

# SUPPORTING NATIONAL STRATEGIES ON TEACHERS' DIGITAL COMPETENCE

through the use of SELFIE for teachers  
in North Macedonia (Working paper)

Authors:

*Republic of North Macedonia: Gordana Janakievska, Nadica Kostoska and Zorica Velkovska*

*European Training Foundation (ETF): Alessandro Brolpito*

*Joint Research Centre (JRC): Anastasia Economou, Georgios Kapsalis*

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## Abstract

The increasing integration of digital technologies into teaching, learning, and assessment demands that educators develop various digital competencies. These skills are essential for improving teaching methods, adopting blended learning approaches, and fostering the digital competence of learners. To achieve this, education and training systems must equip educators with the right tools and processes for cultivating digital skills. This effort requires collaboration across all levels of the education sector, with educators playing a direct and active role in their own professional development. SELFIEforTEACHERS addresses this need by offering a platform for teachers to engage in self-reflection on their digital practices. It enables educators to assess their current skill levels and develop personalized plans for improvement, tailored to their specific needs and teaching contexts.

Beyond individual reflection, SELFIEforTEACHERS also provides valuable insights through anonymized data aggregation. This allows school leaders and policymakers to understand the broader trends in teachers' digital competence across the education system. Such insights can inform initiatives aimed at improving digital skills among educators, both at the national level and, as the tool gains wider adoption in the Western Balkans, at the regional level.

The study in the Republic of North Macedonia was launched under the framework of the European Neighbourhood Policy, as part of an initiative to strengthen the digital competence of educators across the Western Balkans. It provides representative data on the digital skills of teachers in vocational education and training (VET), as well as upper secondary educators, including those in both general education and VET sectors. In addition, the study offers policy recommendations aimed at promoting national ownership and fostering the systematic use of the SELFIEforTEACHERS tool.

# Foreword

Digital transformation and the development of the IT industry are key to how a country will adapt and be competitive in the digital era, in that direction, the economic development is only possible through well-educated human capital. Education is playing crucial role in taking advantage of these changes in technology. From the European Skills and Work Survey conducted in 2023 in the Republic of North Macedonia, 23% of respondents declared that a new digital technology was introduced in their workplace, this average in the EU is 43%. Also, 45% of respondents stated that they participated in some kind of training or education activity to learn new work-related skills. This average in EU countries is 62%.

Changes are happening every day and the only way to accept them as an opportunity is by developing capacities of teachers who have main role in building a climate that allows the individual to develop, collaborate, innovate and think critically. In this context the SELFIEforTEACHERS tool is initiative that will support development of IT educated human capital at school level.

The Ministry of Education and Science contributed in the development of a new advanced EMIS (Education Management Information System) and set up electronic processes for students to make use of their rights for scholarships, accommodation in dorms, enrolment in primary and secondary school, nostrification of diplomas, and other various services.

The Council conclusions on European teachers and trainers<sup>1</sup> emphasize that educators are a driving force in the development of education and training policies. It highlights the need for their involvement in policy creation, while also stressing the importance of providing comprehensive support through initial education, induction, and ongoing professional development. Notably, many teachers express a strong need for professional development in the area of digital competence.

Within the framework of the European Neighborhood Policy, this study aims to support the development of digital competence of educators in North Macedonia. This regional initiative has two primary objectives: (i) to support policymaking by providing evidence for educators' continuous professional development systems, and (ii) to inform future EU policy support for the region.

The study presents representative statistics on the digital competence of vocational education and training (VET) teachers in Albania and upper secondary educators, including general education and VET, in North Macedonia. Additionally, it offers a set of policy recommendations to encourage national ownership and the systematic use of the tool SELFIEforTEACHERS.

This collaborative effort involves the European Training Foundation (ETF), the Joint Research Centre (JRC), and the European Commission's Directorate-General for Education, Youth, Sport, and Culture (DG EAC). In North Macedonia, the study has been carried out in partnership with the Ministry of Education and Science (MoES) and the Bureau for Development of Education (BDE).

*Nadica Kostoska*

Deputy Head of the Department for the European Union  
Ministry of Education and Science of the Republic of North Macedonia

*Gordana Janakievska*

Head of the unit for monitoring and evaluating student's and teacher's achievement  
Bureau for Development of Education of the Republic of North Macedonia

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SELFIEforTEACHERS has been developed by the European Commission as part of the work on digital education and skills. It has been developed by the Joint Research Centre (JRC) in collaboration with the Directorate-General for Education, Youth, Sport and Culture (DG EAC).

