachers' reflection on their digital competence;
- A network of schools uses SfT to support their teachers' digital competence and the school's digital performance;
- In-service teachers, who are also graduate students, register for a university master's course, as part of their teacher certification requirements.

Table 1 provides a brief description of each of the use cases while a more detailed table is provided in Annex 1.

**Table 1.** SELFIEforTEACHERS case studies synopsis.

| <b>Case study</b> | <b>Use case description</b>  | <b>Context</b>                                    |
|-------------------|--|---|
| CY1               | University research group offering a Teacher Professional Development (TPD) programme to support teachers in designing their professional learning             | Professional development provided by a university |
| CY2               | A teacher uses SfT with her colleagues to identify learning needs and plan professional learning   | Teacher initiated school-based activities         |
| CY3               | A policymaker uses SfT aggregate results to plan professional development actions  | Policy planning                                   |
| EL1               | School leadership encourages the use of SfT to support STEM teachers in identifying their digital learning needs and plan their professional development       | Teacher network supported by a university         |
| EL2               | School leadership encourages the use of SfT to support Humanities teachers in identifying their digital learning needs and plan their professional development |   |
| ES1               | Pre-service secondary school teachers use SfT to analyse their learning regarding digital competence for education during their studies                        | University program/classes                        |
| ES2               | In-service computer science teachers use SfT as a trigger to analyse their digital competence and decide on further professional development                   |   |

| <b>Case study</b> | <b>Use case description</b>  | <b>Context</b>               |
|-------------------|--|------------------------------|
| FI1               | School leadership uses SFT and the SFT aggregated data to reflect on teachers' current needs and plan training actions at the school   | Whole school approach        |
| FI2               | School leadership initiates SFT as a starting point for professional learning and personal development   |                              |
| IE1               | School leadership uses SFT to support individual teachers plan their professional learning to further develop their digital competence   | School network collaboration |
| IE2               | Leaders of a school network use SFT and SFT aggregated results to plan and implement professional learning actions for their schools   |                              |
| NL1               | A university research group explores how in-service primary and secondary school teachers use the SFT feedback to advance their digital competence                             | University program/classes   |
| NL2               | A university research group explores how in-service primary and secondary school teachers can use the SFT feedback to level up (that is to advance from one level to the next) |                              |

### 2.2.4 Recruitment

Participants were recruited using a variety of methods, namely:

- Open calls for participation (CY, NL);
- Prior networks of collaboration (CY, EL, ES);
- Pre-existing, whole school-researcher collaborations coming together again to pursue joint goals (FI);
- New networks being formed due to common interests to capitalise on a professional development opportunity (IE);
- Calls for participation for teachers enrolled in teacher certification programmes at a university (ES);
- Researcher-Ministry collaboration (CY).

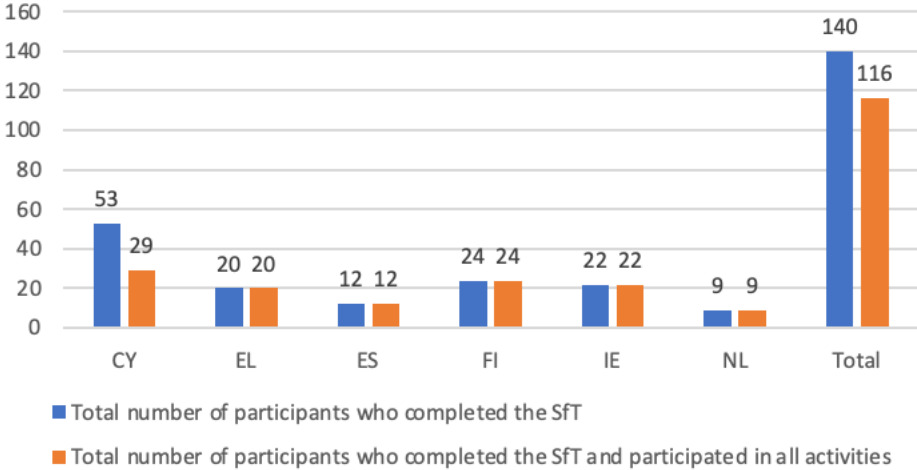
### 2.2.5 Participants

The participants at each site included pre- and in-service teachers, school leaders (e.g., school principal and vice-principal), Ministry of Education or regional authority representatives, a secondary school Chemistry Inspector, and the researchers. All participants volunteered their time. In some cases, the data collection took place at the participants' schools during regular work hours, whereas in other cases at universities or online, during the teachers' time off.

An informed consent was signed by all participants and ethical guidelines in qualitative research were followed (Cieruzo & Keitel, 1999). At the end, 116 individuals participated in the SFT case studies as

shown in Figure 5. Due to the whole school approach followed for some of the case studies (CY, IE, FI) the number of teachers involved with SFT at these schools was probably higher.

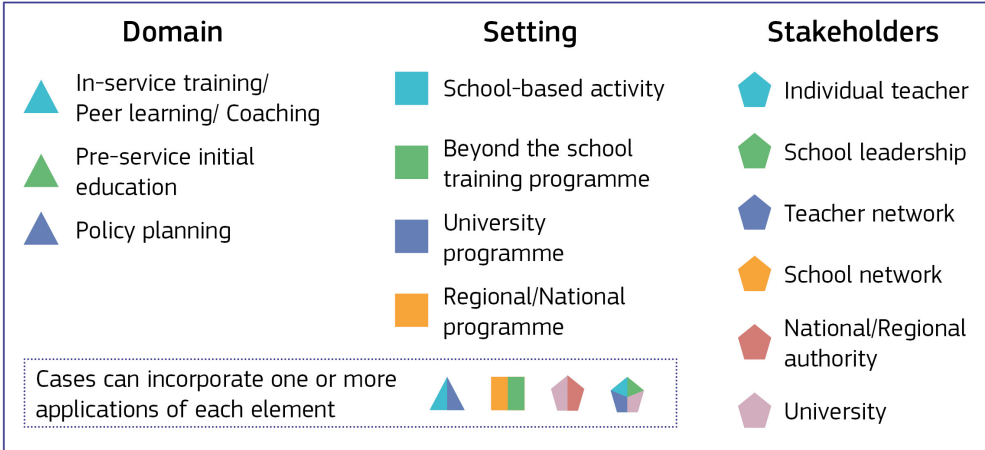
Figure 5. Overview of the SELFIEforTEACHERS case studies participants.













### 2.2.6 Implementation sites and context







SfT is a self-reflection tool. It is meant to be used by individual teachers, but also by other stakeholders, through the feature of the group creator. Therefore, the case studies include contexts where SfT was used by individual teachers (CY, EL, ES, NL), but also contexts where a whole school approach was adopted as in the case studies in three of the participating countries (FI, IE, CY). In addition, in the case of Ireland, the opportunity of using SfT led to the formation of a network of small, rural schools, created by the school leaders and the researchers with the goal of developing digital capacity and improving the schools’ digital competence. Furthermore, SfT was also used in teacher education contexts (ES, NL). Table 2 provides a list of the case studies with a brief synopsis and main characteristics for each one. To facilitate the reading of the table, the case studies main elements are colour-coded so they are easy to identify (Figure 6). Elements may have more than one application in some case studies.

Figure 6. Colour-coding of case studies elements



**Table 2.** Overview of the SELFIEforTEACHERS case studies.

| Case study   | Country | DESI <sup>2</sup> | Ed. system <sup>1</sup> | Location        | Use case description  | Domain  | Focus   | Setting  | Ed. sector          | Primary actors                                       | Initiated by (stakeholder)  |
|--|---------|-------------------|-------------------------|-----------------|---|--|---|---|---------------------|--|--|
| CY1<br>   | Cyprus  | Low               | Centralised             | Southern Europe | University research group offering a Teacher Professional Development (TPD) program to support teachers design their professional learning.           | Professional development programme (in-service training)                                   | Scaffolding SFT reflection & professional learning                | University in-service training network  | Primary education   | In-service teachers                                  | Research team (University)   |
| CY2<br>   |         |                   |                         |                 | A teacher uses SFT with her colleagues to identify learning needs and plan professional learning.   | School-based professional learning activities (peer learning/coaching)                     | A teacher introducing SFT in her school                           | Whole school  | Secondary education | In-service teachers                                  | School teacher (school ICT coordinator)  |
| CY3<br>   |         |                   |                         |                 | A policy maker uses SFT aggregate results to plan professional development actions.   | Policy maker PD planning (policy planning)   | SFT via the lens of a Chemistry Inspector to support her teachers | National (Ministry of Education in collaboration with university)                           | Secondary education | Chemistry in-service teachers<br>Chemistry inspector | Policy maker (Ministry/ University collaboration)  |
| EL1<br>   | Greece  | Low               | Centralised             | Southern Europe | School leadership encourages SFT completion to support teachers teaching STEM topics identify their learning needs and plan professional development. | School-based professional learning and planning of activities (in-service training)        | SFT via the lens of teachers teaching STEM subjects               | Whole school (Teacher network supported by a university)                                    | Secondary education | In-service teachers                                  | School leadership / University collaboration   |
| EL2<br>   |         |                   |                         |                 | School leadership encourages SFT completion to support teachers teaching Humanities identify their learning needs and plan professional development.  | School-based professional learning and planning of activities (in-service training)        | SFT via the lens of teachers teaching non-STEM subjects           | Whole school (Teacher network supported by a university)                                    | Secondary education | In-service teachers                                  | School leadership/ University collaboration  |
| ES1<br> | Spain   | High              | Decentralised           | Western Europe  | Pre-service teachers use SFT to analyse their learning about digital competence for education during their studies.                                   | Initial teacher education (pre-service training)   | Ethical digital competence in pre-service education               | University training programme/ classes  | Secondary education | Pre-service teachers                                 | University   |
| ES2<br> |         |                   |                         |                 | In-service computer science department uses SFT as trigger to analyse their digital competence for education and their further development.           | Master's programme (in-service training)   | Ethical digital competence in highly proficient teachers          | University Master's programme/ classes  | Secondary education | In-service teachers                                  | University   |

|  |                 |      |   |                 |  |   |  |                               |                               |  |   |
|--|-----------------|------|---|-----------------|--|---|--|-------------------------------|-------------------------------|--|---|
| FI1<br>   | Finland         | High | Decentralised   | Northern Europe | School leadership uses SFT and the aggregated data it can provide to reflect on teachers' current needs and plan training actions at the school. | School-based professional learning and planning of activities (in-service training)                     | Perspectives of a primary school leadership team                         | Whole school                  | Primary education             | School leadership<br>In-service teachers | School leadership                                   |
| FI2<br>   |                 |      |   |                 | School leadership initiates SFT as a starting point for a professional learning for personal development.  | School-based professional learning activities (peer learning/ coaching)                                 | SFT for teacher reflection in a whole-school programme                   | Whole school                  | Primary education             | In-service teachers<br>School leadership | School leadership                                   |
| IE1<br>   | Ireland         | High | Collaboration between the State and private agencies      | Northern Europe | School leaders and teachers use SFT to support individual teachers plan their professional learning to further develop their digital competence. | School-based professional learning and planning of activities (in-service training and policy planning) | SFT to support professional learning in four rural schools               | School network/ whole school  | Primary education             | In-service teachers<br>School leadership | School network leaders/<br>University collaboration |
| IE2<br>   |                 |      |   |                 | Leaders of a school network use SFT tool and aggregated results to plan and implement professional learning actions for their schools.           | School / School network policy planning   | SFT to support school leaders to develop a digital action plan           | School network/ whole school  | Primary education             | School leadership<br>In-service teachers | School network leaders/<br>University collaboration |
| NL1<br>   | The Netherlands | High | Some centralisation with State and local responsibilities | Central Europe  | University research group explores how teachers use the SFT feedback to advance their digital competence.  | University training programme   | Reflection on professional development paths in relation to SFT feedback | University programme/ classes | Primary & Secondary education | In-service teachers                      | University  |
| NL2<br> |                 |      |   |                 | University research group explores how teachers use the SFT feedback in comparison to their existing professional goals.                         | University training programme   | Reaction to SFT feedback after initial PD goals                          | University programme/ classes | Primary & Secondary education | In-service teachers                      | University  |

<sup>1</sup> As described in the Eurydice report (based on data from 2022)

<sup>2</sup> DESI 2023

## 2.2.7 Quality assurance: issues of validity and reliability of the research

The researchers, following guidelines shared by Yin (2018), adopted several strategies to safeguard the validity and reliability of the particular multiple-case study research:

- *Construct validity*: A review of the literature yielded the operational definitions of the main constructs of the study. The involvement of the JRC, as the developers and experts in the SfT, strengthened the validity of the work. Furthermore, multiple sources of data were collected in each one of the individual case studies. Interview transcripts were also shared with the interviewees in some of the case studies. Finally, regular researcher meetings during the planning, implementation and analysis phases of the project ensured that the multi-national team members had multiple opportunities to provide feedback, critique and share their ideas on the project processes and outcomes.
- *Internal validity*: The analysis techniques included processes supporting pattern matching, explanation building and actively looking for rival explanations.
- *External validity*: The research design was theoretically informed. A replication logic was adopted for the multiple-case study design.
- *Reliability*: Several research protocols were co-developed and iteratively discussed by the researchers, including the interview and coding scheme protocols. Case study databases were developed in the ATLAS.ti qualitative analysis software tool, and an evidence audit trail was created through the recording of data for repeated examination, and the digital organisation of the transcribed data.

## 2.2.8 Data collection methods

The main data collection method was individual interviews with teachers, using a detailed interview protocol. This interview protocol was adapted and used for teacher group interviews and for interviews with school leadership teams and the Ministry of Education Inspector. The interviews were semi-structured and open-ended, meaning that the interviewers invited participants to offer their feedback on the issues that were discussed beyond what the questions in the protocol asked for. The interview protocol questions were developed based on the study's theoretical framework and theoretical proposition, to collect data around the following key areas:

1. Background information on teachers' self-efficacy, agency to learn, instructional practices with technology, and past professional development experiences.
2. How teachers perceive SfT in terms of usability and usefulness.
3. Teachers' agency, self-efficacy and plan of action after participating in the SfT self-reflection exercise.
4. Personal, institutional and systemic aspects that can support or hinder the utilisation of the SfT self-reflection tool.

The interview protocols adapted for different target groups (teachers, school leaders/policymakers) are presented in Annex 2.

At the same time, as a qualitative multiple-case study, data were collected from multiple sources, serving the goal of triangulation (Stake, 2013), and through a variety of measures and tools, as follows:

- Individual and group interviews: These were individual or group interviews, taking place before or/and after teachers’ self-reflection using SfT. A detailed, semi-structured interview protocol was used for all interviews, and was adjusted for group interviews, interviews with school leaders or Ministry representatives.
- Focus group discussions: Focus group discussions, using an open-ended exploratory approach were also a means for data collection, and accompanied the semi-structured group interviews.
- School leadership team interviews: Data were collected from the school leadership teams for some of the case studies (CY, FI, IE).
- Interview with a Ministry of Education Inspector: In one case study, data were collected from an interview with a secondary education Inspector (CY).
- Professional learning designs: In some cases (CY, EL, IE) teachers developed professional learning designs or were asked to describe action plans for developing their digital competence in one of the SfT areas.
- Field notes: Researchers kept notes of the teachers’ questions, reactions and comments during the discussions about SfT.
- Selected participants’ SfT reports: Even though SfT reports were available only to the teachers who completed it, on some occasions, participants shared the SfT individual results with the researchers and gave them permission to analyse them.

Table 3 indicates the type of data collected from each case study.

**Table 3.** SELFIEforTEACHERS case studies: The data corpus for each case study.

| # | Case study | SfT reflections | Individual teacher interviews | Group and focus group interviews with teachers | Interviews with school leaders or inspectors | Professional learning design plans | Observation/field notes | Other data                               |
|---|------------|-----------------|-------------------------------|--|--|------------------------------------|-------------------------|--|
| 1 | CY1        | •               | •                             | •  |  | •                                  |                         | Teacher presentations                    |
| 2 | CY2        | •               | •                             |  | •  |                                    |                         | Learning designs and future action plans |
| 3 | CY3        | •               |                               | •  | •  |                                    |                         |  |
| 4 | EL1        | •               | •                             |  |  |                                    |                         | Future action plans                      |
| 5 | EL2        | •               | •                             |  |  |                                    |                         | Future action plans                      |

| #  | Case study | SfT reflections | Individual teacher interviews | Group and focus group interviews with teachers | Interviews with school leaders or inspectors | Professional learning design plans | Observation/field notes | Other data                 |
|----|------------|-----------------|-------------------------------|--|--|------------------------------------|-------------------------|----------------------------|
| 6  | ES1        | •               |                               | •  |  |                                    |                         | Future action plans        |
| 7  | ES2        | •               |                               | •  |  |                                    |                         | Future action plans        |
| 8  | FI1        |                 |                               |  | •  | •                                  | •                       |                            |
| 9  | FI2        | •               | •                             | •  |  | •                                  | •                       | Teacher team presentations |
| 10 | IE1        | •               |                               | •  |  |                                    |                         | Future action plans        |
| 11 | IE2        |                 |                               |  | •  |                                    |                         |                            |
| 12 | NL1        | •               | •                             |  |  |                                    |                         | Future action plans        |
| 13 | NL2        | •               | •                             |  |  |                                    |                         | Future action plans        |

Unless it compromised the quality of the data collected, or unless explicitly requested by the participants, all data collection, with the exception of surveys, were audio or video recorded. All data were stored on password-protected computers and were not publicly released, thus protecting the anonymity of the participants. All ethical aspects of data collection were adopted: participants were asked to sign informed consent forms, following the guidelines announced by the European Commission’s “Ethics in Social science and Humanities” report (Rauhala & Kalokairinou, 2021) and ethical standards such as those shared by the American Psychological Association (APA, 2017).

Data were collected in the participants’ national or first language. That is, in the case of Cyprus and Greece in Greek, in Finland in Finnish, in Ireland in English, in Spain in Spanish and in the Netherlands in English (as this was the language of the programme that participants were attending). The data collection instruments were adapted for that purpose by each case study researcher, who was part of the instruments’ development and a native or competent speaker of the language.

## 2.2.9 Data coding and analysis

The audio and video data were transcribed for textual analysis and were analysed qualitatively, using bottom-up and top-down approaches. The analysis was conducted in the data original language and only the excerpts used were translated into English. Discussions between the research team members, using exemplars from all countries, led to a common coding scheme which was applied to the data using the Atlas.ti qualitative analysis software. Table 4 presents the coding scheme which was used for all case studies.

**Table 4.** SELFIEforTEACHERS case studies: coding scheme.

| <b>Coding category</b>               | <b>Code</b>   | <b>Definition</b>  |
|--------------------------------------|---|--|
| 1. Perception of SfT                 | 1.1 Usability   | Statements that indicate how easy/difficult participants find SfT.   |
|                                      | 1.2 Usefulness  | Statements that indicate how useful or relevant participants perceive SfT to be.   |
| 2. Teacher attributes                | 2.1 Self-efficacy   | Statements that indicate participants' belief in their digital competences to use technology.  |
|                                      | 2.2 Agency  | Statements that externalise participants' agency/activity regarding the development of their digital competences or digital practices  |
|                                      | 2.3 Digital competences   | Statements that describe teachers' digital competence.   |
|                                      | 2.4 Digital practices   | Statements that describe teachers' digital practices (i.e., in the classroom).   |
| 3. Process of improvement            | 3.1 Self-reflection   | Statements that refer to teachers reflecting on their digital competence and the use of self-reflection exercises.   |
|                                      | 3.2 Collaborative learning and/or co-design   | Statements that refer to teachers' collaboration as part of their professional growth and for developing their digital competence.   |
|                                      | 3.3 Motivation to improve   | Teachers' motivation to improve their digital competence in the future.  |
|                                      | 3.4 Conditions for professional learning<br>3.4.1 Support<br>3.4.2 Hindrances                     | Statements that indicate what supports or hinders teachers' professional learning.   |
| 4. Using SfT for professional growth | 4.1 Challenges<br>4.1.1 Personal aspects<br>4.1.2 Institutional aspects<br>4.1.3 Systemic aspects | Statements that explicitly discuss challenges to the use of SfT as identified by the participants. These can be additionally coded as Personal (relating to the teachers' personal attributes or situation), Institutional (school-related) or Systemic (i.e., national) challenges. |
|                                      | 4.2 Drivers   | Statements that refer to factors supporting the use of SfT, as identified by the participants.<br><br>Sub-codes referring to personal, institutional and systemic drivers may also be included, if they emerge from the data.  |
| 5. Professional learning design      | 5.1 Learning plans  | Statements that pertain to the participants' planning of professional learning around their digital competence or digital practices.   |

| <b>Coding category</b>    | <b>Code</b>       | <b>Definition</b>  |
|---------------------------|-------------------|--|
|                           | 5.2 Intent to act | Statements that indicate intent to act to improve one's digital competence or digital practices.   |
| 6. Broader technology use | 6.1 Challenges    | Statements that provide a broader description of the challenges teachers may face in relation to their use of technology (i.e., technical infrastructure). |
|                           | 6.2 Drivers       | Statements that provide a broader description of the enablers that support teachers' use of technology.  |

An inter-coder agreement was conducted for the data in all research sites, with satisfactory agreement levels reported. After the data were coded and segmented, each research team proceeded with the analysis for each case study using standard analytic phases such as those suggested by Yin (2018). The analysis was iterative and proceeded in phases: after the analysis of each individual case study, each national team examined and contrasted the case studies within the national context and synthesised its findings. Finally, all individual case studies were analysed together and across the national or regional contexts in order to identify patterns in the data. To support the multi-case analysis, the key themes were first identified for each individual case study. These themes were contrasted with each other, and patterns were then identified across studies and contexts. We specifically searched for evidence that might discount the patterns and the initial theoretical proposition of the research. This process led to the claims (assertions) that could be made across and beyond the local contexts; these claims were organised in respect to the main research question and the theoretical proposition of the study.

## **3 Results**

This section reports the cross-case synthesis and the findings of the multiple-case study, while the results of each case study are presented briefly in section 5 of this report.

The main aim of this multi-case study was to investigate the conditions for the effective use of SfT. The study responds to this broad aim by reporting on the four investigative questions stated earlier in this report. First, we start with an account of how participants perceived the usability and usefulness of SfT, as a pre-requisite for their engagement with SfT for improving their digital competence. We then report on their agency to act, based on the self-reflection supported by SfT, and discuss the conditions for the effective use of SfT as reflected in the evidence collected from the individual case studies.

### **3.1 Did teachers find the SfT tool easy to use?**

The participating teachers in each of the national contexts converged in their positive impression of SfT's interface design and ease of navigation: they recognised it as a user-friendly, intuitive and easy to navigate tool. Teachers also appreciated the immediate feedback they received and the tool's visual representations. On the other hand, some teachers indicated that the questions took considerable time to respond to, something that may influence the uptake of the tool by teachers who are less motivated to engage. At the same time, even though some participants reported that the content presented in SfT was easy to understand, others mentioned that some terminology used in the examples at the tool proficiency level statements was not easy to understand. This was an issue reported by the novice or early career teachers (ES), as well as by teachers with many years of experience who also indicated that they had to look up some of these terms to understand them better (CY, EL, FI, NL). Finally, participants agreed that teachers' digital competence is well introduced by SfT and that the tool content helps them reflect on their own competence, even though some teachers in Finland mentioned that they perceived some of the questions as reflecting their practices rather than their competence. All participants were able to complete the SfT self-reflection and were able to report their challenges, which indicates that they used the tool to reflect and discuss their understanding and awareness of their digital competence.

### **3.2 Did teachers perceive SfT as useful?**

One of the interview protocol questions referred to whether participants perceived SfT as a useful tool for their professional development, or as useful for a schools' efforts in developing digital competence. All participants, which included teachers (all case studies), school leadership teams (CY, FI, IE), a Ministry (CY) or regional authority representatives (FI, IE) positively commented on the self-reflection and self-awareness affordances of SfT. In particular, SfT served a professional development purpose, as the items and areas included problematised teachers' own definition of digital competence, connecting the idea of digital competence with concepts that they had not all previously considered as important or relevant, or even introducing them to new concepts.

### **3.3 To what extent did SfT support teachers in developing agency to improve their digital competence?**

Having established that the participants found the SfT tool easy to use and perceived it as promoting self-reflection, we next asked whether this self-reflection process can support teachers in developing their digital competence on its own. To do this, we contrasted the individual case study findings aiming to understand the teachers' agency to improve their digital competence after responding to the SfT

tool. The overall finding was that teachers' agency to self-improve was present in their engagement with SfT; however, teachers' agency to design a plan of action required support in particular ways, which was not extensively provided in all case studies. The following assertions about the SfT self-reflection activity can be concluded by contrasting the case studies of individual teachers using SfT (CY3, EL1, EL2, ES1, ES2, NL1, NL2):

- *The use of SfT can support self-reflection and self-awareness, even without any other support.* The study participants were self-motivated to benchmark their digital competence against averages of other European teachers. They were interested to see how they could improve their digital competence and readily questioned their competence level because of the SfT results: that is, they assessed their perception of their digital competence, identified their strengths and weaknesses and reflected on their interests and abilities to change.
- *Self-reflection and self-awareness made teachers question their self-efficacy.* On its own, SfT self-reflection helped teachers initiate the process for examining their digital competence; it also created cognitive dissonance for several participants, as reported by teachers in Cyprus, Greece, Spain and the Netherlands, originating from an overestimation of their own abilities.
- *Teachers were more interested in digital competence that directly relates to their teaching.* Several teachers felt they were being assigned to a lower competence level because of activities they were not necessarily interested in engaging with, such as assuming leadership and guiding other teachers. More specifically, as they explained, they felt that reaching the SfT levels of C1-Leadership and C2-Innovation were over and beyond what a typical teacher or even a school principal was expected to do in a school.
- *Teachers who were interested in improving their digital competence had difficulties moving from the SfT feedback to drafting actionable plans.* Teachers found the feedback generated by the SfT important but general in nature, and indicated that they needed specific suggestions and examples to help them proceed based on that feedback. Teachers' agency to improve their digital competence was higher in the cases of the whole school approach (FI) or the networks of rural schools (IE), when collaborative self-reflection among peers was in place (ES), or when scaffolding was provided to support related professional actions (CY). Therefore, a fifth assertion regarding agency to improve would be that:
- *With appropriate support (by peers, knowledgeable others, school leadership, external experts, etc.) teachers' motivation to improve their digital competence can be sustained and guided.* Support for this assertion came from the case studies focusing on the whole school approach (FI), the network of rural schools especially formed to take advantage of the momentum provided by the SfT tool (IE), and the scaffolded case studies in Cyprus (CY1, CY2). For instance, the cross-case comparison of the three case studies in Cyprus indicated that teachers who participated in a scaffolded, multi-week workshop that supported them in identifying areas of improvement and engaging in planning actions for professional development (CY1) were positive about the effectiveness of SfT in developing their digital competence. In contrast, fewer teachers engaged in such processes when there was limited support (CY2). For example, teachers were not interested in planning professional learning actions at the time of the data collection in the non-supported case of Chemistry education secondary school teachers (CY3) unless directly related to their teaching, thus indicating an explicit prioritisation of their professional needs. Similar findings to CY2 and CY3 were reported in the other case studies with individual teachers, despite the fact that those took place in different contexts, countries and educational systems (EL, ES, NL).

### 3.4 Which personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?

As part of the study, we also sought to identify any personal, institutional and systemic characteristics that might influenced teachers' willingness to act upon the feedback they received from the SfT tool. All three categories of characteristics were evident in teachers' responses, some serving as barriers whereas others serving as enablers for teachers' agency to participate or initiate efforts to improve digital competence. Table 5 shows the main barriers reported by at least two research sites. In the case of centralised educational systems, such as those in Cyprus and Greece, the institutional barriers are connected to systemic ones.

**Table 5.** SELFIEforTEACHERS case studies: Main barriers to teachers' agency to respond to the tool feedback.

| <b>A. Personal</b>  | <b>B. Institutional</b>  | <b>C. Systemic</b>   |
|---|--|--|
| A1. Own digital skills and knowledge about technology   | B1. Limited or outdated technological infrastructure at the school             | C1. Insufficient centrally organised professional development                  |
| A2. Personal beliefs about technology   | B2. Limited, outdated or non-existent localised and relevant digital resources | C2. Limited, outdated or non-existent localised and relevant digital resources |
| A3. Uncertainty about strategies they could use to improve their digital competence, even after receiving the SfT results | B3. Professional workload  | C3. Professional workload  |
| A4. Lack of time  | B4. Lack of peer or expert support   | C4. Subject-specific curricular pressures                                      |
| A5. Limited understanding of digital competence   | B5. Voluntary participation  | C5. Voluntary participation  |
| A6. Limited interest in digital competence that are not directly related to classroom instruction                         | B6. School priorities and goals  | C6. Systemic priorities and goals  |

Findings indicate that overcoming the barriers that were reported to hinder the teachers' agency to develop their digital competence can contribute to creating a conducive climate that can support teachers in taking the next step. Evidence of this comes from both what was achieved during this study, and from the suggestions of the participants regarding what could be done to support the development of other teachers' digital competence. For instance, it was suggested that certain *personal, institutional and systemic barriers* (such as A1, A3, A5, B2, B4 and C2 in Table 6) could be overcome with personalised scaffolding of the process by knowledgeable peers or outside experts in the context of a structured professional development programme, as seen in the first and second Cypriot case study (CY1, CY2). The extent to which these can be overcome depends on the type and extent of the scaffolding that is provided, as also suggested by evidence from the Greek case studies, which indicates that teachers need dedicated support to move from general aspirations to specific and actionable plans for improving their digital competence.

The whole school approach, as evident in the case studies in Finland and Ireland, indicate that sharing joint goals for improving a school's or a network of schools' digital performance might motivate

teachers to use tools like SfT to support their school's digital planning. Nonetheless, problematic technological and digital infrastructure was reported to limit the teachers' motivation to engage.

Teachers' *motivation and incentives* provided by others (schools, leadership team, educational authorities, etc.) matters. All participants were volunteers –reflecting with SfT, taking part in the interviews, taking the extra step to develop an action plan and even implement it in their school (as happened with CY1 and CY2), were all completed by teachers on a voluntary basis. The motivation to participate varied: in some cases it was personal, while in others it came from the decision for a school-wide participation, an existing collaboration with the researchers, or was part of a certification or master's programme. Participants in Finland emphasised how important it is that participation in such reflective exercises, as supported by SfT, takes place during school time and regular work hours. Participants at multiple sites also strongly discussed that not all teachers would be motivated to use SfT unless it was integrated into their work life. Several teachers also suggested that in order to take full advantage of the benefits of a self-reflection tool like SfT, and really develop digital competence, the use of such tools should be part of the teachers' mandatory professional development or teacher certification programmes. Otherwise, personal factors, along with institutional priorities, which often may not have digital competence as a primary goal, might limit the individual teachers' motivation and incentives to identify resources and seek support to develop their digital competence.

## 4 Conclusions and policy implications

### 4.1 Discussion

The ultimate goal behind problematising one's understanding of digital competence, and providing opportunities for engaging in self-reflection, is to support teachers in approaching the task of self-reflection critically, and using this knowledge to inform deliberate actions to address the areas they identified as needing improvement. In the case studies leading to this report, we sought to understand whether the process of engaging in self-reflection, supported by SfT, led to the critical appraisal of the teachers' digital competence and whether, in turn, this supported their motivation to take action and their agency to self-improve.

Most teachers who participated in this study were motivated to learn about their digital competence, and potentially sought to understand how to improve themselves. However, even with this self-selected sample, teachers could engage in self-reflection but not specify concrete actions on how to proceed with improving their digital competence without considerable guidance. These findings re-affirm that agency to improve one's digital competence is a multi-dimensional construct. According to the ecological approach of agency, teachers' agency to self-improve is not merely dependent on them as individuals but also on their socio-cultural environment (i.e., the availability of cultural, material and social capital), with researchers highlighting the inseparability of the social and the individual when it comes to the construct of teacher agency (Priestley et al., 2015; Archer & Archer, 2000).

Findings from this study point to this multi-dimensional and multi-level interaction in teachers' willingness to take action after they completed SfT and identified areas for improvement. The case studies indicated that SfT helped most teachers broaden their conceptualisation of digital competence, as a construct that is not limited only to "teaching and learning" – the dimension that is of most interest to their everyday work as teachers – it also helped teachers in respect to their potential impact in educational values. Furthermore, the SfT tool helped them benchmark the level of their digital competence against the levels of competence conveyed through the questions provided in the tool. However, when examining the reports from each of the case studies, we see that mere provision of feedback through the SfT tool was not sufficient to support teachers in proceeding to the next step, which is to develop professional learning plans to improve their digital competence. These findings resonate with the guidelines provided by the JRC in that SfT refers to a self-reflection process within a learning cycle, by proposing the SfT online tool (with guiding statements) and the SfT process (with supporting actions). At the same time, this also raises the question of what the supporting actions could be and how such professional development programmes should be designed. Additional examples and explanations of the more advanced terminology relating to digital competence items in SfT might help less digitally competent users assess their competence. Furthermore, providing localised and personalised links to resources could help teachers act upon their initial agency and transform the experience into a more powerful learning experience.

This multi-case study has, of course, its limitations and its assertions should be interpreted contextually, taking into account the SfT tool's affordances and constraints, and the context in which the case studies took place. The findings indicate that the current design of the SfT tool suggests that its best use will be in conjunction with a carefully designed professional development programme, in which teachers can be provided with just-in-time support to develop selected aspects of digital competence. The timeframe of this research work did not allow for a longitudinal examination of what this support might look like in all participating national or regional contexts. Therefore, our

conclusions about how regional and national educational contexts at the institutional or systemic level may influence the uptake of SfT require further examination.

One important limitation, that also has implications on whether SfT can support the digital transformation of educational systems through helping teachers improve their digital competence, is that the study participants were highly motivated to participate in this study for various reasons (i.e., because they were intrinsically interested in examining their digital competence; because their school had committed to using SfT and, therefore, they had external and internal incentives to participate; because they wanted to complete their teacher certification programme and this was requested; because they were enrolled in a graduate programme, etc.).

As many of the participants explicitly indicated, the use of the SfT tool should be organically integrated into professional development programs or within the national or regional accountability system, and at the same time, be complemented by activities that can support teachers in developing agency to self-improve. Then the impact of such a tool to reach its goal of empowering teachers to take charge of their self-improvement journey can be greater.

## 4.2 Recommendations and policy implications

The multi-case study findings support several recommendations at different levels: from the individual to institutional and systemic levels and from practical suggestions to strategic and policy recommendations.

**At teacher level** the study results indicate that teachers can use the SfT tool to individually assess their own digital competence, self-reflect and raise their self-awareness. The results of the SfT self-assessment can indicate areas where one's digital competence could be improved. It is important for teachers to set goals for their professional learning that can be addressed based on available resources and time. Moreover, to improve digital competence, it is important to engage in cycles of goal setting, learning design, and classroom implementation. Teachers can seek support in developing their digital competence from their peers, school leadership, or activate other resources at their school and elsewhere to be able to address issues of common interest. Finally, teachers can initiate and collaborate within groups and reflect on their group report, which presents aggregated, anonymous results of their self-reflections to decide on joint actions for improving their digital capacity. The case of school teachers in Cyprus can provide a good example and practice that teachers could follow.

**At school leadership level**, the study results indicate that SfT can create opportunities for the whole school, when it is used to inform plans to improve the schools' digital performance. In particular, it can be used in tandem with the Selfie for schools tool. The analysis of the aggregated results of the SfT self-reflections can support discussions on improving the school's digital planning, in the area of Continuing Professional Development. Supportive school leadership is necessary for teachers to show interest in developing their digital competence and sustaining it, as well as collaborative and peer learning opportunities within the school calendar. Finally, achieving a good technological and digital infrastructure can support teachers' motivation and capacity to develop their digital competence. The case of the Finnish whole school approach, as well as the case of the Irish school network can provide a good example and practice that school leaders could follow.

Beyond the school context, teachers should engage in professional learning and in professional development programmes provided by **teacher education and training** institutions. The study results indicate that SfT should be integrated into scaffolded professional development programmes, which are experiential in nature and provide just-in-time support to the teachers. Such professional development opportunities should include access to resources to complement the SfT feedback

supported by the creation of communities of practice to support teachers in sharing resources, expertise and advice on how to improve digital competence. Teachers seem to focus on the areas of SfT that directly affect their classroom practices. They need support in understanding and appreciating other digital competence areas, which seem to be marginalised in favour of the areas that directly impact what they do with their students. Finally, it is preferred that professional development takes place during teachers' work hours and is connected to teachers' professional lives.

At a more **strategic and policy level**, the study results indicate that SfT can support self-reflection and self-awareness of one's digital competence level. However, its use alone is not sufficient. Empowering teachers to improve their digital competence and practices requires a long-term plan, which also attends to teachers' personal (i.e., time, support from peers or experts), institutional and systemic needs (i.e., digital competence as a real priority, updated technological infrastructure, access to pedagogical resources, incentives to engage, etc.). SfT aggregated results can provide useful insights on how teachers perceive their digital competence and support digital planning at different levels (i.e., at the school level, at the level of networks of schools, at the education and training institutions level, regional, national or European level planning). Such opportunities can be especially supportive for rural, remote or under-resourced schools. Integrating SfT in teachers' mandatory but scaffolded professional development programmes will provide incentives and motivation for them to attend to their digital competence. If digital competence and development of digital practices in education is a priority, it needs to be reflected in the goal setting, budget and technology infrastructure plan, curriculum approaches and content, and teachers' pre- and in-service programmes, including teacher certification programmes.

In relation to the **tool**, SfT feedback could be tailored to different levels of digital competence or different regions; feedback could also cater to different disciplines, to support teachers in connecting this feedback to their subject-specific teaching practices. Differentiated feedback could also be provided to novice versus more advanced teachers. Moreover, it could become more contextualised and actionable. For instance, the feedback could provide links to various local, European and international resources, with a preference to open educational resources, as well as examples of learning designs using specific digital competence levels. It is important to include local resources (which are presented based on the language used to respond to SfT).

As a final remark, the research team would like to address the fact that the teachers participating in the study, even though motivated enough to care about their digital competence, expressed their need for support in various forms (e.g., coaching, peer interaction, access to resources and material, systemic and systematic provision of professional learning opportunities). This support can start from the school and regional level and extend to a European level. Tools like SfT can constitute an important element for the imitation of such support. Actions like the Erasmus+ teacher academies, eTwinning and the European School Education Platform (ESEP) can provide opportunities to respond to teachers' needs for support. SfT is already planned to be embedded in ESEP with ESEP content to be mapped to the six SfT competence areas. Six MOOCs, one for each area, have been developed and a certification programme is under discussion based on an ePortfolio approach.

However, providing appropriate personalised support that teachers seem to need might be feasible for small-scale implementations. But can SfT provide a personalised self-reflection learning process and scaffolding for each individual teacher at a large scale? The use of artificial intelligence agents either embedded in the SfT platform or complementing the SfT tool could provide the support and connection to resources that individual teachers are looking for.

## **5 Individual case study summaries**

The case studies are part of a multiple case studies design with a total of 13 case studies in six European Member States. A list of the case studies with a brief synopsis and main characteristics for each one are presented in Table 2 in section 2.2.6.

In this section, the individual case studies are briefly presented within the country context and followed by a summary and a snapshot with the basic elements of the case, a brief introduction, description of the implementation, research methodology, and key findings. Each case study can provide a useful resource for stakeholders with practices and ideas on how to benefit of such a professional learning and development approach that SELFIEforTEACHERS entails in their own settings. Each country section, concludes with key recommendations and lessons learnt.

## 5.1 Cyprus (CY)

### CY

*DESI*: Low

*Geographic location*: Southern Europe

*Educational system*: Centralised

*Case study 1 (CY1)*: Scaffolding primary school teachers' reflection and professional learning through a Professional Development programme

*Case Study 2 (CY2)*: A self-driven initiative of an in-service teacher to introduce SfT in the school

*Case study 3 (CY3)*: Investigating the affordances of SfT using a disciplinary lens: examining Cypriot Chemistry Education teachers' uptake of the SfT

### 5.1.1 Summary of Cypriot case studies

Three case studies were conducted in Cyprus, examining the use of SELFIEforTEACHERS (SfT) in three different contexts with varied degrees of scaffolding. The first case study (Case Study 1) examined the use of the SfT tool in the context of a Teacher Professional Development (TPD) programme for in-service primary education teachers, initiated by the researchers. The TPD programme had an extended duration as it lasted for four months, and it was characterised by just-in-time scaffolding, supporting teachers in designing and implementing their personal professional plans for the development of their digital competence. The second case study (Case Study 2) investigated a bottom-up effort of an in-service Media Studies teacher to integrate SfT into a private secondary education school for the digital empowerment of her colleagues. It also had an extended duration, and support was provided by the Media Studies teacher on demand. Finally, the third case study (Case Study 3) examined the uptake of SfT by the Cypriot Chemistry Education teachers. This effort was initiated by university researchers in collaboration with the Chemistry Education Inspector, had limited duration, and in this case no scaffolding was provided. Collectively, the findings of the three case studies provided support that SfT should be situated in scaffolded and extended duration TPD contexts. For instance, interest in designing personalised learning paths as a result of the SfT feedback was absent in Case Study 3, where no other support was provided to chemistry teachers. Interest to take action was relatively low in Case Study 2, where there was only on-demand support by the Media Studies teacher. Finally, interest was relatively high in Case Study 1, where just-in-time scaffolding was provided by the university researchers in the context of a structured TPD programme.

### 5.1.2 Country information

CY

General information

Compulsory education in Cyprus lasts for approximately ten years, as it extends from the age of 4 years and 8 months (pre-primary education) to the age of 15 years (end of lower secondary education).