SELFIEforTEACHERS is one of the actions of the European Commission Digital Education Action Plan (DEAP 2021-2027).

### **Authors**

North Macedonia: Gordana Janakievska, Nadica Kostoska and Zorica Velkovska

ETF: Alessandro Brolpito

JRC: Anastasia Economou, Georgios Kapsalis

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## Executive summary

This study aims to provide information on teachers' views on their digital competence and guide national authorities in enhancing professional development initiatives aimed at improving digital competence of teachers in secondary education. The research focused on teachers in upper secondary education, including both general and VET educators. Using the SELFIEforTEACHERS tool, the study guided involved teachers in an individual self-reflection process aimed to reflect and assess their digital competence and gathered valuable insights to inform future educational policies and professional development programs.

A total of 476 responses were collected during the data collection period, which was lower than anticipated due to several factors, including the increased workload of teachers, particularly with the preparation for Matura exams, and the additional pressures caused by national elections. These challenges emphasize the need for careful timing in future studies to maximize teacher participation.

The results of the study revealed that teachers in North Macedonia perceive their digital competence to be at the "Integrator" level (B1) on the DigCompEdu scale (similar to the Common European Framework of Reference for Languages from A1 to C2), indicating that they are experimenting with digital technologies but have room for further integration into their professional practice. Teachers showed stronger competence in using digital technologies for communication and information retrieval but identified areas such as emerging technologies and computational thinking as areas for further development.

The study provides data on teacher digital competence and offers a set of policy recommendations aimed at promoting national ownership and the systematic use of SELFIEforTEACHERS tool. Key policy implications include the need for regular, structured use of the tool to assess and improve teacher digital competence, as well as the importance of establishing a national, multidisciplinary team to oversee its implementation. Furthermore, the study highlights the potential value of SELFIEforTEACHERS as a tool for tailoring professional development programs to meet the specific digital learning needs of educators.

### Policy context upper secondary education, including general education and VET, in Republic of North Macedonia

In a changing world with new challenges, the European Union is focused on staying competitive and prosperous. The vision that drives Europe forward is to create conditions where businesses thrive, the environment is protected, and everyone has an equal chance at success. The future of European competitiveness report identifies three main areas for action to reignite sustainable growth<sup>1</sup>: the need to accelerate innovation and find new growth engines, bring down high energy prices while continuing to decarbonise and shift to a circular economy, and responding to the new geopolitical environment with more assertive policies. The report suggests that in order to assess and address current skills shortages, the EU and its Member States should, first and foremost, improve their use of skills intelligence by utilizing data much more intensively. Second, institutions of education and training must adapt more quickly to the shifting demands for skills and the skill shortages that the skills intelligence has discovered. Employers and other stakeholders must be included in the revision of the curriculum.

The Republic of North Macedonia has to restructure its approach to skills, making it more future-focused, strategic, and attentive to new skill, and all new initiatives in order to be effective need to be done in collaboration with all relevant stakeholders. The development of human capital is the most important factor in achieving a higher competitiveness of the economy, and at the same time it is the most productive way to meet the challenges towards the European Union's single market. Such goal is in line with the flagship strategic documents: Education Strategy 2018-2025 and the Smart Specialization Strategy.

Since the academic year of 2007/2008, the secondary education has become mandatory for every citizen, and the horizontal and vertical mobility of students has been made possible. The State Matura exam was introduced in 2008.

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<sup>1</sup> [The future of European competitiveness: Report by Mario Draghi](#)



Specifically, on VET, North Macedonia began participating in the Osnabruck Declaration monitoring process in 2022 when the Country Brief and National Implementation Plan were developed and submitted. In this process, collaboration has turned into an inspiration for more effective planning of the VET modernisation towards the strategic aims and goals of Europe. The tripartite platform for collaboration was chosen as the most efficient way to have modernized VET ecosystem based on cooperation with social partners, chambers, VET providers and learners' organisations at national and regional level.

The new drafted educational laws (Law on Secondary Education, Law on VET and Law on Adult Education) foresees novelties for better harmonisation with the world of work, such as introduction of the Career Advisors, Coordinators for VET and the Unique Student Educational Number, additionally, chapters on Regional VET Centers, Dual Education, and Conducting Social Dialog for harmonization of the education with the labour market needs are made. Substantial efforts have been made to increase enrolment in vocational education, resulting in 67.3% of secondary students choosing for vocational schools over gymnasiums in the 2023/2024 academic year.