*Public schools:*

At the moment, there are 272 public pre-primary schools, 328 public primary schools, as well as 123 public secondary education schools (62 middle schools known as "gymnasiums", 36 high schools known as "lyceums", 10 middle/high schools known as "six-class schools", as well as 15 technical schools known as "secondary technical and

|                        |  |
|------------------------|--|
|                        | <p>vocational education and training schools”), aiming to cater the educational needs of over 100,000 of students (107,323 students as of 2021) all over the island.<sup>11 12 13</sup></p> <p><i>Private schools:</i></p> <p>At the moment, Cyprus has 173 private pre-primary schools, 31 private primary schools, and 39 private secondary education schools, which may be classified as: (a) “same type” (i.e., following without any deviation the curriculum and the timetables of the existing types of public schools); (b) “similar type” (i.e., including in their curriculum at least two-thirds of the main courses provided by the public schools, in terms of allocated time and material); (c) “different type” (i.e., if they do not fall into any of the above categories).<sup>14</sup></p> <p><i>Teachers and students:</i></p> <p>According to the 2020-2021 annual report of the Ministry of Education, Sport and Youth (MoESY)<sup>15</sup>, which is the latest available report, during 2020-2021 there were 928 teachers and 14,223 students in pre-primary schools, 4,367 teachers and 51,541 students in primary schools, and 6,750 teachers and 18,012 students in secondary education schools. An overview of the structure of the Cyprus National Education System, as given in the Eurydice report, is presented in the next page.<sup>16</sup></p> |
| Educational governance | <p>Considering that the educational system in Cyprus is based on a centralised educational model, it is not a surprise that public schools are reported to have very limited autonomy over their operations, financial resources, school curricula, and hiring and regulation of teaching staff. However, the schools can request and organise professional development sessions of short duration. Teachers can also attend short or longer duration courses to learn about new developments in learning and instruction. Most of these courses are offered outside of the teaching time and teachers are free to choose what, if any, they wish to attend.</p>   |
| Digital competence     | <p>Although Cyprus’s score on the 2022 edition of the Digital Economy and Society Index (DESI)<sup>17</sup> has improved in recent years, Cyprus ranks low compared to the DESI average: it ranks 21st in the EU on human capital, below the EU average, while one out of two Cypriots are reported to lack basic digital skills.</p> <p>More specifically, according to the DESI report: <i>“In terms of at least basic digital skills, Cyprus is below the EU average of 54%, with 50% of people between 16 and 74 years having at least basic digital skills. 21% of the population have more than basic digital skills and 60% have at least basic content creation skills against EU averages of 26% and 66%, respectively. The share of ICT specialists in the workforce is lower than the EU average (3.9% compared to 4.5%). Cyprus reaches the EU average for female ICT specialists, who represent 19% of ICT specialists in the country. ICT graduates account for 2.7% of Cypriot graduates, compared to the EU average of 3.9%. Cyprus performs well in the share of enterprises providing ICT training which, at 25%, exceeds the EU average of 20%. These figures show that a change of pace is necessary to empower Cypriot citizens as a whole and provide the economy and society with enough ICT specialists to use and deploy advanced technologies.”</i></p>  |

<sup>11</sup> [http://www.moec.gov.cy/dde/katalogoi\\_sxoleion.html](http://www.moec.gov.cy/dde/katalogoi_sxoleion.html)

<sup>12</sup> [http://www.moec.gov.cy/dme/katalogoi\\_scholeion.html](http://www.moec.gov.cy/dme/katalogoi_scholeion.html)

<sup>13</sup> <http://www.moec.gov.cy/dmteek/index.html>

<sup>14</sup> [http://www.moec.gov.cy/idiotiki\\_ekpaidefsi/genikes\\_plirofories.html](http://www.moec.gov.cy/idiotiki_ekpaidefsi/genikes_plirofories.html)

<sup>15</sup> [https://archeia.moec.gov.cy/mc/605/annual\\_report\\_2021\\_en.pdf](https://archeia.moec.gov.cy/mc/605/annual_report_2021_en.pdf)

<sup>16</sup> <https://eurydice.eacea.ec.europa.eu/national-education-systems/cyprus/overview>

<sup>17</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi-cyprus>

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|   | <p>In addition, according to the Digital 2023 Cyprus report<sup>18</sup> it seems that while there were 1.14 million internet users in Cyprus at the start of 2023, with internet penetration at 90.9% of the total population, there were also 114,200 Cypriots (9.1%) who lacked internet access. Therefore, this indicates that there is still a percentage of the population with no internet access and who, as a result, cannot partake on the possibilities offered by it. Moreover, according to the DESI 2022 report, only 63% of Cypriot internet users were actively engaged in the use of e-government services, which is below the EU average of 65%. Therefore, Cyprus also needs to address this issue, since inadequate digital skills limit the possibility to engage in a wide range of online activities.</p>  |
| <p>Educational technology legislative and policy frameworks</p> | <p>The integration of digital technology within Cyprus's educational system is mainly supported by the 2020 Policy on Digital Education<sup>19</sup> led by the Ministry of Education, Sport and Youth (MoESY) as well as by the 2020 Strategy on the Digital Transformation of Education<sup>20</sup> developed by the Ministry of Research, Innovation and Digital Policy. Both highlight two main aspects:</p> <ol style="list-style-type: none"> <li>a. the development and use of digital technologies in the context of a digital educational ecosystem of high performance, as well as</li> <li>b. the development of digital competence (knowledge, skills, attitudes) at all educational levels. Both initiatives are also driven by the EU's digital competence frameworks, namely the Digital Competence for Citizens Framework (DigComp);<sup>21</sup> Digital Competence for Organisations Framework (DigCompOrg);<sup>22</sup> and the Digital Competence Framework for Educators (DigCompEdu).<sup>23</sup></li> </ol>   |
| <p>Teachers' digital competence</p>                             | <p>According to Eurydice (2019), Cyprus is in the minority of European countries where digital competence is not included in a teacher competence framework at the higher education level, initial training level, and in which notably, according to 2019 data, no teacher competence framework exists. Nonetheless, higher education courses supporting the development of varied, and selected, digital competences can be found in each of the university initial teacher education undergraduate programmes in Cyprus. These initial education training programmes at the university level in Cyprus are developed for pre-school and primary school teachers. However, the situation is different for secondary school teachers, who complete a university degree in their discipline and only receive pedagogical training, which includes a limited number of educational technology courses, just prior to being appointed to teach in schools and well after the completion of their university studies.</p> <p>The Cyprus Pedagogical Institute's (CPI) Department of Educational Technology offers several types of opportunities to develop in-service teachers' continuous professional development, including making available self-assessment tools, facilitating the creation of teacher networks, and offering various professional development modules during the academic year, at the Pedagogical Institute or at schools. The CPI also offers access to digital learning resources on several online platforms specifically designed for teachers.</p> <p>ICT is a separate subject in lower secondary education, but there is no dedicated time for this in primary education, where ICT integration in different subjects is decided at the</p> |

<sup>18</sup> <https://indd.adobe.com/view/90ab46cc-e068-40af-8f9b-4ee3bf926344?allowFullscreen=true&wmode=opaque>

<sup>19</sup> [http://www.moec.gov.cy/archeia/psifiaki\\_ekpaidefsi/05-cpi-athenamichaelidou.pdf](http://www.moec.gov.cy/archeia/psifiaki_ekpaidefsi/05-cpi-athenamichaelidou.pdf)

<sup>20</sup> [http://www.moec.gov.cy/archeia/psifiaki\\_ekpaidefsi/02-dmrid-kyriakoskokkinos.pdf](http://www.moec.gov.cy/archeia/psifiaki_ekpaidefsi/02-dmrid-kyriakoskokkinos.pdf)

<sup>21</sup> <https://www.schooleducationgateway.eu/en/pub/resources/publications/digcomp-22.htm>

<sup>22</sup> [https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg\\_en](https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en)


<sup>23</sup> [https://joint-research-centre.ec.europa.eu/digcompedu\\_en](https://joint-research-centre.ec.europa.eu/digcompedu_en)

level of the school or of the individual teachers. The integration of ICT in teaching at all levels, beyond the dedicated ICT subjects in lower secondary education, is not systematic.

The European Commission's Education and Training Monitor 2020 report<sup>24</sup> paints a mixed picture for the integration of technology by Cypriot teachers, reporting that even though teachers may use technology to prepare for class, ICT is poorly integrated when it comes to teaching and learning.

### 5.1.3 Case study 1 (CY1): Scaffolding primary school teachers' reflection and professional learning through a Professional Development programme

Case Study 1(CY1) examined the use of the SfT tool in the context of a Teacher Professional Development (TPD) programme for in-service primary education teachers, initiated by the researchers. The TPD programme had an extended duration as it lasted for three months (February-April 2023), and it was characterised by just-in-time scaffolding, supporting teachers to design and implement their personal professional plans for the development of their digital competence.

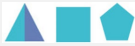
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| <p><b>CY1</b></p>  <p><b>Scaffolding primary school teachers' reflection and professional learning through a Professional Development programme</b></p> <p><b>Domain</b><br/>Professional development programme (in-service training)</p> <p><b>Setting</b><br/>University in-service training network</p> | <p><i>Description</i></p> <p>The Media, Cognition and Learning (MCL) Research group of the Cyprus University of Technology (CUT) announced a Teacher Professional Development (TPD) programme, comprised of a series of experiential workshops involving SELFIEforTEACHERS (SfT), addressed to individual teachers who wished to improve their digital competence. The MCL research group over the years has organised several TPD programmes aiming to advance the expertise of in-service teachers in relation to digital technologies and novel pedagogical approaches, supporting teachers in designing their professional learning.</p> <p><i>Recruitment</i></p> <p>Open call for participation</p> <p><i>Participants</i></p> <p>Thirteen in-service teachers completed the SfT tool (12 primary education teachers and one secondary education teacher)</p> <p>Nine primary education in-service teachers completed the SfT tool and participated in all activities</p> <p><i>Implementation</i></p> <p>1: Individual completion of SfT by the participating teachers – as a group-initiated individual self-reflection facilitated by the CUT researchers</p> <p>2: Teachers' positioning in relation to the group, using the aggregated averages</p> <p>3: Clustering of teachers in teams (as homogenous as possible), taking into account teachers' "needs" across the six areas of the SfT – each cluster focused on a specific area of SfT</p> <p>4: Co-design meetings at the university premises for the development of professional learning paths/actions plans by the teachers within each cluster</p> <p>5: Implementation of teachers' action plans (March-April 2023)</p> <p>6: Focus group with the participating teachers</p> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> </ul> |
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<sup>24</sup> <https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/index.html>

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| <p><b>Initiated by (stakeholder)</b><br/>Research team (university)</p> <p><b>Primary actors</b><br/>In-service teachers</p> <p><b>Education sector</b><br/>Primary education</p> <p><b>Implementation period</b><br/>February – April 2023</p> <p><b>Responsible body</b><br/>Cyprus University of Technology (CUT)</p> | <ul style="list-style-type: none"> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers, for the effective use of SfT to support teachers' development of their digital competences?</li> <li>- RQ5: How can an in-service Teacher Professional Development (TPD) programme support the affordances of SfT for teachers' reflection and professional learning? (Case-study specific RQ)</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Individual teacher interviews</li> <li>- Group and focus group interviews with teachers</li> <li>- Professional learning design plans</li> <li>- Teacher presentations</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers' perception of SfT</i></p> <ul style="list-style-type: none"> <li>- Overall, the teachers held positive perceptions regarding the usability of SfT.</li> <li>- Some terminology used was challenging for some teachers while completing the whole reflection exercise was also time demanding.</li> <li>- Teachers asked for more specific suggestions for follow-up to resources and activities.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- SfT tool supported teachers' self-efficacy of own digital competences and agency to act towards their improvement.</li> <li>- SfT helped teachers to realise that digital competence is a multi-level and multi-dimensional construct.</li> <li>- SfT helped teachers identify the actual level of their digital competence in a more objective and accurate way (per level and dimension).</li> <li>- SfT also increased teachers' motivation to improve their digital competence.</li> <li>- Sometimes teachers, instead of describing their digital competence, spoke about their digital practices.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Integration of SfT in scaffolded professional development programmes.</li> <li>- Guidance from mentors/coaches/experts and co-design.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Personal challenges include a lack of time and commitment, resistance to change, lack of confidence, and sometimes interest/curiosity.</li> <li>- Institutional challenges include a lack of equipment, lack of educational resources, and students' work overload.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SfT is considered a powerful tool to support teachers in identifying the level of digital competence and agency to act towards their improvement.</li> <li>- SfT should be situated in scaffolded and extended duration TPD contexts.</li> <li>- More specific feedback should be provided in the SfT feedback report and some of the content should be simplified.</li> <li>- Simplify some of the terminology used.</li> </ul> |
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#### 5.1.4 Case Study 2 (CY2): A self-driven initiative of an in-service teacher to introduce SfT in the school

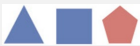
Case Study 2 (CY2) investigated a bottom-up effort of an in-service Media Studies teacher to integrate SfT into a private secondary education school for the digital empowerment of her colleagues. It also had an extended duration, and support was provided by the Media Studies teacher on demand.

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| <p><b>CY2</b></p>  <p>A self-driven initiative of an in-service teacher to introduce SfT in her school</p> <p><b>Domain</b><br/>School-based professional learning activities (peer learning / coaching) and school policy planning</p> <p><b>Setting</b><br/>Whole school</p> <p><b>Initiated by (stakeholder)</b><br/>School teacher (Media Studies teacher)</p> <p><b>Primary actors</b><br/>In-service teachers</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>February – April 2023</p> <p><b>Responsible body</b><br/>Cyprus University of Technology (CUT)</p> | <p><i>Description</i><br/>A self-initiated effort of an in-service media studies teacher to integrate SfT into a private secondary education school in Cyprus for the digital empowerment of the school teaching personnel. The teacher uses SfT with her colleagues to identify learning needs and plan professional learning activities.</p> <p><i>Recruitment</i><br/>Open call to all interested teachers at the school</p> <p><i>Participants</i><br/>The innovative teacher (ICT coordinator who initiated the exercise)<br/>The school principal<br/>Two teachers (Special Education teacher and Drama teacher)</p> <p><i>Implementation</i><br/>Stage 1: Pre-intervention<br/>- Development of an action plan for the integration of SfT in the school by the in-service teacher<br/>- Introduction of SfT to the school<br/>Stage 2: Intervention<br/>- Individual reflection on the SfT tool by the school teachers<br/>Stage 3: Post-intervention<br/>- School principal's/Faculty leaders' reflection and action planning for supporting the teachers' digital competence, considering the teachers' needs</p> <p><i>Research questions</i><br/>- RQ1: How do the teachers perceive SfT, in terms of usability and usefulness?<br/>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?<br/>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?<br/>- RQ4: What are the main conditions, enablers and barriers, for the effective use of SfT to support teachers' development of their digital competences?</p> <p><i>Data collection methods and type of data</i><br/>- SfT reflections (n=15 school teachers completed SfT)<br/>- Individual interviews with the innovative teacher<br/>- Individual interview with the teachers who proceeded with action plans<br/>- Interview with the school principal</p> <p><i>Key findings</i><br/><i>Teachers' perception of SfT</i><br/>- Overall, the teachers held positive perceptions regarding the usability of SfT, commenting that it is a powerful tool for reflection and planning.<br/>- Teachers saw SfT as very useful in understanding where the school stands collectively (group aggregated data).<br/>- The SfT tool motivated the teachers to take various actions towards enhancing their digital competence.<br/>- The tool's feedback is somewhat general; it should be more specific stating exactly which actions to take.</p> <p><i>Teachers' agency and efficacy</i><br/>- The SfT tool supported teachers' self-efficacy of own digital competences and agency to act towards their improvement.<br/>- SfT helped teachers to realise that digital competence is a multi-level and multi-dimensional construct.<br/>- SfT helped teachers identify the actual level of their digital competence in a more objective and accurate way (per level and dimension).<br/>- SfT also increased teachers' motivation to improve their digital competence.<br/>- Sometimes teachers, instead of describing their digital competence, spoke about their digital practices.<br/>- There was a narrower perspective of teachers' actions on improvement in the area of teaching and learning alone.</p> <p><i>Enablers</i></p> |
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|  | <ul style="list-style-type: none"> <li>- Supportive school leadership team.</li> <li>- Existing school structures (biweekly teacher meetings, personal/faculty/school development plans).</li> <li>- Teachers' openness and willingness to try out new things.</li> <li>- Experienced teachers (school ICT coordinator) supporting this effort.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Voluntary nature of the activity.</li> <li>- Lack of time, resistance to change, as well as lack of confidence.</li> <li>- Lack of educational resources, the lack of technical support and the school workload.</li> <li>- Curriculum, its nature and the volume of the learning content to be covered.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SFT is considered a powerful tool for reflection and planning.</li> <li>- It is significant to situate the SFT tool in scaffolded professional development contexts rather than simply using the tool for diagnostic purposes only or in non-scaffolded contexts.</li> <li>- Provide more specific suggestions for action.</li> </ul> |
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### 5.1.5 Case study 3 (CY3): Investigating the affordances of SFT using a disciplinary lens: Examining Cypriot Chemistry Education teachers' uptake of SFT

Case Study 3 (CY3) examined the uptake of SFT by Cypriot Chemistry Education teachers. This effort was initiated by university researchers in collaboration with the Chemistry Education Inspector, had limited duration, and in this case, no scaffolding was provided.

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| <p><b>CY3</b></p>  <p>Investigating the affordances of SFT using a disciplinary lens: examining Cypriot Chemistry Education teachers' uptake of SFT</p> <p><b>Domain</b><br/>Policymaker PD planning (policy planning)</p> <p><b>Setting</b><br/>National (Ministry of Education in collaboration with university)</p> <p><b>Initiated by (stakeholder)</b><br/>Policymaker (Ministry/university collaboration)</p> | <p><i>Description</i></p> <p>A policymaker uses SELFIEforTEACHERS (SFT) aggregate results to plan professional development actions. This case study reports on the potential of SFT as a tool to support secondary school teachers' digital competency as part of a university/Ministry collaboration. It builds on a long-standing collaboration: university researchers have been engaged in co-design efforts with in-service chemistry education teachers, on a voluntary basis, to introduce novel pedagogies to chemistry classrooms, which are also used as contexts of the teachers' professional development around these ideas. These efforts have found support from the Chemistry Education Inspector, who wishes to innovate the teaching of chemistry in Greek-Cypriot schools. In addition, and as a result of this collaboration, the university is one of the co-organisers of the annual Chemistry Education conference for secondary school chemistry teachers, which is primarily organised by the Ministry of Education, Sport and Youth.</p> <p><i>Recruitment</i></p> <p>Open call for participation by an official announcement by the Cyprus Ministry of Education, Sport and Youth (MoESY) and an invitation to CUT networks to lower secondary education schools (gymnasium) and/or upper secondary education schools (lyceums) in-service chemistry teachers.</p> <p><i>Participants</i></p> <p>The Chemistry Inspector (policymaker)<br/>Twenty-five in-service chemistry teachers completing SFT<br/>Five in-service teachers participating in the focus group</p> <p><i>Implementation</i></p> <p>Stage 1: Pre-intervention</p> <ul style="list-style-type: none"> <li>- Anonymous individual reflection using the SFT tool by chemistry teachers</li> </ul> <p>Stage 2: Focus group with five in-service chemistry teachers</p> <ul style="list-style-type: none"> <li>- Quick introduction to SFT and its goals</li> <li>- Focus group discussion with the in-service chemistry teachers regarding challenges, opportunities and ways forward regarding the planning of professional development actions</li> </ul> |
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| <p><b>Primary actors</b><br/>Chemistry in-service teachers<br/>Chemistry Inspector</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>March – April 2023</p> <p><b>Responsible body</b><br/>Cyprus University of Technology (CUT)</p> | <p>Stage 3: Interview with the Chemistry Education Inspector</p> <ul style="list-style-type: none"> <li>- Presentation of the SFT aggregate results</li> <li>- Reflective discussion with the Chemistry Inspector (e.g., affordances, challenges, next steps, etc.)</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SFT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SFT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SFT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SFT to support teachers' development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SFT reflections</li> <li>- Group and focus group interviews with teachers</li> <li>- Interviews with school leaders or inspectors</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- In general, SFT is easy to use.</li> <li>- SFT is positively perceived highlighting the affordances of the tool for diagnostic and planning purposes.</li> <li>- The use of the visual representations and the provision of a summary of the group results was positively appraised as it can easily provide an overview of the cumulative level of digital competence.</li> <li>- The EU login process as a prerequisite for accessing the SFT tool was perceived by some teachers as a complicated process.</li> <li>- Some teachers were confused when trying to select the group-initiated self-reflection versus the individual reflection.</li> <li>- Some teachers found the wording of some questions difficult.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- The SFT tool supported an enhanced self-awareness of the teachers' level of digital competence.</li> <li>- Teachers' high self-efficacy and own appraisal of their digital competence was in some cases challenged by the SFT results bringing disappointment.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Use of SFT in the context of a more systematic professional development can increase teachers' personal interest in participating.</li> <li>- Adoption of a bottom-up approach allowing chemistry teachers to define their own professional learning plans.</li> <li>- Development of a community of practice, structured around the tool and supported by the Inspector.</li> <li>- Concrete teachers' certification plan by the Ministry could provide an incentive structure with external incentives to encourage teachers.</li> </ul> <p><i>Barriers</i></p> <ul style="list-style-type: none"> <li>- Lack of offered seminars immediately relevant to chemistry teachers' teaching.</li> <li>- Lack of interest in participating in training programmes.</li> <li>- Chemistry teachers' limited pedagogical background.</li> <li>- Institutional and systemic challenges including a lack of educational resources, equipment, infrastructure, and technical support, as well as school workload and lack of time.</li> <li>- Chemistry national curriculum constrains.</li> <li>- Focus on digital competence in regard to the area of "teaching and learning".</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- The tool's aggregated data of a group can help obtain an understanding of teacher needs and planning and support decisions on follow-up actions.</li> <li>- Teachers need incentives to participate in TPD programmes and the use of SFT can provide such an incentive.</li> </ul> |
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### 5.1.6 Recommendations and lessons learnt from the three Cypriot case studies

SfT was, overall, positively received by teachers; its sustained use and long-term impact will depend on the ability to create the appropriate environment for its flourishing. The case study findings, especially given the different use cases in the same national context, are interesting in that they all independently point to some common conclusions with the following implications:

- SfT is considered a powerful tool for reflection and planning while it is significant to situate it within scaffolded professional development contexts rather than simply using the tool for diagnostic purposes only or in non-scaffolded contexts.
- More specific suggestions for action are recommended. The SfT tool should be enriched with more specific feedback and links to resources. Local, national and European-level repositories, which are frequently updated and kept up-to-date, will help those teachers who have the motivation to use SfT do so in a manner with more agency.
- If the goal is to use SfT at scale, a series of incentives (or a system combining extrinsic and intrinsic motivation structures), including making its use required and placing it within the national or regional accountability system, should be created.
- The SfT assessment should be coupled with activities that support teachers in developing and implementing professional development action plans around specific goals that they have prioritised.
- Scaffolding should be provided and should consistently focus on how the teachers' autonomy could be promoted and supported, so that gradually the teachers can assume greater responsibility for their professional learning and in improving their digital competence.
- Teachers approach the topic of professional development of digital competence to primarily improve their teaching capacity, ignoring or neglecting other aspects recognised by SfT. Thus, helping teachers understand the importance of improving their overall digital competence, according the SfT framework is imperative.
- Professional development programmes should be extended in duration, should provide just-in-time support and should engage teachers in goal setting, monitoring, implementing and evaluating feasible and realistic goals to improve specific digital competency areas in relation to their professional identity.

## 5.2 Greece (EL)

### EL

*DESI*: Low

*Geographic location*: Southern Europe

*Educational system*: Centralised

*Case study 1 (EL1)*: School leadership encourages SFT completion to support teachers teaching STEM topics identify their learning needs and plan professional development

*Case Study 2 (EL2)*: School leadership encourages SFT completion to support teachers teaching Humanities identify their learning needs and plan professional development

### 5.2.1 Summary of Greek case studies

The Greek case studies include two cases focusing on use of SELFIEforTEACHERS (SfT) by in-service teachers in public lower secondary schools in different disciplines. More specifically, Case Study 1 included ten educators teaching STEM subjects, and Case Study 2 included ten educators teaching Humanities subjects. A pre-test/post-test research design was adopted, and data were collected via two semi-structured interviews, one before and one after the completion of SfT. Data analysis indicated that SfT was overall well-received by the teachers of both case studies. They acknowledged the benefits of self-reflection on their own awareness of strengths and difficulties regarding digital educational technologies. All participants also appreciated the broad range of digital practices that SfT included, as well as the personalised feedback and recommendations for improvement. However, all teachers shared their feedback on some characteristics of SfT and made suggestions for its improvement. They also mentioned personal, institutional and systemic challenges that constrain their everyday professional practice with digital technologies at school, and emphasised the importance of well-organised and frequent professional development programs and of a culture of collaboration at school for the promotion of their digital competence. Despite some differences between STEM and Humanities teachers, the two groups shared more similarities than differences.

### 5.2.2 Country information

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| EL                  | Compulsory education in Greece lasts 11 years and extends from the ages of 4 to 15 including Gymnasio. Free education is provided to all citizens and at all levels of the state education system according to the constitutional law of the Greek State (Eurydice, 2023).   |
| General information | <p><i>Public schools:</i><br/>According to the latest available report of the Hellenic Statistical Authority referring to the academic year 2021-2022,<sup>25</sup> there were 17,488 pre-primary schools, 68,928 primary schools, 1,732 lower secondary schools (“gymnasia”) and 1,268 general upper secondary schools (“lykeia”). Moreover, there were 472 vocational upper secondary public schools, known as “Epagelmatika Lykeia – EPAL” and “Epagelmatikes Scholes”.</p> <p><i>Private schools:</i><br/>The Hellenic Statistical Authority also reports that for the 2021-2022 academic year, there were 817 private pre-primary schools, 159 primary schools, 109 lower secondary schools (“gymnasia”) and 103 upper secondary schools (“lykeia”).</p> <p><i>Teachers and students:</i></p> |

<sup>25</sup> <https://www.statistics.gr/en/statistics/-/publication/SED21>

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|                                     | <p>According to the latest available report of the Hellenic Statistical Authority for the academic year 2021-2022, there were 19,209 teachers and 177,372 students in pre-primary schools, 72,557 teachers and 584,032 students in primary schools, 39,815 teachers and 332,413 students in lower secondary schools, 23,566 teachers and 231,076 students in general upper secondary schools, and 13,828 teachers and 114,013 students in vocational upper secondary schools.</p>  |
| Educational governance              | <p>The Greek educational system is centralised and is governed by the Ministry of Education, Religious Affairs and Sports in relation to all fields, agencies and educational levels. The national educational policy and all key decisions related to long-term objectives but also to other important issues such as curricula content, staff recruitment and funding are taken by the Ministry. In addition, at the regional level, the regional education directorates oversee the implementation of the national educational policy, whereas at the local level, the directorates of primary and secondary education supervise all schools in their area, so that school units run smoothly (Eurydice, 2023).</p>   |
| Digital transformation in education | <p>In accordance with the centralised processes in relation to all key actions, any policy and initiative that is relevant to the digital transformation of primary and secondary education, including the development of in-service teachers' professional development (including ICT), is taken top-down from the Ministry of Education, Religious Affairs and Sports. Teachers' professional development on basic ICT knowledge and skills started during 2000-2004 (A-Level ICT Teacher training) and numerous national digital policies and action plans have been implemented for the primary and secondary education levels related to the development of digital educational content, teacher professional development, digital classroom infrastructure, and digital administrative systems (detailed information about the general policies for enhancing teachers' digital skills can be found at Perifanou and Economides (2021)).</p> <p>A major large-scale initiative was the "Digital School" strategy (2010, updated in 2016) aiming to support the effective integration of ICT in the daily educational practice of Primary and Secondary Education. The "Digital School" comprised actions along five axes:</p> <ul style="list-style-type: none"> <li>(i) "Enhancing school equipment with interactive whiteboards and laptops (digital classroom)";</li> <li>(ii) "Digital Educational Content";</li> <li>(iii) "Teacher Training";</li> <li>(iv) "Electronic Administration of Education";</li> <li>(v) "Horizontal Support Actions"</li> </ul> <p>(<a href="https://dschool.edu.gr">https://dschool.edu.gr</a>).</p>   |
| Teachers' digital competence        | <p>Specifically, for Teacher Training, the Ministry of Education assigned to the "Computer Technology Institute and Press – Diophantus" the implementation of the project titled "In-service Training of Teachers in the utilisation and application of Digital Technologies in the teaching practice" (B-Level ICT Teacher Training) within the framework of the Operational Program "Human Resources Development, Education and Lifelong Learning" (2014-2020). The project was organised in two levels of training:</p> <ul style="list-style-type: none"> <li>(i) The introductory training program titled "Introductory training for the utilisation of ICT in school" (B1-Level ICT Teacher Training). The program covered topics on how primary and secondary school teachers of all disciplines can use ICT in their educational practice, was organised in groups of teachers from related disciplines, had a duration of 36 hours for 12 weeks (three hours per week) and took place face-to-face in Teacher Training Support Centres all over the country. The teachers should have been certified in basic ICT skills (A Level ICT skills) before participating in this B1-Level ICT training, whereas the trainers were B-Level teachers' trainers in ICT.</li> <li>(ii) The "Advanced course for the utilisation and application of ICT in the teaching practice" (B2-Level ICT Teacher Training). The program had a duration of 42 hours of training for 14 weeks (three hours per week) plus 18 hours of "in-class practice". The participant teachers should have been certified in the B1-level ICT teacher training. The purpose of this program was not only to improve teachers' digital skills but also to empower them with methodologies and techniques on how to use ICT in their specific discipline in everyday educational practice. This course was particularly</li> </ul> |

popular during the pandemic since teachers faced great challenges to transform their face-to-face teaching to online teaching.

For the above trainings, an extensive six-month training program was organised in 2019 for 300 new B-Level teachers' trainers who were trained at University Teacher Training Centres. This training had a duration of 380 hours including synchronous, asynchronous and face-to-face meetings and was organised in groups of ten teachers having a similar background for 12 different disciplines/subjects: philology/language, physical sciences, mathematics, informatics, primary education, foreign language learning, arts, physical sciences and health, educational engineers, economy/management/social sciences, land professions, and special education. Highly qualified instructors experienced in the utilisation of ICT for educational purposes undertook the training of teachers and trainers. A certification exam was also required upon completion of the training programme (more details about the teachers' training in ICT in educational practice can be found at Perifanou and Economides (2021)).

In addition to the training programs that aimed to improve teachers' digital competence, Greek teachers were supported with numerous resources. These include open educational resources repositories (e.g., "Photodentro" <https://photodentro.edu.gr>), interactive school books (<http://ebooks.edu.gr/ebooks/>), educational platforms (the Digital Education Platform "e-me" for students and teachers (<https://e-me.edu.gr> and [https://e-me.edu.gr/s/eme/main/e-me\\_v3.0-ShortUserGuide\\_v2.1\\_el.pdf](https://e-me.edu.gr/s/eme/main/e-me_v3.0-ShortUserGuide_v2.1_el.pdf)), and the action "I participate" ([i-participate.gr](http://i-participate.gr)) for the promotion of best open educational practices generated by the teachers.

Moreover, teachers have the following important frameworks and tools available in Greek:

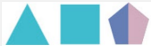
- (i) The European Framework for Digitally Competent Educational Organisations to promote effective digital-age learning (Kampylis, Punie, & Devine, 2015/2023 transl.) has been recently translated into the Greek language by the Hellenic National Documentation Centre and the Cyprus Pedagogical Institute.
- (ii) The European Digital Competence Framework for Educators (DigCompEdu), which was published in 2017 and describes a set of 22 competences that teachers, at all levels of education, should master in order to be digitally competent is available in Greek via an automatic translation.
- (iii) SELFIEforTEACHERS is available in Greek to support teachers in discovering their digital potential and finding out whether they are making the most of digital technologies for their own teaching and learning as well as for their learning (Broek, 2021; Economou, 2022).

It should be noted that all previous initiatives regarding teachers' training aiming to improve their digital competence were not compulsory but only optional. Occasionally, only a specific number of places for trainees was offered and, as a result, a number of teachers were not offered an ICT training opportunity. Moreover, there were no follow-up measures to further support trained teachers in their everyday practice and/or to evaluate their practices. The recent initiative for teachers' evaluation has included – among others – the use of ICT in teaching.

As far as SfT is concerned, at least to our knowledge, it seems that it is not very well-known among teachers and there is significant room for its dissemination in the Greek educational communities.

### **5.2.3 Case study 1 (EL1): School leadership encourages SfT completion to support teachers teaching STEM topics identify their learning needs and plan professional development**


Case study 1 (EL1) aimed to gain further insights about the SfT tool by in-service teachers who teach STEM topics in regular public lower secondary schools in Greece. Specifically, it aimed to respond to the four main research questions of the multi-case study providing a perspective of a Greek context.

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| <p><b>EL1</b></p>  <p>School leadership encourages SFT completion to support teachers teaching STEM topics identify their learning needs and plan professional development</p> <p><b>Domain</b><br/>School-based professional learning and planning of activities (in-service training)</p> <p><b>Setting</b><br/>Whole school (teacher network supported by a university)</p> <p><b>Initiated by (stakeholder)</b><br/>School leadership / university collaboration</p> <p><b>Primary actors</b><br/>In-service teachers</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>February – April 2023</p> <p><b>Responsible body</b><br/>Aristotle University of Thessaloniki</p> | <p><i>Description</i><br/>School leadership encourages SFT completion to support teachers teaching STEM topics identify their learning needs and plan professional development.</p> <p><i>Recruitment</i><br/>Open call for teacher participation within each of the two collaborating schools</p> <p><i>Participants</i><br/>Ten teachers teaching STEM subjects (six males and four females; three math teachers, four physics teachers, one chemistry teacher, one technology teacher and one biology teacher).</p> <p><i>Implementation</i><br/>A pre-test/post-test design was adopted to examine how the SFT feedback and teachers' own familiarisation with SFT and reflection experience may influence teachers' beliefs about their digital competences and their agency to act toward their further development.<br/>Teachers were examined twice, once before and once after the completion of SFT. In both phases, teachers were individually interviewed.<br/>Moreover, after the post-SFT test, participant teachers were asked to provide written responses to three open-ended questions assessing their perceived benefits and/or costs in completing SFT, their plans for activities related to the development of their digital competences, and specific strategies to realise them.<br/>Thus, the study design included four study phases and one preparatory phase:</p> <ul style="list-style-type: none"> <li>- Preparatory Phase</li> <li>- Phase 1: Pre-SFT (Meeting 1)</li> <li>- Phase 2: SFT completion</li> <li>- Phase 3: Post-SFT (Meeting 2)</li> <li>- Phase 4: Open-ended questions (three written questions 1-2 weeks after the post-SFT test)</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SFT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SFT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SFT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SFT to support teachers' development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SFT reflections</li> <li>- Individual teacher interviews</li> <li>- Future teacher plans</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- The great majority of teachers perceived SFT as a useful tool mainly in regards to their better understanding of their digital strengths and weaknesses.</li> <li>- For some teachers the tool was easy, clear and a positive experience. Others expressed challenges such as the tool being demanding, time-consuming and sometimes unclear or with difficult terminology.</li> <li>- Feedback would be more useful if it were more concrete, detailed and actionable.</li> </ul> <p><i>Teachers' Agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- The great majority acknowledged the self-reflection process of SFT in supporting their awareness of digital competence.</li> <li>- Some teachers were signed to a lower competence level than thought themselves to be, which in some cases caused disappointment.</li> <li>- Others perceived their SFT experience as beneficial and enriching, which made them better aware of their own level of digital competence as well as of the more advanced available choices for their personal improvement.</li> <li>- Any further activity to improve their digital competence after SFT completion would be the result of own initiative.</li> </ul> |
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|  | <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Teachers' positive attitude and initiative towards their own personal and professional development.</li> <li>- Increase students' interest and their engagement during the class.</li> <li>- Supportive conditions for professional learning including the TPD programmes organised by the Ministry of Education.</li> <li>- Teachers' digital competence as a prerequisite for position and promotion.</li> <li>- A common vision with respect to technology in education, culture of collaboration, teachers' communities of learning.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Hindrances to professional learning included the limited availability of professional development courses on technology for specific disciplines as well as the lack of their continuity.</li> <li>- Hindrances related to professional learning include limited collaboration with school advisors and a lack of culture of collaboration.</li> <li>- No compulsory professional development courses.</li> <li>- Restrictions and problems in schools involving technical equipment and infrastructure.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SFT is perceived as a useful tool mainly in regard to a better understanding of digital strengths and weaknesses.</li> <li>- The importance of having in place a common vision regarding technology in education, a culture of collaboration and teachers' communities of learning.</li> <li>- Educational policies to be introduced at a systemic level related to teachers' digital competences.</li> <li>- Provision of more concrete feedback and specific recommendations associated with available educational resources tailored to the country.</li> </ul> |
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### 5.2.4 Case study 2 (EL2): School leadership encourages SFT completion to support teachers teaching Humanities identify their learning needs and plan professional development

Case study 2 (EL2) aimed to gain further insights into the SFT tool by in-service teachers who teach STEM topics in regular public lower secondary schools in Greece. Specifically, it aimed to respond to the four main research questions of the multi-case study providing a perspective of the Greek context.

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| <p><b>EL2</b></p>  <p>School leadership encourages SFT completion to support teachers teaching Humanities identify their learning needs and plan professional development</p> | <p><i>Description</i></p> <p>School leadership encourages SFT completion to support teachers teaching Humanities identify their learning needs and plan professional development.</p> <p><i>Recruitment</i></p> <p>Open call for participation within each of the two collaborating schools</p> <p><i>Participants</i></p> <p>Ten teachers teaching Humanities (nine females and one male; four philologists, two music teachers, two foreign languages, one religion, one social sciences).</p> <p><i>Implementation</i></p> <p>A pre-test/post-test design was adopted to examine how the SFT feedback and teachers' own familiarisation with SFT and reflection experience may influence teachers' beliefs about their digital competences and their agency to act toward their further development.</p> <p>Teachers were examined twice, once before and once after the completion of SFT. In both phases, teachers were individually interviewed.</p> <p>Moreover, after the post-SFT test, participant teachers were asked to provide written responses to three open-ended questions assessing their perceived benefits and/or costs in completing SFT, their plans for activities related to the development of their digital competences, and specific strategies to realise them.</p> |
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| <p><b>Domain</b><br/>School-based professional learning and planning of activities (in-service training)</p> <p><b>Setting</b><br/>Whole school (teacher network supported by a university)</p> <p><b>Initiated by (stakeholder)</b><br/>School leadership / university collaboration</p> <p><b>Primary actors</b><br/>In-service teachers</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>February – April 2023</p> <p><b>Responsible body</b><br/>Aristotle University of Thessaloniki</p> | <p>Thus, the study design included four study phases and one preparatory phase:</p> <ul style="list-style-type: none"> <li>- Preparatory Phase</li> <li>- Phase 1: Pre-SfT (Meeting 1)</li> <li>- Phase 2: SfT completion</li> <li>- Phase 3: Post-SfT (Meeting 2)</li> <li>- Phase 4: Open-ended questions (three written questions 1-2 weeks after the post-SfT test)</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers, for the effective use of SfT to support teachers' development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Individual teacher interviews</li> <li>- Future teacher plans</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers' perception of SfT</i></p> <ul style="list-style-type: none"> <li>- The great majority of teachers perceived SfT as a useful tool mainly in regards to their better understanding of their digital strengths and weaknesses.</li> <li>- The majority found it quite well organised, easy to navigate and considered the report easily interpreted.</li> <li>- Some difficult terminology.</li> <li>- Collaborative opportunities that the tool provided since they had fruitful discussions with their colleagues.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- The great majority acknowledged the self-reflection process of SfT in supporting their awareness of digital competence.</li> <li>- Teachers exhibited a positive attitude towards improving their digital skills, and the SfT seems to have contributed to their growth.</li> <li>- Almost all of them mentioned how completing the SfT influenced their perception of themselves; primarily observed in their professional life as educators, while their beliefs about their digital competence in their personal life remained mostly unchanged.</li> <li>- Some teachers were signed to a lower competence level than they thought themselves to be, which in some cases caused disappointment.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Increase in students' interest and their engagement during the class.</li> <li>- Supportive conditions for professional learning including the TPD programmes organised by the Ministry of Education.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- No compulsory professional development courses.</li> <li>- Lack of organised professional training and support, the lack of free time, as well as the lottery-based established procedure for participation in the official cycle of the Ministry's seminars on digital skills development.</li> <li>- Limited hardware resources and poor internet connection in schools.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SfT is perceived as a useful tool mainly in regard to a better understanding of digital strengths and weaknesses.</li> <li>- Provision of well-organised TPD programmes at central level with the use of SfT is a need.</li> <li>- Educational policies and funding to be introduced at systemic and school level are needed.</li> </ul> |
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### **5.2.5 Recommendations and lessons learnt from the two Greek case studies**

Based on the findings of the two case studies, some recommendations and lessons learnt follow below:

- SfT can be better approached within a holistic/systemic approach where teachers are seen within the contexts in which they live and work. These contexts set affordances and restrictions and affect teachers' motivation to improve, their agency to act and the applicability of their learning plans. Within such an approach, SfT may be seen as the lever to mobilise not only the teachers themselves, but also school administrators and educational policymakers to set-up more frequent well-organised professional development programs for teachers. SfT could be a critical component in continuing professional development programmes for teachers that would support both their digital competence and their efficacy beliefs about their digital competence in relation to teaching and their professional role in general. These benefits could be realised at an individual level but also at a collective level via the collaboration opportunities that will be established among teachers.
- Teachers' increased awareness of their digital competence via SfT is critical and necessary but not sufficient. Policymakers should continuously support schools' technical infrastructure and necessary equipment so that teachers can feel that their technological advancement is worthwhile, can better implement their digital practices, and contribute to the digital school transformation.
- Future revisions of SfT would be useful taking into consideration teachers' subjective experiences and recommendations concerning the language used and terminology, the scope of digital skills presented, and the feedback provided.

## 5.3 Spain (ES)

### **ES**

*DESI*: High

*Geographic location*: Western Europe

*Educational system*: Decentralised

*Case study 1 (ES1)*: Pre-service teachers use SfT to analyse their learning about digital competence for education during their studies

*Case Study 2 (ES2)*: In-service computer science department uses SfT as a trigger to analyse their digital competence for education and their further development

### 5.3.1 Summary of Spanish case studies

The Spanish case studies explored the use of the SfT tool with different groups of teachers that consider the contextualised dimension of teachers' agency for profiles situated at the extremes of the average community, in terms of professional experience and estimated proficiency in general digital competence. The first case study focused on the use of SfT by pre-service teachers undergoing a compulsory master's program for secondary school teaching, specialising in life sciences and language teaching, while the second case study focused on the use of SfT by in-service teachers in the computer science department of a vocational education centre. Through the individual use of SfT and subsequent collaborative processes guided by focus groups, the participants engaged in productive reflection and co-designed their professional learning opportunities based on their assessed digital competency levels. The process showed differences according to the types of profiles involved. Different judgements and decisions emerged from their situated contexts, as well as different capacities to mobilise resources to enact their agency, in order to materialise the engagement achieved with the use of SfT. As a conclusion, both case studies lead to recommendations for the SfT tool and its use.

### 5.3.2 Country information

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| ES                     | In Spain, ten years of compulsory and free-of-charge education is offered, divided in two levels: Primary education (Grades 1 to 6, between 6 and 12 years) and compulsory secondary education (between 12 and 16 years old).   |
| General information    | In the year 2022-2023, there were a total of 4,869,088 students in compulsory levels (2,783,606 in primary education and 2,085,482 in compulsory secondary education). The total number of general education centres (including vocational training) is 28,735 (19,247 public, 9,488 private and charter ("concertadas") schools. These centres employ a total of 770,018 teachers, 72.2% of them in public centres. <sup>26</sup>            |
| Educational governance | In Spain, the governance of the educational system is characterised by a dual structure, involving both national and autonomous regional levels. The central government assumes the responsibility of establishing the overall framework and guidelines for education, while the regional governments enjoy a considerable degree of autonomy in the implementation and management of education policies within their respective territories. |

<sup>26</sup> <https://www.educacionfpydeportes.gob.es/dam/jcr:27162db1-c2b3-4f9c-a8fa-a17731a561f8/datos-y-cifras-2023-2024-espanol.pdf>

Digital transformation in education – teachers' digital competence

The Sectoral Conference of Education ("Conferencia Sectorial de Educación") serves as a platform for representatives from the Ministry of Education and Vocational Training (MEFP) at the central level and the regional governments to convene and engage in discussions aimed at coordinating education policies and initiatives.

The need for the development of digital competence in education has long been recognised within the educational system. The challenges presented by the COVID-19 pandemic highlighted the significant gaps that individuals, schools, and the overall system face in terms of digital competence, particularly in the context of education. In July 2020, the Sectoral Conference of Education released an agreement on the Spanish common framework for digital competence for teachers, published by INTEF and which followed the guidelines established by the European Framework DigCompEdu with some subsequent adaptations in May 2022 (combining DigCompEdu and SELFIEforTEACHERS). Additionally, initial steps were taken towards the establishment of common evaluation guidelines for accrediting and recognising teachers' digital competence throughout the country. The procedures for formal recognition, published in July 2022, sparked a robust debate and generated significant activity within the educational policymaking and professional communities. One of the landmark actions was the National Plan of Digitalisation and Digital Competence of the Educational System of the Ministry of Education and Vocational Training, part of the ambitious National Plan of Recovery, Transformation and Resilience supported by the Next Generation EU program. This plan sets the objective to have, by the end of June 2024, a minimum of 92,868 teachers with accredited digital competence, and 3,541 educational centres which have developed and reviewed their digital strategy.


For the specific case of Catalonia, the Statute of Autonomy grants the Government of Catalonia exclusive competence in the continuous training and professional development of teaching staff and other education professionals, as well as the approval of guidelines for action in the field of human resources. In May 2002, the common Spanish framework for teachers' digital competence, agreed at the national level, was directly adopted. In February 2023, the modalities and procedures for accrediting the levels of digital teaching competence were published, which also allow for recognition at the national level. The procedures for the accreditation of the digital competence are: (i) degrees enabling to work as a teacher in the formal public system; (ii) certification of training activities, recognised by the Department of Education, involving digital technologies; (iii) passing an accreditation test; (iv) evaluation through the observation of professional practice; and (v) analysis and validation of evidence of implementation, adequate to the corresponding level, along the individual academic and professional path.

The publication describing the procedures for the accreditation of digital competence also established the relationship between this accreditation and the existing official degrees that qualify for the teaching profession, where the competence will be automatically accredited with the diploma. This aspect pushed all institutions training pre-service teachers to more formally and coherently address digital competence for education in the programmes for pre-service teacher training. The general degrees related to primary education have to start already in 2024-2025, and the postgraduate degrees required to teach in secondary and vocational training centres have the academic year 2025-2026 as a deadline. In these postgraduate degrees, the candidates hold a previous degree in their area of specialisation. This specialisation can range from degrees where students finish with a high level of general digital competence, as it is their core area of study (such as computer science and related disciplines), to degrees where no level of digital competence is automatically recognised, such as in the life sciences, the humanities and the social sciences, where general digital competence is not a specific subject of their education.

This publication was followed in March 2023 by an open call to fund the Catalan side of the broader National Plan of Digitalization and Digital Competence of the Ministry of Education, to support the involvement of local entities, companies, associations and universities in the accreditation of the digital competence of teachers, the development of strategic plans by educational centres, and the promotion of activities that support an advancement in the uptake of the Digital Competence Framework.