Additionally, the Ministry of Education and Science (MoES) established 3 Regional VET Centres by transformation of the existing VET school in 2019 and introduced 2 new additional Regional VET Centers in 2024. The MoES created and adopted a Concept for Establishment of the Regional VET Centers and under preparation is the new Strategy for Education of Adults.

During the COVID-19 epidemic, North Macedonia implemented distance learning model, which exposed several challenges, especially regarding digital infrastructure, teacher readiness, and student involvement. Addressing these issues requires a collaborative approach involving the government, communities, and international organizations to ensure equitable access to quality education for all students.

In the post-COVID-19 era, enhancing teachers' digital competence is crucial for effectively integrating digital technologies into teaching and learning, thus supporting higher quality and relevance of primary and secondary education, in line with the new Law for Secondary Education – Article 60 (3) that foresees that “In teacher`s planning of the implementation of the curriculum, the teacher obligatorily will plan at least 20% of the contents of the curriculum to be realized through digital forms and contents”.

Additionally, through the results of the IPA project's second component - Improved process of development and implementation of the ICT and digital skills/ competences in education, teachers were equipped with a wide range of skills, with a particular emphasis on digital competencies. These competencies include the ability to access, manage, understand, integrate, communicate, evaluate, and create information effectively and responsibly.

## Main findings

The study aimed to utilise SELFIEforTEACHERS as a tool to assess the self-perceptions of secondary education teachers in the Republic of North Macedonia regarding their digital competence. Additionally, it sought to assist national authorities in designing professional development programs for secondary education teachers. Specifically, the study involved a representative sample of teachers from general, vocational (VET), and mixed schools<sup>1</sup> in North Macedonia, with the goal of answering two key research questions:

**RQ1 - How do teachers of secondary education in North Macedonia perceive their digital competence; and**

**RQ2 - What digital competence areas and topics are more relevant to the needs of secondary education teachers in North Macedonia.**

In response to RQ1, the findings revealed that participants generally perceived their digital competence at the 'B1–Integrator' competence level. This suggests that teachers experiment with digital technologies in a variety of contexts and for different purposes, but the next step for them is to critically integrate these technologies into their professional practice<sup>2</sup>.

In response to RQ2, the findings indicate that participants tend to perceive themselves as more competent in using digital technologies for communication and searching for information, while they consider themselves as less competent in areas such as emerging technologies and computational thinking.

These findings are cross cutting findings from evidence, in the form of aggregated anonymised data from a representative sample of teachers.

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<sup>2</sup> More information regarding each competence levels can be found in the ["Toolkit Using SELFIEforTEACHERS : supporting teachers in building their digital competence"](#)

## Related and future work

With the goal of fostering stronger partnerships between the EU and candidate countries in education (Chapter 26), the study will expand in 2025 to include new countries in the Western Balkans. This will provide multi-country data, offering a regional perspective and contributing to a shared strategic approach for developing educators' digital competence across the region.

The Republic of North Macedonia could consider running SELFIEforTEACHERS on a regular basis to continuously gather data on educators perceived digital competence, as well as on relevant professional learning and development programs at both school and system levels. To achieve this, based on the process outlined in this study, the country should undertake a series of initiatives to institutionalize the tool and its related conceptual framework, DigCompEdu, by embedding them into national digital education reforms. Under the policy messages and lessons learned, there are valuable and inspiring elements to be considered in its implementation.

The study can also serve as a key reference for policymakers, researchers, regional authorities, and other stakeholders, providing a foundation for discussing, planning, designing, and developing various instruments, actions, policies, strategies, and research aimed at enhancing digital competence.

## Quick guide

This working paper documents the exercise findings to support teachers' professional learning and development of their digital competence in North Macedonia, as a candidate country for accession in the EU. To pursue this goal, the European Commission self-reflection tool SELFIEforTEACHERS was used in a study in the period from February to November 2024. In parallel, a similar study was also conducted in Albania. This national working paper presents the findings and conclusions specific to North Macedonia, while a publication of a comprehensive report summarising the results from both countries (North Macedonia and Albania) is in progress (Economou, A., Kapsalis, G., & Brolpito, A. *Supporting national strategies on teachers' digital competence through the use of SELFIEforTEACHERS: the case of Albania and North Macedonia*. JRC 2024). A separate national working paper detailing the findings and conclusions for Albania is likewise available.

The study findings support a number of recommendations and lessons learnt for policymaking and action planning for teacher professional development at national, school and individual (teacher) level. At the same time, the country implementation findings can provide practices that can apply to similar contexts and could provide useful recommendations for education stakeholders to implement in their own settings as well as at EU policy planning. The report is organised as follows:

- presentation of the conceptual and contextual underpinning of the work;
- description of the methodology; presentation of findings;
- discussion of the lessons learnt and
- policy implications of this work.

## Key conclusions

- Digital Competence Levels:** The study revealed that secondary education teachers in North Macedonia perceive their digital competence to be at the "Integrator" level (B1) on the SELFIEforTEACHERS scale (A1...C2). This indicates that while teachers are experimenting with digital technologies in various contexts, there is room for further integration and critical use of these tools in their professional practice.
- Strengths in Communication and Information Retrieval:** Teachers reported perceived higher competence in using digital technologies for communication and information retrieval. This suggests that they are relatively confident in utilizing digital tools for collaboration and finding educational resources, which are critical for effective teaching.
- Challenges in Emerging Technologies and Computational Thinking:** The study identified gaps in teachers' perceived competence in areas such as emerging technologies and computational thinking. These areas represent opportunities for targeted professional development, as they are becoming increasingly relevant in modern education systems.
- Importance of Tailored Professional Development:** The results underscore the need for tailored professional development programs that address the specific digital competence needs of educators. Teachers expressed a desire for more training opportunities, particularly in advanced digital skills, to better integrate technology into their teaching.
- Impact of Contextual Factors:** The study highlighted the influence of contextual factors such as school type, language of instruction, and regional distribution on teachers' digital competence levels. This indicates the need for differentiated approaches in professional development to accommodate diverse educational environments across the country.
- Teacher Participation and Anonymity:** The study demonstrated that providing clear communication and ensuring the anonymity of the self-reflection process are key to encouraging teacher participation. Teachers were more willing to engage meaningfully in the process when assured of confidentiality, which contributed to the authenticity of the data collected.
- Moderate Response Rate:** The study collected a total of 476 responses, which was lower than anticipated. This has been influenced by several factors, including the increased workload on teachers, particularly related to the Matura exams, as well as the additional pressures related to the national elections. The elections brought non-working days and limitations on organizing events, further complicating efforts to engage participants during the exercise. This highlights the importance of carefully planning the timing of data collection in future studies to avoid such challenges and maximize teacher participation.
- Potential for Long-term Implementation:** The study confirmed the value of SELFIEforTEACHERS as a tool for assessing and improving teacher digital competence. There is potential for long-term, regular use of the tool to continuously monitor and develop educators' digital skills, which can inform evidence-based policy decisions and professional development initiatives.

These conclusions provide insights into the current state of digital competence among secondary education teachers in North Macedonia and highlight areas where further support and development are needed.

# 1. Introduction

## 1.1 Purpose of the study

As part of a regional initiative in the Western Balkans, this study aims to provide suggestions and recommendations for education stakeholders in North Macedonia on how to enhance teacher digital competence development programs and resources. These programs are essential for fostering professional competencies in the use of digital technologies, thereby supporting the digital transformation of education, with a particular emphasis on vocational education.

Simultaneously, the study seeks to contribute to EU policy development in this area, enriching the existing data and informing future policy directions.

While SELFIEforTEACHERS provides valuable insights, the findings reflect teachers' own perception of their digital competence; hence these findings can be supplemented with data from traditional education surveys and qualitative analysis. This combined approach will offer a more comprehensive view of teachers' digital competence, particularly in North Macedonia, and help create a more holistic understanding of the digital skills landscape.

## 1.2 North Macedonia context

Regarding skills, Republic of North Macedonia is updating its education system to meet EU standards, with a focus on lifelong learning, vocational, and digital education. This includes working on the three new laws which are relevant for improving the quality of education. The proposal for the new Law on Secondary Education clearly defines and systemically regulates the inclusion of students with disabilities in secondary education, ensuring appropriate educational support for each student integrated into regular teaching processes. Also, according to Article 60 (3), teachers are required to prepare and implement for at least 20% of the curriculum's contents through digital forms and contents. The new Law on VET foresees novelties for better harmonisation with the world of work, such as introduction of the Career Advisors, Coordinators for VET and the Unique Student Educational Number, additionally, chapters on Regional VET Centers, Dual Education, and Conducting Social Dialog for harmonization of the education with the labour market needs are made.