### 5.3.3 Case study 1 (ES1): Pre-service teachers use SfT to analyse their learning about digital competence for education during their studies

Case study 1 (ES1) focused on the use of SfT by pre-service teachers undergoing a compulsory master's program for secondary school teaching, specialising in life sciences and language teaching. Through the individual use of SfT and subsequent collaborative processes guided by focus groups, the participants engaged in productive reflection and co-designed their professional learning opportunities based on their assessed digital competency levels. The case study aims to provide insights into how to support pre-service teachers' agency to act upon the SfT feedback and plan for the development of their digital competence.


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| <p><b>ES1</b></p>  <p>Pre-service teachers use SfT to analyse their learning about digital competence for education during their studies</p> <p><b>Domain</b><br/>Initial teacher education (pre-service training)</p> <p><b>Setting</b><br/>University training programme/classes</p> <p><b>Initiated by (stakeholder)</b><br/>University</p> <p><b>Primary actors</b><br/>Pre-service teachers</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>April 2023</p> | <p><i>Description</i><br/>Pre-service teachers use SfT to analyse their learning about digital competence for education during their studies.</p> <p><i>Recruitment</i><br/>Call for participation of teachers enrolled in the UPF postgraduate program for secondary education teaching.</p> <p><i>Participants</i><br/>Seven pre-service teachers enrolled in the Universitat Pompeu Fabra (UPF) postgraduate programme for secondary education teaching. Eleven of them carried out the first step (autonomously undergoing the SfT self-reflection). Eight participated in any of the two first focus groups (which represent the final sample of the case study), although one of them did not complete all the steps in the study (including a second focus group and a final individual report).</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- <i>Pre-session</i>: Enrolled teachers were invited to complete the SfT tool assessment without any prior indication. Following this, they individually shared their general feedback and outlined tentative actions to be taken through the initial individual survey.</li> <li>- <i>Session 1</i>: A first focus group session was conducted (FG1). The first part of the session covered aspects associated with the use and usefulness of SfT while the second part focused on topics regarding digital competence.</li> <li>- <i>Intermediate session</i>: One week after the first session, the participants attended a lecture covering topics related to digital competence for education.</li> <li>- <i>Session 2</i>: One week after the intermediate session, the participants attended a second focus group (FG2) to discuss their experience with SfT and areas of opportunity for professional development. Participants were invited to start selecting and discussing specific areas of improvement and to establish a personal plan of training actions.</li> <li>- <i>Final individual report</i>: The participants were asked to work individually on a final report to include their perception about usability and usefulness of the SfT tool and their personal plan and a prioritisation of training actions. They were given two weeks to complete this assignment.</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers' development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Group and focus group interviews with teachers</li> <li>- Final individual survey</li> </ul> |
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| <p><b>Responsible body</b><br/>Universitat Pompeu Fabra, Barcelona</p> | <p><i>Key findings</i></p> <p><i>Teachers' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- Organised structure, relevant content and examples.</li> <li>- Certain improvements are needed, especially including external links (e.g., direct access to educational resources) for specific, actionable feedback.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- Help in understanding current digital competence, assessing improvement areas, and planning professional development.</li> <li>- Teachers became more aware of the broader aspects of digital competence in education through the tool's assessment.</li> <li>- Some teachers felt motivated and saw room for improvement, others felt disappointed with their results.</li> <li>- Teachers were engaged in critically assessing their digital capabilities, identifying limitations and recognising areas for improvement.</li> <li>- Pre-service teachers found "a world to see and do" in digital practices.</li> <li>- SFT stimulated a continued reflection process, leading participants to extend discussions on topics of interest.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Going through the self-assessment process and the associated reflection, as well as receiving structured feedback after completion was overall reported by participants as providing incentives to create a higher awareness of the global dimension of the digital competence in education and the need to further develop the associated set of skills.</li> <li>- A major enabler for its effective use would be to have it inserted into a collaborative process, such as the one conducted with the case study, or within a formal training program, such as the master's degree they are pursuing.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Time constraints affecting teachers' motivation</li> <li>- Accreditation of digital competences</li> <li>- SFT to be conducted at a systemic level</li> <li>- Absence of professional support</li> <li>- The tool not recognising the diversity of profiles of work as teachers</li> <li>- In the case of a teacher conducting SFT individually, there are concerns about the capacity of the process to result in clear future development paths and learning.</li> <li>- The SFT tool provide suggestions; encouragement of the "novice teachers" remains at the level of the training they have.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SFT can help in understanding current digital competence, assessing improvement areas, and planning professional development.</li> <li>- Embedding the reflection process in collaborative activities or within formal training activities, in order to allow teachers to enrich the reflection process, especially in those aspects where they lack the previous knowledge to trigger the process by themselves.</li> <li>- Link the feedback provided with actionable information, such as direct access to resources which expand the feedback, and more illustrative examples.</li> </ul> |
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### **5.3.4 Case study 2 (ES2): In-service computer science department uses SFT as trigger to analyse their digital competence for education and their further development**

Case study 2 (ES2) focused on the use of SELFIEforTEACHERS (SfT) by in-service teachers in the computer science department of a vocational education centre in the context of the starting accreditation process of digital competence for education by the Catalan Government. In this process, all in-service teachers, irrespective of their previous background, have to carry out the needed courses

and requirements for their digital competence. This case study will report on the use of SfT by in-service teachers with a high digital competence (with a background in computer science or equivalent) who have the commitment to jointly revise their digital competence and plan for future years. In addition, the promotion of an advanced digital competence of their students is in itself the main objective of their teaching. The case study aims to provide insights into how to better support the agency of in-service computer science teachers in further developing their digital competence in their teaching, to enhance its quality and improve the outcomes of the students. Through the individual use of SfT and subsequent collaborative processes guided by focus groups, the participants engaged in productive reflection and co-designed their professional learning opportunities based on their assessed digital competency levels.

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| <p><b>ES2</b></p>  <p><b>In-service computer science department uses SfT as trigger to analyse their digital competence for education and their further development</b></p> <p><b>Domain</b><br/>Master's programme (in-service training)</p> <p><b>Setting</b><br/>University master's programme/classes</p> <p><b>Initiated by (stakeholder)</b><br/>University</p> <p><b>Primary actors</b><br/>In-service teachers</p> <p><b>Education sector</b><br/>Secondary education</p> <p><b>Implementation period</b><br/>April 2023</p> <p><b>Responsible body</b><br/>Universitat Pompeu Fabra, Barcelona</p> | <p><i>Description</i><br/>In-service computer science department uses SfT as a trigger to analyse their digital competence for education and their further development.</p> <p><i>Recruitment</i><br/>University network of educators were informally surveyed for their interest in participating.</p> <p><i>Participants</i><br/>Five in-service teachers with a computer science or equivalent background, members of the same vocational school computer science department (four men and one woman, between 23 and 51 years of age).</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- <i>Pre-session:</i> Two weeks before session 1, in-service teachers were invited to complete the SfT tool assessment without any prior indication. After that, they individually reported their general feedback and tentative actions to be done with the feedback provided through the initial individual survey.</li> <li>- <i>Session 1:</i> A first focus group session was conducted (FG1). The first part of the session covered aspects associated with the use and usefulness of SfT while the second part focused on topics regarding digital competence.</li> <li>- <i>Intermediate session:</i> One week after session 1, the participants attended a lecture covering topics related to digital competence for education.</li> <li>- <i>Session 2:</i> One week after the intermediate session, the participants attended a second focus group (FG2) to discuss their experience with SfT and areas of opportunity for professional development. Participants were invited to start selecting and discussing specific areas of improvement and to establish a personal plan of training actions.</li> <li>- <i>Final group report:</i> The participants were asked to work collaboratively on a final report to include their perception about usability and usefulness of the SfT tool and their collective plan of action (as members of the same department) and a prioritisation of training actions. They were given two weeks to complete this assignment.</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers' development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Group and focus group interviews with teachers</li> <li>- Final group report</li> </ul> |
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|  | <p><i>Key findings</i></p> <p><i>Teachers' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- Teachers found the SFT tool user-friendly, with an intuitive interface that allowed for effective navigation, and appreciated the structure and design.</li> <li>- Teachers perceived a good organisation in the presentation of questions, while some of them appreciated the clear feedback.</li> <li>- Some statements may need improved clarity and added examples.</li> <li>- SFT facilitated the participants' self-reflection on their digital daily practices.</li> <li>- The personal advice and suggestions provided by the assessment were appreciated, which provide an understanding of the current digital practices.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- The tool provided advice and enhanced action.</li> <li>- SFT initiated discussions in the group reached a consensus that merely possessing digital skills is not equivalent to having the required digital competence for effective teaching.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- The integration of SFT into the teachers' training programme and professional development processes.</li> <li>- Positive perception of digital tools and education.</li> <li>- Collaborative group reflections over SFT results.</li> <li>- Self-awareness and motivation.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Lack of motivation might hinder effectiveness.</li> <li>- Teachers might have limited awareness of digital competence or a misconception about their level of digital competence, which might condition the positive or negative attitudes towards the received feedback.</li> <li>- Curricula, necessary resources and technical support.</li> <li>- Tool complexity.</li> <li>- Resistance to using digital tools in teaching practices.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SFT supports teachers in critically assessing their teaching practices; moreover, the SFT results are relevant for enhancing their digital awareness and taking action based on the received feedback.</li> <li>- Importance of integrating SFT into teachers' education and training, enabling teachers to reflect on their digital competence levels from the beginning of their training and career.</li> <li>- Promote collaborative self-assessment processes for professional learning.</li> <li>- Incorporate digital competence into curricula, provide necessary resources and technical support by different levels, including the European Union, countries, regions, institutions.</li> <li>- Provide more specific guidance and particularly integrate external resources in the tool.</li> </ul> |
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### 5.3.5 Recommendations and lessons learnt from the two Spanish case studies

Based on the findings of the two case studies, the main recommendations and lessons learnt are presented below:

— Adapt and personalise

Allow the self-assessment process to adapt to the competence level of the user. This may include the vocabulary and examples available, but also the number of questions shown.

Evolve towards offering more personalised support and resources to address individual needs and specific competence levels. This may include actions such as (i) the capacity to share assessment results at an individual or group level with the local bodies

responsible for promoting the professional development of teachers, (ii) targeted coaching and support to individuals or groups, or (iii) online training modules focusing on specific competence levels and topics.

— Enrich content and feedback

Enrich the whole process to better illustrate the relations between digital competence and educational outcomes to help teachers assess their competence level more effectively, both in terms of digital skills and of their ability to translate these skills into educational practice. Additional explanations at the different areas, topics and performance levels may be offered, to help users better understand some aspects of the result, such as: the implications of advancing levels for their educational practice, or the implications of not developing their skills; the type of learning required to advance (technical or educational); the effort required for that learning; and examples that illustrate the improvements in their educational practice (such as specific learning designs).

— Promote collaborative self-assessment processes

Foster collaboration among teachers through professional learning communities or online platforms where they can share experiences, resources and best practices related to specific competence levels and topics.

Foster the elaboration and dissemination of good practices about the use of SfT in training programs aiming at the improvement of the digital competence of teachers.

## 5.4 Finland (FI)

### **FI**

*DESI*: High

*Geographic location*: Northern Europe

*Educational system*: Decentralised

*Case study 1 (FI1)*: School leadership uses SfT and the aggregated data it can provide to reflect on teachers' current needs and plan training actions at the school

*Case Study 2 (FI2)*: School leadership initiates SfT as a starting point for teachers' professional learning and development of their digital competence.

### 5.4.1 Summary of Finnish case studies

The Finnish case studies include two cases representing a whole-school approach to the use of SELFIEforTEACHERS (SfT). The aim of Case study 1 was to investigate the perspective of a school leadership team in using SfT to advance digital practices and collegial development work at the whole-school level. Case study 2 focused on teachers' perceptions of using SfT to reflect on digital competence and practices from both an individual teacher and whole school perspective. Both case studies were conducted at the same school, where the central event was a teacher workshop. During the workshop, teachers completed the SfT reflection and compiled their proposals regarding the development needs associated with digital practices in the school through working in groups; these groups discussed areas for improvement and created a list of their collective proposals in a shared online presentation slide. The results of the workshop were later briefly introduced to the participants at a school-level training event. In Case study 1, the schools' leadership team was interviewed both before and after the teacher workshop. In Case study 2, the data consisted of the workshop outcomes (aggregated SfT results, list of suggestions for improving the schools' digital practices made by three teacher teams) and observations from both school events as well as a group interview with teachers. The results indicate that SfT works well as a reflection tool for the whole school if appropriately organised. However, the participants felt that current challenges in using digital technology in the school do not relate to teachers' digital competence or their willingness to develop their competence and practices, but rather to contextual and institutional factors concerning technical infrastructure and city-level support mechanisms. Sharing and collaborating between teachers was considered important.

### 5.4.2 Country information

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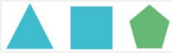
General information

Compulsory education in Finland lasts 12 years and extends from the ages of 7 to 18. It includes nine-years of primary and lower secondary education (comprehensive school), and upper secondary education, which is either general upper secondary education or vocational education and training. Compulsory education is free of charge. Comprehensive schools are mainly maintained by the local authorities (municipalities). Less than two per cent of comprehensive school pupils go to a private or state school. For further information, see <https://okm.fi/en/education-system>. There are 2014 comprehensive schools, 330 general upper secondary schools and 76 vocational schools (<https://stat.fi/en/publication/cln4f327p2b060avx6j4v2t2z>). According to the statistical data of Statistics Finland (<https://stat.fi/en/publications>), there were 551,900 comprehensive school pupils, 110,600 general upper secondary school students and 347,700 students in vocational education in Finland in 2023.

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| Educational governance   | <p>According to Eurydice (2023), differences between schools are small in Finland and the quality of teaching is generally high; education is free, local autonomy is high and most of the funding comes from local budgets. Municipalities serve as local education providers responsible for establishing and operating educational institutions. While they do receive central government transfers to cover costs, more than two-thirds of the financing for education comes from the municipalities' own funds. This significant reliance on local funding can potentially result in disparities between municipalities and a reduction in overall equality. For more information on the financing of general education in Finland, you can refer to <a href="https://okm.fi/en/financing-of-general-education">https://okm.fi/en/financing-of-general-education</a>).</p>  |
| Digital transformation in education – teachers' digital competence | <p>Current key documents guiding schools with respect to digitality are the national curricula for comprehensive school (Opetushallitus, 2014) and upper secondary school (Opetushallitus, 2019). All schools follow the national core curriculum, but it leaves room for local variations. Each municipality applies the national curriculum to make a municipality-specific curriculum and each school can add school-specific details to it. Therefore, individual schools and teachers have much freedom in designing their own curricula and instruction.</p> <p>In Finland, the teachers' collective labour agreement determines that each teacher has to participate in some training or planning events yearly (see, e.g., <a href="https://www.oaj.fi/tyoelamaopas/tyoaika/kunnalliset-peruskoulut/">https://www.oaj.fi/tyoelamaopas/tyoaika/kunnalliset-peruskoulut/</a>). These so-called "VESO days" are planning and training days in which full-time teachers at elementary schools, general upper secondary schools and vocational upper secondary schools, who are employed for at least the entire academic year, are obliged to participate during the academic year. There are three six-hour VESO days each year. Municipalities often organise some of the yearly VESO days centrally, but schools can also arrange their own events, or sometimes individual teachers participate in other in-service training events to fulfil this obligation. These VESO days can be used for updating teachers' digital competence, but that is only one of the possible topics that municipalities and schools choose.</p> <p>To summarise, due to the strong self-governance of municipalities and schools in Finland, there are no general regulations on how to ensure digital resources for schools or to support teachers' digital competence, and there is no up-to-date centralised data available about the current situation.</p> <p>According to Mannerström et al. (2018), investments in Finland both on the national and local levels in supporting students' digital competence have probably reduced differences between students' competence. However, in their recent research report, Tanhua-Piironen et al. (2020) concluded that there is much variation in the possibilities of Finnish schools to utilise digital teaching and learning opportunities. Test results of their study indicate that teachers' and students' digital competence have not recently increased, even though development has taken place according to teachers' self-reports. For testing teachers' and students' digital competence, the ICT skill test developed at the University of Turku was used, a test which is not publicly available (the task descriptions of the ICT skill test tasks are attached in Appendix 1 of Tanhua-Piironen et al., 2020). For collecting self-evaluation data from teachers, the researchers used the Opeka survey tool (<a href="https://opeka.fi/en">https://opeka.fi/en</a>), which was developed at the University of Tampere and is used widely in Finnish schools and municipalities. The report by Tanhua-Piironen et al. (2020) concluded that tutor activity in addition to well-organised in-service teacher training has improved teachers' confidence in their digital skills.</p> <p>In the government period 2019-2023, the Finnish Ministry of Education launched a "New literacies" programme whose results have now been published as a Framework for Digital Competence (Opintopolku, 2023) to support schools and teachers in implementing the national core curriculum related to digital transformation. The framework has been published in Finnish, Swedish, English and Sami languages. In April 2023, the Finnish Ministry of Education and Culture (2023) published the Guidelines for the Digitalization of Education and Training 2027, which will create a strategic basis for promoting the digitalisation of education in the future.</p> |

### 5.4.3 Case study 1 (FI1): School leadership uses SfT and the aggregated data it can provide to reflect on teachers' current needs and plan training actions at the school

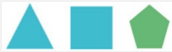
The aim of case study 1 (FI1) was to investigate the perspective of a school leadership team in using SfT in advancing digital practices and collegial development work at the whole-school level. A workshop for all teachers in the school was organised in collaboration with an external researcher mentor and the school leadership team, in which all teachers answered the SfT survey and had reflective discussions. The school leadership team aimed at using the workshop outcomes and aggregated SfT results to reflect on the current needs of the teacher community and to plan future development and training actions concerning digitality inside the school.

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| <p><b>FI1</b></p>  <p>School leadership uses SfT and the aggregated data it can provide to reflect on teachers' current needs and plan training actions at the school</p> <p><b>Domain</b><br/>School-based professional learning and planning of activities (in-service training)</p> <p><b>Setting</b><br/>Whole school</p> <p><b>Initiated by (stakeholder)</b><br/>School leadership</p> <p><b>Primary actors</b><br/>School leadership<br/>In-service teachers</p> <p><b>Education sector</b><br/>Primary education</p> | <p><i>Description</i><br/>School leadership uses SfT and the aggregated data it can provide to reflect on teachers' current needs and plan training actions at the school.</p> <p><i>Recruitment</i><br/>The researchers knew the principal from previous collaboration activities and told him about SfT and asked about his interest in using SfT in the school.</p> <p><i>Participants</i><br/>Members of the school leadership team: the principal, the vice principal (who is also a class teacher), and three teachers who were team leaders of the established grade-level teacher teams (grades 1–2, 3–4 and 5–6) in the school.</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- An online meeting with the principal (45 minutes): introducing SfT as well as defining goals and plans for the overall process and the teacher workshop (March 2023)</li> <li>- An online meeting and pre-interview for the leadership team (1h and 8 minutes): introducing SfT, making final plans for the workshop and conducting the pre-interview (March 2023)</li> <li>- Conducting the workshop in the school for all teachers (1.5 hours): introducing SfT, completing the SfT survey by the teachers, group work for defining development needs in the school's digital practices (April 2023). Also the members of the leadership team, excluding the principal, participated in the workshop as participants because they were class teachers in the school.</li> <li>- An online meeting and post-interview for the leadership team (1h and 7 minutes): examining and evaluating the workshop outcomes for further actions and conducting the post-interview (May 2023)</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers' development of their digital competences?</li> <li>- RQ5: What are the benefits of organised use of SfT in the teacher community for school leadership? (Case-study specific RQ)</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- Interviews with school leaders or inspectors</li> <li>- Professional learning design plans</li> <li>- Observation/field notes</li> </ul> <p><i>Key findings</i><br/><i>Participants' perception of SfT</i></p> <ul style="list-style-type: none"> <li>- SfT usefulness for school leadership was regarded as quite high: it provides evidence-based information about teachers' current digital competence and</li> </ul> |
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| <p><b>Implementation period</b><br/>March – May 2023</p> <p><b>Responsible body</b><br/>University of Helsinki</p> | <p>practices, which helps in considering what aspects to develop, as well as raises individual teachers' awareness of their competence.</p> <ul style="list-style-type: none"> <li>- The school leadership expected benefits for individual teachers, especially for those who are not so aware of their competence, and about the information that they can get from the aggregated results about the current situation of digital practices in the whole school.</li> <li>- They expressed some concerns about the length of the self-reflection.</li> </ul> <p><i>Participants' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- The school leadership, after analysing their school's SfT results, discussed practical suggestions to adopt, including organising teacher training and pedagogical cafés inside the school; reserving some regular teacher team meeting times for digital aspects, and making a joint decision about the digital learning platform that everybody uses in order to unify digital practices.</li> <li>- The team shared the opinion that digital tools are used regularly in teaching, but the aggregated SfT results raised questions about the pedagogical diversity and quality of teachers' digital practices.</li> <li>- The leadership team considered that teachers sometimes do not utilise offered training or support possibilities or they do not put in effort themselves into learning new digital skills, except when they have some specific skill that they want to develop.</li> <li>- Leadership team members considered collegial collaboration as important for digital improvement.</li> <li>- More time resources in their school could be allocated specifically for discussing and designing digital practices together.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Regional initiatives, such as a Digital Skills badge campaign launched by the city some years ago.</li> <li>- Providing a suitable period and reserving joint time to facilitate teachers' reflection.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Training and support (provided, e.g., by the city) for digital issues have been lacking during recent years.</li> <li>- The city's constantly changing decisions about the digital platforms that they provide to schools.</li> <li>- Lack of a school digital plan including aspects related to digital development that have not been the focus of attention in recent years in the school.</li> <li>- Problems with the school infrastructure.</li> <li>- Personal aspects as, for example, some teachers might be too tired after the school day to concentrate on participating in the SfT self-reflection.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SfT usefulness for school leadership is quite high: it provides evidence-based information about teachers' current digital competence and practices, which helps in considering what aspects to develop, as well as raises individual teachers' awareness of their competence.</li> <li>- In-service teacher training and organised support for teachers is important, especially if the aim is to promote and increase pedagogically advanced ways of using digital technology in teaching.</li> <li>- Provide opportunities to teachers for positive experiences of their efforts to learn and apply digital technology and demonstrate practical benefits for their specific teaching aims and challenges.</li> <li>- The SfT tool should be introduced to teachers so that they see its actual benefits for their own work and for the whole school.</li> </ul> |
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#### 5.4.4 Case study 2 (FI2): School leadership initiates SFT as a starting point for teachers' professional learning and development of their digital competence

The aim of case study 2 (FI2) focuses on teachers' thoughts and perceptions of their digital competence and the SFT reflection activity. The aim of the case study was to investigate: (i) how teachers in the school, who attended a school-based workshop, used SFT to reflect on their professional development needs in digital practices; (ii) how teachers see the benefits of SFT after their self-reflection for personal use as well as for advancing collegial discussion and collaboration; and (iii) how the teachers, after completing SFT, jointly define what aspects they should focus on in their school to develop digital practices.