All the novelties previously were piloted and substantial efforts have been made to increase enrolment in vocational education, resulting in 67.3% of secondary students choosing for vocational schools over gymnasiums in the 2023/2024 academic year. The attractiveness of secondary vocational education is stimulated by providing a fund of 2,200 scholarships for first-year students, with a total value of about 60 million denars. Students who are enrolled in a dual class will receive a monthly amount of MKD 3,500 for 9 months of the year. This support is continued for all students in dual classes for each year of their VET education.

The new Draft Law on Adult Education outlining procedures for validating non-formal and informal learning. Proposed amendments within the new law aim to enhance the verification process for special adult education programs and redefine the role, goals, and tasks of the Adult Education Center.

The core of the reforms in VET and AE has been and will be the establishment of Regional VET Centres (RVETCs), which are being developed in partnership with local employers. These centers are expected to serve as regional centers of excellence, optimising resources and offering training programs that are closely aligned with the needs of regional labor markets. The success of RVETCs will be crucial in providing more relevant and effective training opportunities and addressing the skills mismatch in the labor market.

In 2022, the Republic of North Macedonia saw significant participation in education and lifelong learning activities among its population aged 18 to 69, with 346,155 individuals engaged, of which 48.5% were men and 51.5% were women. The age group with the highest participation was 18 to 24 years (28.1%), while the 65 to 69 age group had the lowest (0.3%). The overall participation rate in education and training stood at 27.7%, with a higher rate of 37.2% observed among those aged 25 to 34.

The National qualification board (NQF) from 14 sectoral commissions, established 12 with participation of representatives from the businesses.

The Education Strategy 2018-2025<sup>3</sup> has already identified these goals and outlined steps to achieve them through enhanced standards, improved assessment methods, teacher training, and increased investment in the teaching and learning environment. Additionally, the government aims to improve the generally low and uneven educational attainment across the population by creating learning pathways within the framework of lifelong learning and strengthening support for students with special educational needs.

The Strategy has been implemented through the development of policy documents, action plans and legislative reforms. The reforms have been supported by a large package of ongoing projects funded by the EU and other international donors and are accompanied by increased funding for capital investment in education infrastructure. However, the level of spending on education resulting in partial institutional capacity, the limited inter-sectoral coordination and the pending adoption of key legislation appear to be hampering the successful implementation of the Strategy. Public spending on education and training decreased slightly to 3.71% of GDP in 2022 (3.98% in 2021), which is still far below the EU average of 5%<sup>4</sup>.

### 1.3 SELFIEforTEACHERS and DigCompEdu

To address the need to describe teacher-specific digital competence the European Framework for the Digital Competence of Educators (DigCompEdu) was developed. DigCompEdu specifies educators' digital competence as professional competences, pedagogical competences, as well as competences related to learners' competences. The framework is structured around 22 specific digital competences and classified within 6 areas: (a) professional engagement, (b) digital resources, (c) teaching and learning, (d) assessment, (e) empowering learners and (f) facilitating learners' digital competence (Redecker, 2017). Based on DigCompEdu, SELFIEforTEACHERS (SfT) was developed by the European Commission as an online tool to support teachers build their digital competence through a self-reflection process (Economou, 2023). SfT guides teachers to self-assess their teacher-specific digital competence through 32 self-reflection items (Fig. 1). Each item offers 6 answer options for users to choose from, reflecting the level of their digital competence.

The 6 answer options are aligned with the DigCompEdu proficiency progression model of Newcomer (A1), Explorer (A2), Integrator (B1), Expert (B2), Leader (C1) and Pioneer (C2). Upon completing their self-reflection using SfT, teachers receive an individual feedback report with their results and suggestions on possible next paths. Based on their report, they are prompted to design their professional learning paths, addressing their needs. Moreover, the aggregated anonymised results can support education stakeholders plan teacher professional development programmes at school and system level.

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<sup>3</sup> [EDUCATION STRATEGY FOR 2018-2025 and Action Plan, Republic of North Macedonia](#)

<sup>4</sup> [North Macedonia 2023 Report](#)



Figure 1. SELFIEforTEACHERS areas and items.



Source: SELFIEforTEACHERS tool infographics, 2021 Study implementation

## 1.4 Set up

The study in North Macedonia was carried out by a well-structured team, coordinated at two levels:

- **The SELFIEforTEACHERS (SfT) Steering Group**, comprising representatives from the European Training Foundation (ETF), Joint Research Centre (JRC), and Directorate-General for Education and Culture (DG EAC). This group steered the initiative at the regional level, provided reference standards, and offered methodological support.
- **The SELFIEforTEACHERS (SfT) North Macedonia Team**, led by an assigned National Coordinator, supported by a project coordinator and an econometric expert recruited by the ETF. This team was responsible for the local implementation of the study at country level.