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| <p><b>FI2</b></p>  <p>School leadership initiates SFT as a starting point for teachers' professional learning and development of their digital competence</p> <p><b>Domain</b><br/>School-based professional learning and planning of activities (in-service training)</p> <p><b>Setting</b><br/>Whole school</p> <p><b>Initiated by (stakeholder)</b><br/>School leadership</p> <p><b>Primary actors</b><br/>In-service teachers<br/>School leadership</p> <p><b>Education sector</b><br/>Primary education</p> | <p><i>Description</i><br/>School leadership initiates SFT as a starting point for teachers' professional learning and development of their digital competence.</p> <p><i>Recruitment</i><br/>The SFT workshop was organised in the school during a school day and participation in it was part of job duties for all teachers in the school. Interview participants were recruited from the workshop on a voluntary basis.</p> <p><i>Participants</i><br/>Twenty-four teachers completed the SFT reflection (some had, e.g., technical problems) and 28 teachers participated in the teamwork in three grade-level teams. Four teachers participated in a group interview.</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- Pre-interview of the leadership team</li> <li>- 1.5-hour workshop in the school</li> <li>- Group interview of four voluntary teachers</li> <li>- Post-interview of the leadership team</li> <li>- Teacher training event in the school</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SFT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SFT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SFT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SFT to support teachers' development of their digital competences?</li> <li>- RQ5: What are the benefits of organised use of SFT in a school community for individual teachers and for collegial discussions and collaboration? (Case-study specific RQ)</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SFT reflections</li> <li>- Group and focus group interviews with teachers</li> <li>- Interviews with teacher members of the leadership team</li> <li>- Observation/field notes</li> <li>- Teacher team presentations</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- Participants thought that completing the survey made them reflect on their digital practices, strengthened their own perceptions, crystallised their view of their digital competence and practices, and made them think what they could do more in digital pedagogy.</li> <li>- Teachers liked receiving immediate feedback and clear and informative style of the feedback.</li> </ul> |
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| <p><b>Implementation period</b><br/>March – May 2023</p> <p><b>Responsible body</b><br/>University of Helsinki</p> | <ul style="list-style-type: none"> <li>- Some teachers thought that in some cases SfT statements addressed behaviours and practices, which are situation and context specific, and not necessarily indicative of digital competence.</li> <li>- There was interest in comparing own results with the aggregated SfT results of others.</li> <li>- Some teachers found that the statements or the whole survey were long and in some cases the language difficult. On the other hand, the teachers felt that it was useful to answer the survey and get feedback regarding their digital competence and critically evaluate their current practices.</li> <li>- The teachers liked the approach of using SfT jointly so that they can discuss the development needs with colleagues and aggregated results are used to evaluate school-level situation.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- Some teachers described that completing the SfT reflection made them think of what they could do more, even though they are not so highly motivated towards digital aspects.</li> <li>- Participants expressed interest in learning more about tools, including using one's own time frequently in searching for new digital tools and materials for teaching, or open-minded experimentation of new digital possibilities with students.</li> <li>- Importance of being able to practice new tools and applications during working hours was considered relevant, but also the situation in personal life matters.</li> <li>- Some teachers described how they have high motivation to learn about new digital possibilities, while others explained that they are not so interested in digitality like younger people.</li> <li>- The teachers were positive about the idea that the tool would be used regularly and repeatedly for school-level reflection and evaluation of development needs, but not too often.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Informal and formal practices in the school that support collaboration in digital aspects such as spontaneous support between colleagues, joint meeting times for all teachers or smaller teacher teams, and a special team responsible for planning the uniform use of digital tools in the school.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- SfT exercise organised after teaching hours when everybody is already tired.</li> <li>- Teacher focus on technical infrastructure and practices for organising technical resources, not on teachers' competence improvement.</li> <li>- Teachers' personal interest and motivation.</li> <li>- Length of the statements or the whole survey.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SfT can be used regularly and repeatedly for school-level reflection and evaluation of development needs.</li> <li>- It is important that teachers see real benefits of SfT for their work or for the whole school, and that results are discussed and examined together with colleagues.</li> <li>- There should be proper introduction of the tool before going through the self-reflection and enough time to complete it at one's own pace and during working hours.</li> <li>- It is important to spend peaceful time for individual reflection first, and joint discussions only after that.</li> </ul> |
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### **5.4.5 Recommendations and lessons learnt from the two Finnish case studies**

Based on the results, below are some recommendations for developing the SELFIEforTEACHERS (SfT) services further.

- SfT usefulness for school leadership is quite high: it provides evidence-based information about teachers' current digital competence and practices, which helps in considering what aspects to develop, as well as raises individual teachers' awareness of their competence.
- Teachers seem to be interested in comparing their own/their schools'/their groups' results with the results of other participants, schools or groups in different areas nationally and internationally. Adding such opportunities could increase the users' motivation to reflect on their results and help in making conclusions about further actions.
- Even though it is possible to use SfT by individual teachers without any training or guidance, the tool will also be used on occasions that include introductions, presentations, or demo sessions of the tool. There is a need for a toolkit for professionals organising such events, which would allow creating demo user accounts and demo groups with automatic results so that all procedures can be tested and introduced flexibly. A ready-made slide set about the SfT tool use in all languages could also be useful.
- It might be worth evaluating the user interface of SfT with professional interface testers and/or target group representatives (using, e.g., think aloud protocols). This could easily reveal the few weaknesses in the interface.
- The translations of instructions and survey statements into national languages could be checked with language experts that represent the target group (e.g., Mother tongue teachers; digitally less and more competent teachers). Some experienced problems with the complexity of the language which might relate to translations.

## 5.5 Ireland (IE)

*DESI:* High

*Geographic location:* Northern Europe

*Educational system:* Collaboration between the State and private agencies

*Case study 1 (IE1):* School leaders and teachers use SFT to support individual teachers plan their professional learning to further develop their digital competence.

*Case Study 2 (IE2):* Leaders of a school network use SFT tool and aggregated results to plan and implement professional learning actions for their schools.

### 5.5.1 Summary of Irish case studies

The Irish study includes two complementary but connected case studies. Both explore the use of SFT to improve and enhance digital capacity in the context of small, remote, rural primary schools in the west of Ireland. Case study 1 was set in North Mayo and involved teaching staff from four schools ( $n=22$ ), each school is characterised by ongoing work on school digital learning planning, mixed levels of digital usage and/or confidence among the teachers, and an interest in exploring the possibilities of SFT within and between the schools in the cluster. Case study 2 was set in East Galway and involved school leaders in four similar schools – three principals and one acting principal – who were interested particularly in how SFT might be of help in the reformulation of their schools' digital learning plans. Evidence from the Ireland cases – although necessarily qualified by the geography and the brevity of the work involved – suggests that a reflective tool like SFT holds significant promise for such small rural schools in addressing the challenges they face in integrating technology effectively into classroom and school activities. The case insights would support the idea that SFT offers a particularly promising individualised approach to professional development, has considerable potential to foster and support collaboration with teaching peers, and can empower teachers in isolated settings to make the most of their available resources. The case studies offered useful insight into school digital planning in ways that emphasise the role of school leaders in providing the leadership and institutional support needed to make a success of adopting a reflective tool like SFT in small rural schools. Both suggest that school leaders who endorse and promote the use of a tool like this can create an environment where feedback is valued and acted on. There are some initial reasons noted for policymakers and other educational stakeholders to consider investing in leadership support and creating incentives for schools to participate in initiatives that employ reflective tools for professional learning, such as SFT, that are accessible even at remote locations such as those in the case settings, and offer the depth and range of reflection that this tool facilitates, as well as the credibility that EU labelling brings with it.

### 5.5.2 Country information

IE

The Department of Education of Ireland (DE) is responsible for policy, ensuring provision, funding, and regulation of education at all levels of the school education system in Ireland. All children in Ireland are entitled to free primary and post-primary (second-level) education. Education is compulsory from the ages of six to 16 or until students have completed three years of second-level education. State-funded education is available at all levels though parents/guardians can choose to send their child to a private institution.

General information<sup>27</sup>

The primary education sector is made up of different types of primary schools including denominational schools, multi-denominational schools, Irish-speaking schools (called *Gaelscoileanna*), special schools and non-State-aided private primary schools. Education in State primary schools is free of charge. The current and capital costs of primary schools, including teachers' salaries, are funded mainly by the Government and supplemented by local – predominantly parent – “voluntary” contributions, which are directed at some of the general expenses involved in running a school, additional teaching resources, school-trips, light, heat, cleaning, and so on. Most primary schools are funded by the State and the vast majority of children attend these schools.

A large number of these primary schools are small (of the 3,250 primary schools nationally, approximately 200 are two-teacher schools, 200 are three-teacher schools and 200 are four-teacher schools). This raises particular challenges for leadership and instructional support facilities.<sup>28</sup>

## Digital transformation in education – teachers' digital competence

The context of ICT and education technology usage generally in Ireland's school system has received considerable policy attention in recent times. The DE Digital Strategy for Schools 2015–2020, and its follow-up Digital Strategy for Schools to 2027 represent a coherent and reasonably well-resourced programme to embed technologies and digital learning tools in the learning experiences of children and young people in primary and post-primary schools. Central importance is placed on the integration of digital technologies into teaching, learning and assessment (DE, 2020, p. 7). As a recent OECD publication notes, this is broadly in line with, builds upon and develops the priorities of the 2021 EU Digital Education Action Plan (DEAP) (OECD, 2023, p. 9).

However, there are challenges to the achievement in full of this programme, particularly relating to what is termed Pillar 2 – digital technology infrastructure (with objectives around the funding of digital infrastructure, the provision of broadband connectivity to schools) and prioritising training of in-career teachers. The journey to digital maturity in Irish schools has been long and troubled is not yet completed (McGarr & Johnston, 2021) with support and education for teachers remaining particularly problematic in some geographically remote settings (McGarr, Mifsud & Rubio, 2021). INTO – the leading primary teachers' union – has long argued that while principals and teachers are positively disposed towards the increased integration of modern technologies into their teaching and are aware of the benefits of doing so, the necessary conditions relating to digital content, ICT infrastructure, teacher continuing professional development and support (2017, p. 37) are not always available or properly funded, particularly in small-school settings (INTO, 2020).


That, briefly, is the context within which the case studies reported below are set. They were designed to offer understanding of both how the schools concerned approach the integration of digital technologies into their teaching activities and specifically how they engage with the opportunity to use SELFIEforTEACHERS to assist in this.

<sup>27</sup> This section draws from a number of sources including: Coakley, J., & Gallagher, M. (Eds.). (2017). *Politics in the Republic of Ireland*. Routledge; O'Donoghue, T., & Harford, J. (2015). *Secondary School Education in Ireland: History, Memories and Life Stories, 1922-1967*. Springer; the EU [EURYDICE website](#) for Ireland; and the Citizens Information Board, Ireland [website](#).

<sup>28</sup> See, for example, O'Donovan, M. (2017). The challenges of distributing leadership in Irish post-primary schools. *International Electronic Journal of Elementary Education*, 8(2), 243–266. Retrieved from <https://iejee.com/index.php/IEJEE/article/view/111>

### 5.5.3 Case study 1 (IE1): School leaders and teachers use SfT to support individual teachers plan their professional learning to further develop their digital competence.

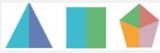
Case study 1 (IE1) reports on the design, development, implementation and documentation of an *intervention-led* case study using *SELFIEforTEACHERS* to enhance the professional learning experiences of a group of teachers based in four remote, rural primary schools in the west of Ireland.

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| <p><b>IE1</b></p>  <p>School leaders and teachers use SfT to support individual teachers plan their professional learning to further develop their digital competence</p> <p><b>Domain</b><br/>School-based professional learning and planning of activities</p> <p><b>Setting</b><br/>Whole school / school network</p> <p><b>Initiated by (stakeholder)</b><br/>School network leaders / university collaboration</p> <p><b>Primary actors</b><br/>In-service teachers school leadership</p> <p><b>Education sector</b><br/>Primary education</p> | <p><i>Description</i><br/>School leaders and teachers use to support individual teachers plan their professional learning to further develop their digital competence.</p> <p><i>Recruitment</i><br/>Open invitation to all teaching staff at the four participating schools (28 in total from which 22 chose to participate).</p> <p><i>Participants</i><br/>16 teachers<br/>Six school leaders</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- Meeting 1: Orientation for the project and introduction to SfT – individual and group uses. 19 January 2023 (2hrs).</li> <li>- Meeting 2: Full cluster discussion on curriculum themes and focuses for the work of the project; sustainability and local history identified as main points of interest. 28 January 2023 (2hrs).</li> <li>- Meeting 3: Finalising areas and aspects of focus and electing to groups. 29 March 2023 (2hrs).</li> <li>- Meeting 4: Close-out of project. 3 May 2023 (2hrs).</li> <li>- Meeting 5: Project-meet/shared learning event at the regional Education centre. 10 June 2023 (6hrs).</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers’ agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers’ agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers’ development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Group and focus group interviews with teachers</li> </ul> <p><i>Key findings</i></p> <p><i>Teachers’ perception of SfT</i></p> <ul style="list-style-type: none"> <li>- Overwhelmingly positive, having great potential, being applicable in different contexts, being useful for self-assessment, offering valued privacy, and aiding professional development planning – both at the individual and school levels.</li> </ul> <p><i>Teachers’ agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- Influenced by a blend of personal characteristics such as interest, competency and adaptability as well as institutional factors such as support from school management and access to appropriate professional development opportunities.</li> <li>- Personal interest in technology resonates with students, driving enthusiasm for learning.</li> <li>- Wider social pressures and expectations as well as government policy initiatives.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Potential of SfT to contribute to more data-driven school improvement.</li> <li>- SfT focus on reflection, self-assessment and development in a structured approach.</li> </ul> |
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| <p><b>Implementation period</b><br/>January – June 2023</p> <p><b>Responsible body</b><br/>University College<br/>Dublin</p> | <ul style="list-style-type: none"> <li>- Opportunity to align and support school digital strategy.</li> <li>- Systemic context of changing understandings and expectations concerning pedagogical and schooling, influencing teachers’ wanting to respond more meaningfully to their student needs, and broader societal trends which collectively shape teachers’ willingness and ability to integrate digital technologies into their teaching.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Initial lack of awareness of SfT and its possibilities.</li> <li>- Availability of suitable resources and infrastructure.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SfT holds substantial promise for advancing digital planning and self-evaluation within educational contexts. By identifying individual strengths, developmental needs, expectations and targets, the tool offers a holistic view of the pedagogical landscape on which the teacher can then act with some confidence.</li> <li>- SfT can align with a school’s comprehensive digital strategy.</li> <li>- Relevant training and peer learning are important aspects of supporting teachers to develop and enhance their digital ability.</li> </ul> |
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#### 5.5.4 Case study 2 (IE2): Leaders of a school network use the SfT tool and aggregated results to plan and implement professional learning actions for their schools.

Case study 2 (IE2) reports on the introduction and use of *SELFIEforTEACHERS* for professional and pedagogical reasons by a group of school leaders – three principals and one acting principal – and its use to assist in the reformulation of their schools’ digital learning plans. The research involved four school leaders, assisted by a university researcher and a regional primary school inspector.

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| <p><b>IE2</b></p>  <p>Leaders of a school network use SfT and aggregated tool results to plan and implement professional learning actions for their schools</p> <p><b>Domain</b><br/>School / school network policy planning</p> <p><b>Setting</b><br/>Whole school / school network</p> | <p><i>Description</i><br/>Leaders of a school network use SfT and aggregated tool results to plan and implement professional learning actions for their schools.</p> <p><i>Recruitment</i><br/>Open invitation to all teaching staff at the four participating schools (28 in total from which 22 chose to participate).</p> <p><i>Participants</i><br/>Four school leaders</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- Meeting 1: Orientation for the project and introduction to SfT – specific focus on C1 (Leadership) and C2 (Innovation) across all six areas of the instrument. 12 May 2023 (2hrs).</li> <li>- Meeting 2: Individual interviews with each of the participating school-leaders regarding their exploration into the possibilities of SfT as a tool to assist in work on renewing their school digital plan. 16 June 2023 (6hrs).</li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers’ agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers’ agency to act upon the feedback received from the SfT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers’ development of their digital competences?</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Interviews with school leaders or inspectors</li> </ul> |
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| <p><b>Initiated by (stakeholder)</b><br/>School network leaders / university collaboration</p> <p><b>Primary actors</b><br/>School leadership<br/>In-service teachers</p> <p><b>Education sector</b><br/>Primary education</p> <p><b>Implementation period</b><br/>May – June 2023</p> <p><b>Responsible body</b><br/>University College Dublin</p> | <p><i>Key findings</i></p> <p><i>Participants' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- Value of self-assessment tools like SFT in supporting school leaders' digital strategies and teacher development efforts connected to improving the use of digital technologies and resources within teaching and learning settings.</li> <li>- SFT supports building digital leadership and innovation skills; however, the tool's statements for levels C1 and C2 are aspirational and challenging.</li> <li>- SFT supports teachers in identifying their strengths and weaknesses.</li> <li>- The feedback-oriented perspective informs continuous improvement in digital competence.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- Influenced by a blend of personal characteristics such as interest, competency and adaptability as well as institutional factors such as support from school management and access to appropriate professional development opportunities.</li> <li>- Wider social pressures and expectations as well as government policy initiatives.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- SFT value as a strategic thinking tool, its potential in terms of individual development as well as wider school applications, and its very practical value in relation to development planning and DE requirements around School Self-Evaluation (SSE).</li> <li>- The SFT feedback-oriented perspective offering a promising way to inform continuous improvement in digital competency among teaching staff.</li> <li>- Systemic context of changing understandings and expectations concerning pedagogical and schooling, influencing teachers' wanting to respond more meaningfully to their student needs, and broader societal trends which collectively shape teachers' willingness and ability to integrate digital technologies into their teaching.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Initial lack of awareness of SFT and its possibilities.</li> <li>- School having or not having a clear digital plan.</li> <li>- Access to good CPD courses.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- SFT holds substantial promise for advancing digital planning and self-evaluation within educational contexts. By identifying individual strengths, developmental needs, expectations and targets, the tool offers a holistic view of the pedagogical landscape on which the teacher can then act with some confidence.</li> <li>- SFT can align with a school's comprehensive digital strategy.</li> <li>- Relevant training and peer learning are important aspects of supporting teachers to develop and enhance their digital ability.</li> <li>- SFT can be used by leaders in a school for informed decision-making, tailored professional development, and monitoring progress.</li> </ul> |
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### 5.5.5 Recommendations and lessons learnt from the two Irish case studies

Small rural schools face unique challenges in today's increasingly digital educational landscape. The insights gathered from the case studies and summaries above shed light on what these schools can learn about the value of a reflective tool like SELFIEforTEACHERS (SFT) in addressing their specific needs.

- First and foremost, the Irish cases have shown that small rural schools can lack the access to technological resources and infrastructure that urban counterparts may take for granted. Outdated technology, limited formalised tech support, and difficulties accessing professional development opportunities can hinder small schools' ability to take advantage of digital advancements. In this context, SFT emerges as a powerful ally. The tool's ability to indicate

individual strengths and developmental needs can guide teachers in making the most of the technology at their disposal and also identify areas of their digital practice that they may decide to develop further. It provides a useful starting point and may also help scope-out a pathway for educators to enhance their digital competence and make more effective use of available resources, even in resource-constrained environments.

- Second, the case studies both suggest that SfT can support the development of a sense of community among teachers in – and among – remote schools. By fostering collaboration and knowledge exchange, the tool encourages educators to work together to address common challenges – we saw this particularly in the North Mayo case setting where the teachers collaborated around developing their creativity or local studies work using digital technology. This collective approach can help overcome the isolation that some small rural schools experience, creating an informal but powerful support network that extends beyond the schools themselves. The case studies also highlight how SfT can facilitate collaboration both within individual schools and across a network of rural schools.
- Third, SfT offers above all else a personalised and essentially confidential approach to professional development, which can be particularly appropriate for teachers in small rural schools, especially those engaging in professional development that needs to align with school planning or digital strategy. The tool’s ability to identify specific areas for improvement – and offer some initial ideas about how to address these – can empower such teachers to seek out targeted professional development opportunities that address their interests and align with school needs. This personalised learning approach can both build confidence and increase technical effectiveness in using digital tools which ultimately benefit both the teacher and the students in their school.
- Additionally, the case studies offered useful insight into school digital planning in ways that emphasised the role of school leaders in providing the and institutional support needed to make a success of adopting a reflective tool like SELFIEforTEACHERS in small rural schools. The studies both suggest that school leaders who endorse and promote the use of a tool like this can create an environment where feedback is valued and acted on. There are some initial reasons here for policymakers and other educational stakeholders to consider investing in leadership support and creating incentives for schools to participate in initiatives that employ reflective tools for professional learning, such as SELFIEforTEACHERS that are accessible even at remote locations such as in these case settings, and offer the depth and range of reflection that this tool facilitated, as well as offering the credibility that EU labelling brings to the initiative.

In conclusion, the evidence from the Irish cases – although necessarily qualified by the geography and the brevity of the work involved – can be seen to suggest that a reflective tool like SELFIEforTEACHERS holds significant promise for such small rural schools in addressing the challenges they face in integrating technology effectively into classroom and school activities. SfT offers a particularly promising individualised approach to professional development, has considerable potential to foster and support collaboration with teaching peers, and can empower teachers in isolated settings to make the most of their available resources. Policymakers should recognise the value of such tools in supporting these schools and their digital development and so introduce policies that facilitate their adoption and implementation in rural education contexts such as those explored in the Ireland case contexts.

## 5.6 The Netherlands (NL)

*DESI:* High

*Geographic location:* Central Europe

*Educational system:* Some centralisation with State and local responsibilities

*Case study 1 (NL1):* Self-reflection on professional development paths in relation to the SfT feedback.

*Case Study 2 (NL2):* Reaction to SfT feedback after initial professional development goals.