The SfT Steering Group provided essential resources and defined the methodological approach for the translation of the SfT tool and teacher sampling. It also equipped the team with tools for online collaboration, in both synchronous and asynchronous modes. Regular online meetings were scheduled, including a formal, multilingual (EN-MK-ALB) kick-off event in April 2024, and a dissemination event in November 2024. The Steering Group actively monitored the progress of the study and offered ongoing support to the SfT North Macedonia team to ensure the successful completion of their tasks.

The National Coordinators in North Macedonia led the coordination of the public institutions and schools involved in the study, including the Ministry of Education and Science (MoES), the Bureau for Development of Education (BDE), and various high schools.

Within the national team, the selected ETF project coordinator managed the translation, validation, and testing of the SfT tool in close collaboration with the local team. The ETF project coordinator also drafted the SfT Inception Report for North Macedonia, incorporating input from other team members, and closely monitored the self-reflection exercise, ensuring smooth execution and contributing the report writing process.

The selected econometric expert spearheaded the design and implementation of the sampling process, working closely with the SfT North Macedonia Team to ensure accurate representation.



The SfT self-reflection questionnaire was available for a four-week period, from April 19 to May 17, 2024, on the DigCompEdu web platform, within a dedicated group for North Macedonia. A shared link was provided to the invited teachers, enabling the collection and analysis of aggregated, anonymous data.

## 1.5 Communication

The SfT National Coordinators were responsible for leading the official communication with schools (managers and selected teachers) by sending two key letters through formal channels:

- An **Official Letter** to the selected high school managers, informing them of the initiative and requesting their support in facilitating the participation of selected teachers.
- An **Official Invitation** to the selected teachers, inviting them to the online Kick-off meeting.

In close collaboration with the SfT National Coordinator, the ETF's project coordinator ensured regular communication, providing assistance and support to teachers throughout the self-reflection exercise via various communication channels, including emails and ZOOM.

The ETF facilitated continuous communication within the steering group and between the steering group and the national team. This was achieved through both synchronous tools (online meetings) and asynchronous methods (shared folders).

A national online Kick-off meeting was held on April 19, 2024, featuring presentations from the ETF and JRC, along with addresses from officials of relevant institutions in North Macedonia. The event included dedicated time for guiding participants through the exercise process and an interactive Q&A session.

An online dissemination event is scheduled for November 2024 to share the outcomes of the study.

## 1.6 Tool translation methodology

The translation and adaptation process of SELFIEforTEACHERS into Macedonian followed a structured series of activities:

- 1. Review of the National Curriculum and Identification of Key Terminology:** The first step involved a thorough review of the national curriculum to identify key concepts and terminology related to digital technologies and competences. These terms were compiled to serve as reference material for further refinement and adaptation.
- 2. Consultation of DigCompEdu and Existing SELFIEforTEACHERS Materials:** The second step entailed reviewing both the DigCompEdu framework and the SELFIEforTEACHERS tool to cross-check the key terms identified in step one. This allowed the team to verify or select the most accurate translations, particularly in cases where terms were ambiguous.
- 3. Iterative Translation and Adaptation:** The translation process followed a systematic, step-by-step approach using Excel files, which were also employed in the translation in Macedonian language on the SELFIEforTEACHERS platform. The team began by translating the Help Text, which contained the majority of the key terms and concepts. Translators kept detailed notes of recurring terms to ensure consistency and accuracy as the process unfolded, refining the translations as needed.

4. **Review and Refinement:** In this phase, the team consulted with additional members and external reviewers, such as teachers proficient in both English and digital competencies, who provided feedback and recommendations on specific terms. This collaborative effort helped ensure the accuracy and relevance of the terminology.
5. **Indicative Back Translation:** As an added quality control measure, approximately 5% of the translation in Macedonian language was randomly selected and translated back into English. This back-translation was then compared with the original English text to verify the accuracy and fidelity of the translation.

Once the translation was completed, it was imported to the SELFIEforTEACHERS platform. Teachers involved in the study, after logging in through the EU login platform, were able to select Macedonian as their language of choice and complete the questionnaire. Since North Macedonia has two official languages, teachers also had the option to take the exercise in Albanian, using the existing translation prepared within the study in Albania.

## 1.7 Challenges

In North Macedonia there were several major challenges that effected the level of participation in the Survey and required extra efforts to support the process and event providing additional week for participation:

- **Spring Holiday:** The timing of the survey coincided with the Spring Holiday period in North Macedonia. This likely led to a reduced availability of teachers, who were either away or occupied with holiday activities, thereby affecting the teachers' engagement with the survey process.
- **Presidential and Parliamentary Elections:** The survey was conducted during a politically turbulent period marked by Presidential and Parliamentary elections. These elections created a charged atmosphere, with significant public attention diverted to political events. The political situation also imposed restrictions on organising events that involved public sector representatives, limiting opportunities for direct engagement with teachers and impacting their ability to participate fully in the survey.
- **Final Exams and Matura:** The survey period coincided with critical academic milestones, including final exams and the Matura (a high-stakes examination for high school students). Teachers were heavily involved in preparing students for these assessments, which required significant time and effort. Consequently, their ability to focus on and complete the survey was diminished, as their primary attention was directed toward student assessment and examination preparation.
- **Level of Digital Skills of Teachers:** The effectiveness of the online survey was hindered by varying levels of digital literacy among teachers. Those with limited digital skills faced difficulties in accessing and navigating the online survey platform, which required an EU Login account. Additionally, teachers who lacked email accounts or had unstable internet access encountered further barriers, reducing their likelihood of participating in the survey.
- **Technical Difficulties and Limitations:** The process of inviting teachers to participate in the survey through generated automatic messages with text, links and photos incurred some technical challenges. A lot of teachers complained that they didn't receive the invitation or was sent to spam. In some cases, the invitation was blocked by the national servers marking it as oversized message (most of the teachers have email addresses on Macedonian domains, hosted on governmental servers like edu.mk). Additionally, the SFT tool, within the questionnaire lists school subjects in a closed format, restricted the ability to perform a comprehensive analysis based on the subject teachers mainly teach. This limitation particularly affected subject-specific insights and may have led to a less nuanced understanding of teachers' experiences (as indicated in Figure 5). Furthermore, the tool's implementation in Macedonian and Albanian language limited the

opportunity for some teachers to participate using the language of other minorities recognised in the country, like the Turkish language, further reducing accessibility for Turkish-speaking teachers.

Overall, these challenges significantly impacted the social atmosphere in schools and limited the time and capacity of teaching staff to engage with the survey. As a result, the sample achieved may not fully represent the broader teacher population, reflecting the constraints imposed by these overlapping challenges.

## 2. Research methodology

The research study aimed to investigate how a self-reflection process using SELFIEforTEACHERS (SfT) in different contexts can support meaningful professional learning and development of teachers' digital competence based on their needs. Hence, the main research questions guiding this work were:

**RQ1 - How do teachers of secondary education in North Macedonia perceive their digital competence; and**

**RQ2 - What digital competence areas and topics are more relevant to the needs of secondary education teachers in North Macedonia,**

The research study aims to respond these two research questions. It was designed and conducted between January 2024 - June 2024, using a representative sample of the secondary vocational education teachers in the country. The instrument used for the data collection was the SfT online tool.

### 2.1 Sample

Following the research study's sampling methodology to ensure a representative sample, a stratified sample of schools was selected based on predefined criteria for participation. These criteria were designed to capture the diversity and complexity of North Macedonia's educational landscape, ensuring that the sampled schools accurately represented the variety of general, vocational education and training (VET), and mixed schools. This approach aimed to reflect the contextual conditions of North Macedonia, making the sample as representative as possible of the country's broader educational environment.

The first step in the sampling process involved applying three adopted selection criteria to the schools:

1. **Education Sector:** Ensuring representation from general, vocational (VET), and mixed schools (combining secondary general and VET).
2. **Geographical Representation:** Including schools from all geographical areas, based on North Macedonia's eight regions, corresponding to the country's municipalities.
3. **Official Teaching Language:** Considering schools with instruction in two languages—Macedonian and Albanian.

These criteria were designed to ensure a comprehensive and representative sample of schools, capturing the diversity in education sectors, regional distribution, and linguistic diversity across North Macedonia.

#### **Sampling Methodology: Clustered, multi-stage**

Total number of schools: 36

- **by Type:** 9 VET, 15 mixed, 12 general
- **by Language of Instruction:** 19 in Macedonian, 7 in Albanian, 10 in both Macedonian and Albanian

#### **Steps in Sample Design:**

**Step 1:** The population was divided into 8 strata, corresponding to the planning regions of North Macedonia.

**Step 2:** Clusters were identified, where each high school represented a single cluster within each stratum (planning region).