### 5.6.1 Summary of Dutch case studies

The Dutch study comprises two complementary but connected case studies. The two case studies focused on how reflecting on past steps of professional development before using the SfT tool affects how teachers accept and utilise the feedback they receive from the SfT tool (CS1), and on how reflecting on personal goals of professional development before using the SfT tool affects how teachers accept and utilise the feedback they receive from the SfT tool about their level and suggested future steps for development (CS2). The data collection process included an entry interview, using the SfT tool, and an exit interview. The interviews included both case-specific and project-wide questions. Overall, the SfT tool was positively accepted by the participants, even though several issues on the levels of usability and usefulness arose. The report discussed the findings of the two case studies and the project-wide research questions while offering recommendations for improvements that could enhance the impact that SfT could have on teachers' professional development in relation to their digital competence.

### 5.6.2 Country information

NL

General information

#### *Primary education in the Netherlands*

Children may go to primary school from the age of four, but attendance is not compulsory until the first school day of the month following the child's fifth birthday. Most children go to primary school for eight years. Children who need extensive support may go to a special school for primary education. Public schools are open to all pupils and teachers. Their teaching is not based on a particular religion or belief. Private schools are established based on religious, ideological principles or a specific educational ethos, such as a Protestant or Muslim school. A private school based on religious or ideological principles may require its teaching staff and pupils to subscribe to the beliefs of that denomination or ideology; the school board decides whether or not a pupil can enrol. The requirements may not be discriminatory.

Primary schools, including special schools for primary education, are free to decide on their own internal organisation and the grouping of pupils. At most primary schools, the pupils are grouped by age. Others have mixed-age groups or group children according to their level of development or ability. There are eight year groups in all, of which the first two are pre-primary. Each child begins in year 1 and, in most cases, goes up a class each year until they reach the top class. Years 1 to 4 (four to eight-year-olds) are known jointly as the juniors and years 5 to 8 (nine to 12-year-olds) as the seniors. Alternatively, the school may be divided into junior, middle and senior sections (years 1 to 3, 4 to 6 and 7 and 8 respectively). Primary school teachers and teachers at special schools for primary education are qualified to teach all subjects across the entire age range.

#### *Secondary education in the Netherlands*

There are three kinds of secondary education:

- Pre-vocational secondary education (VMBO) – ISCED 2: It is intended as a foundation course as regards both the general and the pre-vocational component; lasts four years and is for pupils between the ages of 12 and 16 (average); pupils can choose between

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|                                     | <p>four learning pathways: theoretical programme, combined programme, middle-management vocational programme, and basic vocational programme.</p> <ul style="list-style-type: none"> <li>• Senior general secondary education (HAVO) – ISCED 3: It lasts five years and is for pupils aged 12 to 17 years (average); HAVO provides pupils with a basic general education and prepares them for higher professional education. (Pupils can also transfer to pre-university education (VWO). After completing a core curriculum in the three lower years, HAVO pupils enter the second stage where they choose one of four subject combinations. Each group of subjects includes a compulsory component and an optional component.); the first three years of senior general secondary education are ISCED 2; the last two years of senior general secondary education are ISCED 3.</li> <li>• Pre-university education (VWO) – ISCED 3: It lasts six years and is for pupils aged 12 to 18 years (average); the first three years of pre-university education are ISCED 2; the last three years of pre-university education are ISCED 3; the second stage starts in the fourth year, when pupils must choose one of four subject combinations, each comprising a compulsory and an optional component. (A “gymnasium” offers a pre-university programme including the subjects Latin, ancient Greek and classical culture. Some schools offer bilingual programs in which, from the first year on, about half of the subjects are taught in English.).</li> </ul> <p>(source: Eurydice)<sup>29</sup></p>   |
| Educational governance              | <p>According to Eurydice (2023), the overall responsibility for the education system in the Netherlands lies with the State, specifically vested in the Minister of Education, Culture and Science, along with the State Secretary (junior minister) for Education, Culture and Science. The Ministry of Education, Culture and Science plays a crucial role by establishing the statutory requirements for early childhood education, primary and secondary education, and secondary vocational education. Additionally, it exercises oversight over adult general secondary education.</p> <p>In terms of primary and secondary education, the Minister of Education sets the framework within which individual schools are expected to operate, as enshrined in law and other regulations. Notably, while there is no national curriculum, there are clear attainment targets set for general education. As for higher education institutions, both higher professional education institutions and universities are subject to a framework established by the government. However, it is the responsibility of the competent authority of each institution to elaborate on this government framework in their respective teaching and examination regulations.</p> <p>The provincial authorities in the Netherlands play a limited role in education, primarily focused on supervisory and legal tasks. The administration and management of schools in primary and secondary education, as well as schools for secondary vocational education, are primarily organised at the local level. Within this decentralised system, the school board assumes responsibility for each school, including ensuring the quality of education and meeting the attainment targets set forth by the government. In essence, the Dutch educational system embodies both highly centralised elements, governed by the State and the Ministry of Education, and highly decentralised components, where local authorities and school boards play vital roles in school administration and management. This balance seeks to create a dynamic and flexible educational environment that allows for both national coordination and regional adaptability.</p> |
| Digital transformation in education | <p>The Netherlands ranks third out of 27 EU Member States in the 2022 edition of the Digital Economy and Society Index (DESI). The country has been a consistent top performer in the EU and is, despite its already high scores, still able to make progress in some key areas.</p> <p>The Dutch digital strategy (DDS) for the digital transformation of the economy and society was adopted in 2018. It is updated every year. The most recent version was</p>   |

<sup>29</sup> <https://eurydice.eacea.ec.europa.eu/national-education-systems/netherlands/overview>

## Teachers' professional development

published in June 2021.<sup>30</sup> The DDS brings together all policies on digitalisation from the Dutch central government. Among other things, the DDS stresses the importance of an inclusive digital transition in which everyone takes part and it singles out the Netherlands' position as a digital frontrunner in Europe and the world.

The Netherlands ranks second in Human Capital in the DESI 2022, continuing its streak as one of the best performing EU countries for digital skills and human capital. It continues to score very highly for the share of its population with at least basic digital skills and it is placed at the top of EU countries when it comes to individuals with above basic digital skills. The Netherlands is one of the top five EU countries for the share of ICT specialists as a percentage of its workforce. However, the Netherlands still requires many more ICT specialists to continue to be a frontrunner in the digital transition. In particular, despite steady progress, the 3.4% of graduates who studied ICT out of all graduates in the Netherlands remains behind the EU average of 3.9%.

On the integration of digital technologies, the Netherlands ranks fourth in the DESI 2022. Among Dutch small and medium-sized enterprises (SMEs), three out of four already have a basic level of digital technology integrated in their operations. This is significantly above the EU average of 55%. This pattern of Dutch outperformance of the EU average can be observed for the adoption of several digital technologies. Specifically, Dutch enterprises perform well above the EU average for the share of enterprises using cloud (60% vs an EU average of 34%), big data (27% vs an EU average of 14%), and the use of social media (49% vs an EU average of 29%). However, the Netherlands does not lead by much compared to the EU average in several other key indicators. This is the case for the share of SMEs selling online (23% vs an EU average of 18%), the percentage of SMEs' e-Commerce turnover (15% vs an EU average of 12%), the use of AI (13% vs an EU average of 8%), the percentage of SMEs selling online cross-border (13% vs an EU average of 9%) and the amount of electronic information sharing (43% vs an EU average of 38%). The Netherlands also performs below the EU average for the use of e-Invoices as a percentage of enterprises (25% vs an EU average of 32%) and the use of ICT for environmental sustainability (64% vs an EU average of 66%). Overall, growth rates for most of these measures on the integration of digital technologies are limited. And although the Netherlands continues to perform well compared to other EU countries, more ambition and action are needed to increase its performance sustainably into the future.

(source: DESI 2022)<sup>31</sup>

According to the OECD Teaching and Learning International Survey (TALIS) (OECD, 2019), in the Netherlands, teaching was the preferred career choice for 53% of teachers, while this figure rises to 67% among OECD countries and economies participating in the survey. The motivation behind joining the profession is reportedly a desire to influence children's development or contribute to society, cited by at least 80% of teachers in the Netherlands. The average age of teachers in the Netherlands stands at 43 years, slightly lower than the average age of teachers in other participating OECD countries and economies (44 years). However, 32% of teachers in the Netherlands are aged 50 and above, a proportion similar to the OECD average of 34%. Consequently, the Netherlands will need to renew approximately one-third of its teaching workforce over the next decade.

Teachers and school leaders in the Netherlands generally view their colleagues as open to change and their schools as receptive to adopting innovative practices. Specifically, 71% of teachers report that they and their colleagues support each other in implementing new ideas. Although slightly lower than the OECD average of 78%, this still represents a significant majority.

<sup>30</sup> <https://www.rijksoverheid.nl/documenten/kamerstukken/2021/04/26/nederlandse-digitaliseringsstrategie-2021>

<sup>31</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi-netherlands>


During their initial education and training, 88% of teachers in the Netherlands received instruction on subject content, pedagogy and classroom practice, surpassing the OECD average of 79%. Moreover, 65% of teachers in the Netherlands participated in formal or informal induction programs when they joined their current school, compared to 42% of teachers across the OECD countries and economies participating in TALIS. Professional development is common among teachers and principals in the Netherlands, with 98% of teachers and 100% of principals attending at least one professional development activity in the year prior to the survey, in line with the OECD averages. In terms of professional development activities, attending courses and seminars is the most popular option for teachers in the Netherlands, with 88% of teachers participating in such training. Additionally, 50% of teachers engage in training based on peer learning and coaching. Notably, teachers across the OECD indicate that professional development based on collaboration and collaborative approaches to teaching is among the most impactful for them. However, some areas of professional development require more attention, according to teachers. Developing advanced ICT skills is one such area where teachers express a need for further training, along with teaching in multicultural/multilingual settings and teaching students with special needs. Notably, teachers in the Netherlands specifically express a higher need for training in ICT for teaching as compared to their OECD counterparts.

Despite 49% of teachers in the Netherlands reporting that the “use of ICT for teaching” was included in their formal education or training, only 29% of teachers felt adequately prepared for it upon completing their studies. In the 12 months before the survey, 61% of teachers participated in professional development activities related to the “use of ICT for teaching”. However, among professional development topics, “use of ICT for teaching” is the one with the highest percentage of teachers in the Netherlands (16%) reporting a high need for additional training, though this figure is similar to the OECD average of 18%.

Against this background, the two case studies conducted in the Netherlands focused on how previous experiences and current goals for professional development affect the self-reflection process in the SFT tool.

### 5.6.3 Case study 1 (NL1): Self-reflection on professional development paths in relation to the SFT feedback.

The main goal of case study 1 (NL1) was to support the participants’ in reflecting on their professional development up now and compare it to the suggestions to “level up” the SFT tool offerings for levels lower than theirs. Such a reflection process could allow a better understanding of the usability and usefulness of the offered feedback, as perceived by the teachers, and also engage the teachers in a deeper self-reflection process. The case study focused on two out of the six areas of the SFT tool, Area 2 – Digital Resources and Area 3 – Teaching and Learning.


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| <p><b>NL1</b></p>  <p>University research group explores how teachers use the SFT feedback to advance their</p> | <p><i>Description</i><br/>University research group explores how teachers use the SFT feedback to advance their digital competence.</p> <p><i>Recruitment</i><br/>Invitation for participation via email to a list of primary and secondary schools and teachers that included among others collaborators in past research and development activities, network of schools in the region, and current students and alumni of teacher training programs and of master’s programmes that often have teachers in their cohorts. Additional personal communications were made with teachers and with UT staff that are often working with teachers advertising the SFT tool and the project.</p> <p><i>Participants</i><br/>Three school teachers</p> <p><i>Implementation</i></p> |
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| <p><b>digital competence</b></p> <p><b>Domain</b><br/>University training programme</p> <p><b>Setting</b><br/>University programme / classes</p> <p><b>Initiated by (stakeholder)</b><br/>University</p> <p><b>Primary actors</b><br/>School leadership<br/>in-service teachers</p> <p><b>Education sector</b><br/>Primary and secondary education</p> <p><b>Implementation period</b><br/>May – June 2023</p> <p><b>Responsible body</b><br/>University of Twente</p> | <ul style="list-style-type: none"> <li>- Outreach</li> <li>- Entry interviews (30'): <ul style="list-style-type: none"> <li>o Background information</li> <li>o Current level and past professional development experience on Area 2 – Digital resources and Area 3 – Teaching and learning</li> </ul> </li> <li>- SFT usage (self-paced use of SFT within 1-2 weeks)</li> <li>- Exit interviews (50'): <ul style="list-style-type: none"> <li>o Reflection on the current level and the suggestions for future action of lower levels on Area 2 – Digital resources and Area 3 – Teaching and learning</li> <li>o Agency and plan of action</li> <li>o Reflecting on SFT</li> </ul> </li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SFT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SFT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SFT tool?</li> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SFT to support teachers' development of their digital competences?</li> <li>- RQ5: How does reflecting on past steps of professional development affect how teachers accept and utilise the feedback they receive from the SFT tool? (case-study specific RQ)</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SFT reflections</li> <li>- Individual teacher interviews</li> <li>- Future teacher plans</li> </ul> <p><i>Key findings</i></p> <p><i>Participants' perception of SFT</i></p> <ul style="list-style-type: none"> <li>- SFT is a helpful and thought-provoking instrument that triggered a self-reflection process and improved self-awareness of own digital competence.</li> <li>- The breadth of the description and steps suggested in the SFT feedback can cause confusion.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- Personal drive and self-directed learning were the main paths to develop their digital competence.</li> <li>- The descriptions of steps a teacher should take to reach their level seemed appropriate to them. Having had past experiences in professional development based primarily on self-directed learning, teachers were more critical about the feedback provided by the tool and even triggered to re-assess their current level.</li> <li>- Some of the suggestions could indeed provide ideas for further development. However, there were also cases in which the participants found the suggestions not as useful.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Working along with colleagues that could help them improve is a great support for teachers.</li> <li>- Provision of SFT in structured professional development activities such as courses.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- While the SFT tool tries to avoid the "one-size-fits-all" paradigm, it is in several terms a single self-reflection tool for a very wide and diverse audience. No personalisation or tailoring of the feedback to the needs and background of the teacher.</li> <li>- While many of the feedback suggestions to level up have been positively perceived as useful by the participants, there were some cases where there was misalignment between their self-reflection and the competence level the tool already considers attained by them. In these occasions, the tool appears to suggest solutions to a problem that the teachers do not identify.</li> </ul> <p><i>Key conclusions</i></p> |
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|  | <ul style="list-style-type: none"> <li>- The SfT tool received an overall positive response as a helpful and thought-provoking instrument that triggered a self-reflection process that would not have happened otherwise and allowed the participants a better understanding of their digital competence.</li> <li>- The participants praised the role of the tool in improving their self-awareness, even though there were reservations and critiques on how specific, relevant and applicable the feedback was for them.</li> <li>- Enhancement of the SfT tool with adaptive functionalities to provide personalised support to teachers with different backgrounds, profiles and experience.</li> <li>- Provision of actionable advice and information for teachers to make the next step on their own.</li> <li>- The participants seemed more interested in developing their digital competences that would allow them to apply new/improved digital practices in their classroom and less in development for self-improvement in general.</li> </ul> |
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#### 5.6.4 Case study 2 (NL2): Reaction to SfT feedback after initial professional development goals.

Case study 2 (NL2) examined how teachers' personal goals for professional development and self-reflection at their current level of competence before using the SfT tool affect how they accept the feedback they receive within the SfT tool. The case study focused on two out of the six areas of the SfT tool, Area 2 – Digital Resources and Area 3 – Teaching and Learning.

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| <p><b>NL2</b></p>  <p>University research group explores how teachers use the SfT feedback in comparison to their existing professional goals</p> <p><b>Domain</b><br/>University training programme</p> <p><b>Setting</b><br/>University programme / classes</p> | <p><i>Description</i><br/>University research group explores how teachers use the SfT feedback in comparison to their existing professional goals.</p> <p><i>Recruitment</i><br/>Invitation for participation via email to a list of primary and secondary schools and teachers that included among others collaborators in past research and development activities, network of schools in the region, and current students and alumni of teacher training programs and of master's programmes that often have teachers in their cohorts. Additional personal communications were made with teachers and with UT staff that are often working with teachers advertising the SfT tool and the project.</p> <p><i>Participants</i><br/>Six school teachers</p> <p><i>Implementation</i></p> <ul style="list-style-type: none"> <li>- Outreach</li> <li>- Entry interviews (30'): <ul style="list-style-type: none"> <li>o Background information</li> <li>o Current level and past professional development experience on Area 2 – Digital resources and Area 3 – Teaching and learning</li> </ul> </li> <li>- SfT usage (self-paced use of SfT within 1-2 weeks)</li> <li>- Exit interviews (50'): <ul style="list-style-type: none"> <li>o Reflection on the current level and the suggestions for future action of lower levels on Area 2 – Digital resources and Area 3 – Teaching and learning</li> <li>o Agency and plan of action</li> <li>o Reflecting on the SfT</li> </ul> </li> </ul> <p><i>Research questions</i></p> <ul style="list-style-type: none"> <li>- RQ1: How do the teachers perceive SfT in terms of usability and usefulness?</li> <li>- RQ2: How can teachers' agency and self-efficacy in their digital competence be supported through the use of SfT?</li> <li>- RQ3: What personal, institutional and systemic characteristics influence teachers' agency to act upon the feedback received from the SfT tool?</li> </ul> |
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| <p><b>Initiated by (stakeholder)</b><br/>University</p> <p><b>Primary actors</b><br/>School leadership<br/>in-service teachers</p> <p><b>Education sector</b><br/>Primary and<br/>secondary education</p> <p><b>Implementation period</b><br/>May – June 2023</p> <p><b>Responsible body</b><br/>University of Twente</p> | <ul style="list-style-type: none"> <li>- RQ4: What are the main conditions, enablers and barriers for the effective use of SfT to support teachers' development of their digital competences?</li> <li>- RQ5: How does reflecting on personal goals of professional development before using the SfT tool affect how the teachers accept and utilise the feedback they receive from the SfT tool on their level and suggested future steps for development? (case-study specific RQ)</li> </ul> <p><i>Data collection methods and type of data</i></p> <ul style="list-style-type: none"> <li>- SfT reflections</li> <li>- Individual teacher interviews</li> <li>- Future teacher plans</li> </ul> <p><i>Key findings</i></p> <p><i>Participants' perception of SfT</i></p> <ul style="list-style-type: none"> <li>- SfT is self-explanatory and easy to use tool.</li> <li>- Pausing and continuing the self-reflection at different sessions was positively commented on even though most participants completed the self-reflection process in one continuous session. All participants needed approximately 30 to 60 minutes to complete.</li> <li>- The tool visualisations received positive comments for being clear and helpful.</li> <li>- In some cases the questions were not clear.</li> <li>- The suggestions to level up were appreciated. However, usefulness of the feedback lack specificity, relevance, and applicability.</li> <li>- The advice they receive is not always actionable or teachers would need more information to make the next step on their own.</li> </ul> <p><i>Teachers' agency and efficacy</i></p> <ul style="list-style-type: none"> <li>- During the entry interview, none of the participants had made specific plans to develop further their digital competence, even though they expressed their intentions to try out new things, albeit not in a planned, structured manner.</li> <li>- In many occasions the SfT suggestions received a positive reaction enhancing the intention of the participant to act and to pursue further development of their digital competence, even though this did not also result in solid plans, but rather a stronger will to act. In other cases, though the tool's suggestions to level up did not match the participants' function or responsibilities, and therefore their goals.</li> <li>- Area 6 – Facilitating learners' digital competence was mentioned as the area in which they are more inclined to act.</li> <li>- In most cases where a calibration occurred in the exit interview, this resulted in a score lower than the score the participants used to describe their level in the entry interview.</li> </ul> <p><i>Enablers</i></p> <ul style="list-style-type: none"> <li>- Working along with colleagues that could help them improve is a great support for teachers.</li> <li>- Provision of SfT in structured professional development activities such as courses.</li> </ul> <p><i>Challenges</i></p> <ul style="list-style-type: none"> <li>- Teachers are usually more willing to act if the outcome of the activity will benefit their students and less in development for self-improvement.</li> <li>- Since the SfT tool is designed to be used by teachers across different education levels and systems, it is logical to expect that some descriptions of the feedback provided for each level may fit better in some contexts than others.</li> <li>- Without adequate domain knowledge and a clear understanding of the domain, goal-setting can be problematic and lead to detrimental effects for the participants.</li> <li>- Limited available time.</li> <li>- Lack of available technology within the school.</li> <li>- Indifferent or negative opinions of the role of technology in the classroom.</li> </ul> <p><i>Key conclusions</i></p> <ul style="list-style-type: none"> <li>- The SfT tool received an overall positive response as a helpful and thought-provoking instrument that triggered a self-reflection process that would not have</li> </ul> |
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|  | <p>happened otherwise and allowed the participants a better understanding of their digital competence.</p> <ul style="list-style-type: none"> <li>- The participants praised the role of the tool in improving their self-awareness, even though there were reservations and critiques on how specific, relevant and applicable the feedback was for them.</li> <li>- Enhancement of the SFT tool with adaptive functionalities to provide personalised support to teachers with different backgrounds, profiles and experience.</li> <li>- Provision of actionable advice and information for teachers to make the next step on their own.</li> <li>- The participants seemed more interested in developing their digital competences that would allow them to apply new/improved digital practices in their classroom and less in development for self-improvement in general.</li> </ul> |
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### 5.6.5 Recommendations and lessons learnt from the two Dutch case studies

Based on the findings of the two case studies, there is a number of lessons learnt and recommendations that could be made to better align the SFT to the needs of the teachers across different European countries.

- *Sft value.* The SFT tool received an overall positive response as a helpful and thought-provoking instrument that triggered a self-reflection process that would not have happened otherwise and allowed the participants a better understanding of their digital competence. The participants praised the role of the tool in improving their self-awareness, even though there were some cases where participants were critical on how specific, relevant and applicable the feedback was for them.
- *Prepare the teachers before self-reflection.* When asking for self-reflection, it is important to first prepare and educate the participants so that self-reflection would be more accurate and the goals and expectations more pragmatic. It is, therefore, strongly advised that the tool will first offer an introductory session on the particularities of the self-reflection activity that is about to start. There are, of course, several additional resources already available that include this information. However, going through this material is not necessary or suggested for using the SFT tool.
- *Take into account personal characteristics and goals.* Participants' characteristics are important as they define the context, function, needs and goals of the participant, along with levels of understanding of the DigCompEdu framework. However, as the tool does not use such information, the feedback offered is the same for all teachers of the same level regardless of country, function or career level information. Misalignment with the participants' own contexts, needs and goals can negatively affect how participants perceive the usability and usefulness of the SFT tool. A preparatory questionnaire could feed the SFT tool with this information, allowing the resulting feedback to be tailored to the participant.
- *Focus on teachers' digital competence that will reach their students.* It was evident on many occasions, both explicitly and implicitly, that one of the strongest drives for the participants to improve their digital competence was their willingness to improve their digital practices within the classroom. In other words, professional development in this case is clearly linked to benefits for the students. However, for some levels of the SFT feedback, the focus is away from the classroom and towards society in general. For example, suggesting that the teacher would lead discussions with local, national, and international stakeholders does not draw a line back to the classroom. This connection on how higher levels of digital competence could benefit the students should be made clear to enhance teachers' engagement with the SFT tool.

- *Acknowledge the role of peers and learning climate.* Among the many different factors that affect teachers' agency and self-efficacy in relation to digital competence, fellow teachers and the learning climate within the school seem to have a prominent place and multiple functions. As several suggestions to level up mention collaboration with colleagues, SfT should take into account the varied experience the participants may have with colleagues. In the interviews conducted in the two case studies, the participants described fellow teachers that can be knowledgeable, supportive and engaging and fellow teachers that may have a position with respect to what the SfT tool and the DigCompEdu framework suggest. Similarly, the learning climate at the school was usually mentioned when an issue was described and even though this can vary significantly across schools of the same educational system, the feedback should take this into account when offering advice.
- *A better description of DigCompEdu within the questions and feedback.* The different levels of the DigCompEdu framework as described through the question options and the resulting feedback was not always easy to understand and use by the participants. Often the questions do not "speak" the language of the teacher, while in some occasions there is a combination of different concepts within the same question. Preparing the participant before using the SfT tool or tailoring the feedback to the participant could alleviate this issue. Alternatively, it is also common to provide information and feedback at different degrees to users of varied levels of understanding. For example, mentioning the concept of "micro-teaching" should be enough for a knowledgeable user, while a link could provide popup information on the term to a user that is not familiar with the term.
- *More examples with elaborate descriptions.* Similar to the above, a higher number of examples and alternative concrete steps could improve the impact of the SfT tool. Following the previous recommendation, a standard example could be enough for a knowledgeable user, while additional examples could be readily available for users that need them. The practice of layering information as needed by different user groups is common when developing instructional material. However, no such flexibility is present in the SfT tool.
- *Tailored feedback per country.* Even without a preparation session or a form that would feed the SfT tool with participant-specific information, there is still a user action that offers information on the participants' profile and this is the language version of the SfT tool. The advice is identical for people of the same level regardless of the language. However, since the language is often linked to a specific country, the tool could use this information to present feedback that would be better aligned with the participants' profiles.

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## List of abbreviations and definitions

| <b>Abbreviations</b> | <b>Definitions</b>  |
|----------------------|---|
| DEAP                 | Digital Education Action Plan   |
| DG EAC               | Directorate General for Education, Youth, Sport and Culture                                       |
| DigComp              | European Digital Competence Framework for Citizens  |
| DigCompEdu           | European Framework for the Digital Competence of Educators  |
| EC                   | European Commission   |
| EU                   | European Union  |
| ICT                  | Information and Communications Technology   |
| JRC                  | Joint Research Centre   |
| SELFIE               | Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies |
| SELFIEforTEACHERS    | Self-reflection tool for teachers' digital competence   |
| SfT                  | SELFIEforTEACHERS   |

**List of figures**

Figure 1. SELFIEforTEACHERS areas and items..... 8

Figure 2. Geographical distribution of the SELFIEforTEACHERS case studies participating countries.  
..... 13

Figure 3. DESI 2023 data for the SELFIEforTEACHERS case studies participating countries..... 14

Figure 4. Overview of the SELFIEforTEACHERS case studies main characteristics..... 14

Figure 5. Overview of the SELFIEforTEACHERS case studies participants. .... 17

Figure 6. Colour-coding of case studies elements..... 17

**List of tables**

**Table 1.** SELFIEforTEACHERS case studies synopsis..... 15

**Table 2.** Overview of the SELFIEforTEACHERS case studies ..... 18

**Table 3.** SELFIEforTEACHERS case studies: The data corpus for each case study..... 21

**Table 4.** SELFIEforTEACHERS case studies: coding scheme. .... 23

**Table 5.** SELFIEforTEACHERS case studies: main barriers to teachers’ agency to respond to the tool feedback..... 27

## Annex 1. SELFIEforTEACHERS case studies synopsis

| # | Case | Use case description  | Main actors  | Aim  |
|---|------|---|--|--|
| 1 | CY1  | A local university announces a series of workshops about SELFIEforTEACHERS (SfT), aimed at supporting primary school teachers to develop their digital competence. Individual teachers who wish to improve their digital competence register to participate.  | Individual teachers  | Explore individual teachers' use of the SfT tool through a training programme  |
| 2 | CY2  | SfT is introduced to teachers at a secondary school by an individual teacher, as a self-driven initiative, aiming at contributing to the advancement of the teachers' digital competence. The case study will focus on the perceived strengths, weaknesses, opportunities, and challenges of this effort through the lens of this in-service teacher.                     | In-service teacher who introduces the SfT to her/his school  | Explore the efforts of an in-service teacher to integrate SfT into her school to support the digital empowerment of the school.  |
| 3 | CY3  | SfT is used by individual secondary education Chemistry teachers invited through a university-educational authority collaboration. This collaboration aims to assess secondary school Chemistry teachers' digital competence and identify areas where individual or collective actions could be undertaken. These results will be discussed with the Chemistry Inspector. | Chemistry Inspector, individual chemistry education teachers | Explore how an educational authority (i.e., Inspector) could make use of teachers' aggregate responses to SfT  |
| 4 | EL1  | In-service teachers teaching STEM subjects (Mathematics, Physics, Chemistry, Biology, Technology) are introduced to the SfT through a university-school collaboration and with the encouragement of the school leadership.  | Individual teachers from specific schools                    | Investigate how SfT supports reflection on teachers' digital competences and raises awareness about their strengths, weaknesses and needs, as well as their motivation to plan actions to improve their digital competences through a school/university collaboration. |
| 5 | EL2  | In-service teachers teaching non-STEM subjects (Greek language and literature, English, History, Religious Education, etc.) are introduced to SfT through a university/school collaboration and with the encouragement of the school leadership.  | Individual teachers from specific schools                    | Investigate how SfT supports reflection on teachers' digital competence and raises awareness about their strengths, weaknesses and needs, as well as their motivation to plan actions  |

| # | Case | Use case description  | Main actors  | Aim   |
|---|------|---|--|---|
|   |      |   |  | to improve their digital competence through a school/university collaboration.  |
| 6 | ES1  | Pre-service teachers, currently pursuing compulsory postgraduate education to become secondary teachers. Spain is currently approving the processes for the accreditation of the digital competence of teachers and, therefore, self-evaluation of the competence is of interest for future teachers.   | Pre-service secondary education teachers with a Life Sciences or Language background, enrolled in the master's programme for secondary school teaching | Investigate how the SFT may support teachers' reflection on the ethical and societal impacts of technology in a pre-service programme. Understand the conditions that may contribute to the effective use of SFT.   |
| 7 | ES2  | In-service teachers with high digital competence (teachers with an educational background on Computer Science or similar) who wish to improve their digital competence.   | In-service secondary or vocational training teachers with a high level of digital competence   | Investigate how SFT enables the reflection of digitally competent teachers (teachers with an educational background in Computer Science or similar) with respect to the ethical aspects of their digital competence in an in-service training programme.<br><br>Explore the involvement of individual/school/ system factors to identify those responsible for ethical practices. |
| 8 | FI1  | The Principal of a primary school is interested in helping the school's teachers develop their digital practices. An external mentor suggests the use of SFT as a way to promote teachers' reflection and collaborative discussion about this issue. A workshop is organised together with the leadership team for all teachers of the school to use SFT and the outcomes are used for advising the leadership team regarding future support actions. | School leadership team   | Understand how the school leadership team can use the SFT aggregate results to plan training and develop actions at the school level.   |
| 9 | FI2  | An external mentor, in collaboration with the school leadership team, organises a workshop at a primary school and introduces SFT as a means to support the school's efforts to implement the national New Literacies competence definitions ( <a href="https://uudetlukutaidot.fi/en/">https://uudetlukutaidot.fi/en/</a> ) in Finland. In   | Individual teachers from the same school   | Investigate how SFT supports reflective discussions and collaboration regarding teachers' digital competence and support for students' digital  |

| #  | Case | Use case description   | Main actors  | Aim   |
|----|------|--|--|---|
|    |      | the workshop, all teachers at the school use SfT, which aims to support their reflection and development, as well as professional collaboration.   |  | competence in everyday teaching in a school setting.  |
| 10 | IE1  | This case reports on the design, development, implementation and documentation of an <i>intervention-led</i> case study using SfT to enhance the professional learning experiences of a group of teachers based in four remote, rural primary schools in the west of Ireland.  | Individual teachers from an informal cluster of four (4) schools | Investigate if and how an intervention using the SfT tool might support teachers in increasing their self-efficacy around the use of technology in their work.  |
| 11 | IE2  | The case reports on the use of SfT for professional and pedagogical reasons by a group of school leaders – Principals and deputy Principals – to assist in the (re)formulation of their schools' digital learning plans. The research will involve eight school leaders from across five schools, assisted by a university researcher and a regional primary school Inspector. | School leaders from an informal cluster of five (5) schools      | Explore how school leadership teams may use the SfT tool for planning the development of digital competence at their school.  |
| 12 | NL1  | A university team introduces collaborating in-service primary and secondary school teachers to the SfT tool.   | In-service primary and secondary education teachers              | Explore how in-service teachers reflect on using the feedback provided by SfT to advance their digital competence in an in-service training programme.  |
| 13 | NL2  | A university team introduces collaborating in-service primary and secondary school teachers to the SfT tool.   | In-service primary and secondary education school teachers       | The case study focuses on two of the SfT areas (Area 2: Digital Resources and Area 3: Teaching and Learning) and examines how teachers use the feedback from the SfT tool to support them in advancing from one level to the other in an in-service training programme. |

## **Annex 2. SELFIEforTEACHERS case studies interview protocols**

The interview protocols adapted for different target groups (teachers, school leaders/policymakers)

### **I. Interview Protocol 1 – Teacher Interview Protocol**

*Introduction: The questions in the following semi-structured teacher interview protocol aim to capture the following areas of interest:*

- 1) *Background information on teacher's self-efficacy, agency to learn, and past professional development experiences.*
- 2) *How teachers perceive SFT (ease of use, usability, usefulness).*
- 3) *Teachers' agency and plan of action after responding to SFT.*
- 4) *Personal, institutional and systemic aspects that can support or hinder the utilisation of SFT self-reflection tool.*

#### *General guidelines*

- Proper qualitative interview techniques should be adopted, i.e.
  - Prompt participants to explain their point of view.
  - Refrain from sharing researchers' own opinion on the topic to avoid biasing the respondents.
  - Do not reveal judgement of any of their responses (either positive or negative).
  - As this is a semi-structured interview, add any follow-up questions to clarify participants' responses or to help them expand on a point of view they expressed and respond to the aims of the study (namely, to help us understand the personal, institutional, and systemic reasons for using/not using the SFT tool productively).
- Interviews should be video- or audio-recorded, with explicit permission from the participants.
- The JRC Consent Form should be completed prior to the interview.
- Transcriptions of interviews (in the language in which they were recorded) will be expected to be shared with JRC.

#### *Interview questions and procedure*

- Introduction/welcome

Hello. I am ..., [role] at the [name of institution]. First of all, I would like to thank you for taking the time to speak with us about the SELFIEforTEACHERS (SFT) self-reflection tool. The purpose of the invitation for this interview, which will be conducted with all of the participants in the programme, is, on the one hand, to better understand participants' needs, in relation to the objectives of the seminars, and on the other hand, to be able to provide anonymous feedback to the European Commission on how best to use such tools and the impact they could have on teachers' professional learning and improving their digital skills. In fact, this work is being conducted as part of a contract, and in collaboration with the European Commission's Joint Research Centre (JRC).

It is for this reason that we want to ask you some questions regarding your experiences in relation to teachers' digital competences, completing the SFT self-reflection tool, and any actions you might want to take regarding the improvement of your digital competences for personal and professional purposes. I would like to record this interview, with your permission. Please be assured that any recording will not be made public and will only be used with your permission and for the purposes of documenting the views we will exchange. I also want to assure you that these opinions will not be used by name but only anonymously. Would you give your consent to continue with the recording?
- Interview questions

As this is a semi-structured interview, the interviewer should prompt participants for additional information that can help understand the personal, institutional, and systemic reasons for using/not using the SFT tool productively.

## **1. Background information (self-efficacy, teacher agency, professional development experiences)**

1.1 What made you interested in this tool (or seminar, or workshop)?

1.2 Do you use digital technologies in your teaching or for other professional purposes?

- If yes, why ... Is this a personal-driven decision or is it triggered by other factors (top-down initiatives? School policies? Curriculum requirements? etc.)
- Can you give us some examples? [How]

1.3 On a scale of 1-10, how confident do you feel about your digital competences for your own personal use? Why did you choose this number?

*Follow up questions: Do you feel more or less competent in relation to specific digital skills? If yes, which are the areas you feel more competent? Why? Which are those areas you feel less competent? Why? [Note to the interviewer: You should be prepared to remind teachers of the areas, if they do not remember, or even show them as you discuss this.]*

1.4 On a scale of 1-10, how confident do you feel about your digital competences in your teaching or your professional practice? Why did you choose this number?

*Follow up questions: Do you feel more or less competent in relation to specific digital skills? If yes, which are the areas you feel more competent? Why? Which are those areas you feel less competent? Why? [Note to the interviewer: Connect this discussion to the SfT areas as much as possible.]*

1.5 What experiences in your personal and professional life have led you to develop these digital competences? (Clarify which competences these might be.) Which of these were the most important ones?

1.6 What makes you decide if you are going to use digital tools in your practice (for your own learning or for teaching)?

1.7 What are your experiences with Professional Development (PD) regarding the use of technology: Have you participated in any PD programmes focusing on the development of your digital competences? How many? When? What were they about? Can you give us some examples? Who initiated this participation?

## **2. Reflecting on the SfT**

2.1 Have you used SfT or a similar tool before? How? When?

2.2 How easy or difficult was it to complete SfT?

2.3 What was the easiest aspect?

2.4 What was the most challenging?

2.5 Was the score and feedback you received what you expected? Why? Why not?

2.6 What did you find most surprising in your results? What did you find as least surprising?

2.7 How useful or not have you found the SfT tool?

2.8 Do you feel you might have learned something about what digital competences for teachers are, or for yourself personally, as you were completing, or after you completed the SfT self-reflection? [If they answer yes, then you can ask:] "How did SfT help you to engage in such learning/learning experience?"

2.9 Did you read/use any of the SfT online support (e.g., resources, toolkit)? Why? How? (If not, why not?)

2.10 Would you recommend SfT to your colleagues? For individual or whole school use? Why? Why not?

2.11 What could make SfT more useful to you or to other colleagues?

## **3. Agency and plan of action**

3.1 What do you think about the feedback you received from SfT? How easy or difficult was it to interpret?

3.2 Are you planning to act on the feedback that you received? Why? Why not? What type of action? In which area(s)? How? (Prompt to explain.)

3.3 Are there any resources or people in your school that could support you in using the feedback from SfT for your professional learning?

3.4 Are there any resources or people in your educational system or your country that could support you in utilising the feedback from the SfT for your professional learning?

3.5 If you were to choose one of the SfT areas to improve in, which one(s) would you select? Why? (How will this be useful to you in your profession?)

3.6 Do you expect any challenges or obstacles in improving your results in this area? What might these be?

3.7 How would you go about improving your digital competences? Can you accomplish this on your own or do you think you might seek some kind of support? (If so, which type of support/by whom?)

3.8 Do you usually collaborate with other teachers (in your school or elsewhere) to learn new professional practices or devise a plan for professional development? (If yes: can you please explain this collaboration? i.e., who initiates it? Who supports it? What form does it take? What is the expected duration and outcomes, etc.?)

#### 4. After teachers complete their professional learning design (plan of action)

4.1 On a scale of 1-10, how confident do you feel about your digital competences for your own personal use now that you have completed SfT? Why did you choose this number?

*Follow up questions: Now that you have completed SfT, do you feel more or less competent in relation to specific digital skills? If yes, in which areas do you feel more competent? Why? In which areas do you feel less competent? Why?*

4.2 On a scale of 1-10, how confident do you feel about your digital competences in your teaching or your professional practice now that you have completed SfT? Why did you choose this number?

*Follow up questions: Now that you have completed SfT, do you feel more or less competent in relation to specific digital skills? If yes, in which areas do you feel more competent? Why? In which areas do you feel less competent? Why?*

## II. Interview Protocol 2 – School leader/policymaker Interview Protocol

*Introduction: The following describes a protocol for a semi-structured school leader interview. This seeks to capture the following areas of interest:*

- 1) *Background information on the school's current status in using digital technologies and teachers' digital competence.*
- 2) *How leaders perceive SfT (ease of use, usability, usefulness).*
- 3) *The plan of action after using SfT in the school to support teachers' professional learning and self-reflection at the individual and school levels.*
- 4) *Personal, institutional and systemic aspects that can support or hinder the utilisation of the SfT self-reflection tool.*

### *General guidelines*

- Proper qualitative interview techniques should be adopted, i.e.
  - Prompt participants to explain their point of view.
  - Refrain from sharing the researcher's own opinion on the topic to avoid biasing the respondents.
  - Do not reveal judgement of any of their responses (either positive or negative).
  - As this is a semi-structured interview, add any follow-up questions to clarify the participants' responses or to help the respondents expand on a point of view they expressed.
- Interviews should be video- or audio-recorded, with explicit permission from the participants.
- The JRC Consent Form should be completed prior to the interview.
- Transcriptions of interviews (in the language in which they were recorded) will be expected to be shared with JRC.

## Interview questions and procedure

- Introduction/welcome

Hello. I am ..., [role] at the [name of institution]. First of all, I would like to thank you for taking the time to speak with us and for your interest in participating in the experiential seminars that we organise. The purpose of the invitation for this interview, which will be conducted with all the participants in the programme, is, on the one hand, to better understand participants' needs in relation to the objectives of the seminars, and on the other hand, to be able to provide anonymous feedback to the European Commission on how best to use such tools and the impact they could have on teachers' professional learning and improving their digital skills.

It is for this reason that we want to ask you some questions regarding your experiences in relation to teachers' digital competences, completing the SfT questionnaire, and any actions you might want to take regarding the improvement of your digital abilities for personal and professional purposes.

Before we proceed, I would like to mention two more issues: The first is that we would like to record this interview, with your permission. Please be assured that any recording will not be made public and will only be used with your permission and for the purposes of recording the views we will exchange. Next, I want to assure you that these opinions will not be used by name but only anonymously. Are you OK with this and with the video recording?

- Interview questions

As this is a semi-structured interview, the interviewer should prompt participants for additional information that can help understand the personal, institutional and systemic reasons for using/not using the SfT tool productively.

### **1. Background information (self-efficacy, teacher agency, professional development experiences)**

1.1 What made you interested in using this tool (or seminar, or workshop) with your teachers?

1.2 Do teachers at your school use digital technologies for teaching or for other professional purposes?

- If yes, ... Is this a personal-driven decision or is it triggered by other factors (top-down initiatives? School policies? Curriculum requirements? etc.)?
- Can you give us some examples? [How]
- If they say that teachers are using digital technologies for other professional purposes, ask them to elaborate and explain.

1.3 How central are digital technologies to your school's priorities?

1.4 How confident do you think that teachers in your school are about their digital competences for their own personal use? Describe the variation.

1.5 How confident do you think that the teachers in your school are about their digital competences for teaching or professional practice? [*Prompt them to explain what they refer to and provide more details.*] Are all teachers at your school at the same level? What variations have you identified?

1.6 What kinds of factors in teachers' personal or professional lives, in your opinion, motivate them to develop their digital competences? (Clarify which competences these might be.)

1.7 What, in your opinion, makes teachers decide if they are going to use digital tools in their practice (for their own learning, for various professional reasons, or for teaching)?

1.8 What kinds of Professional Development possibilities do teachers at your school have regarding the use of digital technologies:

- As far as you know, have teachers in your school participated in any PD programmes in the last year? [If yes, can you please describe what these programmes are?]
- Have you organised events or programmes at your school focusing on the development of teachers' digital competence? [If they do not provide information about these on their own, prompt them to do so. E.g.: How many? When? What did they involve? Can you give us some examples?]
- Who initiated these professional development opportunities?
- Was teachers' participation required or voluntary?
- Is there time devoted in the school calendar for teachers to work together? Can you explain?
- How would you describe your school culture in terms of sharing, collaborating, reflecting, etc.?

## 2. Reflecting on SfT

2.1 Have you used SfT or a similar tool before in your school to support teachers' development of digital competences?

If yes, how? When? Who used it?

If no, have you ever considered it? [Prompt to elaborate]

2.2 How useful do you think the SfT tool will be for teachers' professional learning?

2.3 Could the SfT tool support your school's priorities? Why/why not? In what ways? [Prompt to elaborate]

2.4 What kind of support do you think teachers might need to follow up on the SfT feedback?

Who is in the best position to provide that support? [Variations/additional questions: Whose role is it? Who is responsible to provide that support?]

2.5 Do you think that the aggregated results of the SfT could be used to support the goals of the school? [If yes, ask how. Prompt them to explain the answer.]

2.6 Would you recommend SfT to teachers or other school leaders? Why? How? Why not?

2.7 What could make SfT more useful to teachers or schools?

## 3. Agency and plan of action

3.1 How are you planning to use the aggregated feedback from SfT? (Prompt to explain.)

3.2 If you were to choose one or more of the SfT areas to improve in the school, which one(s) would you select? Why? (How will this be useful for developing the digital competences of the teachers in your school?) What actions would you take to achieve such a task?

3.3 Do you expect any challenges or obstacles in improving teachers' digital competences? What might these be?

3.4 How would you go about improving teachers' digital competences in your school? *[Note to interviewer: prompt to refer to both the individual and school levels.]*

What kind of support do you think that your teachers need?

Can you accomplish this using the schools' own resources or do you need external support? (If so, which type of support/by whom.)

3.5 Would you consider a new school-reflection exercise with SfT? If yes, why? If not, why?

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