**Step 3:** Clusters (individual high schools) were selected within each stratum based on the following criteria:

- Geographic coverage within the stratum (ensuring schools from different municipalities in the same planning region)
- Type of school (general/mixed/vocational)
- Language of instruction
- Recommendations from the Ministry of Education and Science (MES)

The number of schools and teachers in the sample was generally proportionate to the population of schools and teachers at the stratum level.

**Step 4:** Within each selected cluster (school), the entire teacher population participated, ensuring full involvement of all teachers in the sampled schools.

The second step of sampling involved the selection of teachers. All teachers from the selected schools were included in the sample, expecting a high participation rate (a minimum of 85%).

Table 1 below presents the full sample, comprising 36 schools distributed across 8 regions, 3 types of schools and 3 languages, along with the count of teachers categorised by their teaching types, VET and General subjects. Additionally, the language of instruction criterion was applied to ensure linguistic diversity. Replacement schools were also identified from the stratum list, with the next school on the list being chosen as the first alternative.

**Table 1. Study sample in North Macedonia.**

Region		School	Municipality	Edu. Sector	# of all teachers	# vet teachers	# general teachers	school official language
Vardar	1	Kocho Racin	Sveti Nikole	mixed	50	15	35	MK
	2	Dobri Daskalov	Kavadarci	mixed	49	7	42	MK
	3	Kocho Racin	Veles	general	41	0	41	MK, AL
	4	Kole Nedelkovski	Veles	vet	66	28	38	MK
East	5	Slavcho Stojmenski	Shtip	general	43	0	43	MK
	6	Aco Ruskovski	Berovo	mixed	48	8	40	MK
	7	Ljupco Santov	Kochani	mixed	63	16	47	MK
Southeast	8	Josif Josifovski	Gevgelija	mixed	73	22	51	MK
	9	Nikola Karev	Strumica	vet	85	46	39	MK
Southwest	10	28 Noemvri	Debar	general	66	0	66	MK, AL
	11	Vanco Pitosheski	Ohrid	vet	31	12	19	MK
	12	Kliment Ohridski	Ohrid	general	57	0	57	MK

	13	Drita	Kichevo	mixed	73	17	56	AL
Northeast	14	Kiro Burnaz	Kumanovo	vet	83	48	35	MK, AL
	15	Gjorce Petrov	Kriva Palanka	mixed	60	16	44	MK
	16	Ismet Jashari	Lipkovo	mixed	37	1	36	AL
Polog	17	Kiril Pejcinovic	Tetovo	general	107	0	107	MK, AL
	18	Mosha Pijade	Tetovo	vet	135	56	79	MK, AL
Polog	19	7 Marsi	Tetovo	general	74	0	74	AL
	20	SEOU Gostivar	Gostivar	mixed	67	40	27	AL, MK
	21	Negotino	Vrapchishte	mixed	26	4	22	AL
Pelagonija	22	Josip Broz Tito	Bitola	general	50	0	50	MK
	23	Taki Daskalo	Bitola	mixed	87	31	56	MK
	24	Mirche Acev	Prilep	general	57	0	57	MK
	25	Naum Naumovski Borce	Krushevo	mixed	27	0	27	MK
	26	Car Samoil	Resen	mixed	47	6	41	MK, AL, TR
	27	Josip Broz Tito	Centar	general	91	0	91	MK
Skopje	28	Rade Jovcevski Korchagin	Centar	general	58	0	58	MK
	29	Panche Karagjozov	Centar	vet	142	72	70	MK, AL
	30	Orce Nikolov	Karposh	general	60	0	60	MK
	31	Zefljush Marku	Karposh	general	112	0	112	AL
	32	Marija Sklodovska Kiri	Aerodrom	vet	119	53	66	MK, AL
	33	Brakja Miladinovci	Kisela Voda	mixed	48	20	28	MK, AL
	34	Cvetan Dimov	Chair	vet	93	44	49	AL
	35	Saraj	Saraj	mixed	53	14	39	AL
	36	Shaip Jusuf	Shuto Orizari	vet	49	26	23	MK

## 2.2 Data collection

### 2.2.1 Instrument

The data collection instrument for the study was the online tool SELFIEforTEACHERS, hosted on the European Commission's dedicated online platform<sup>5</sup>. The tool consists of 32 items covering all six competence areas of the European Framework for the Digital Competence of Educators (DigCompEdu). Each item provides 6 statements as answer options for the users reflecting their different levels of digital competence. These statements are aligned with the DigCompEdu proficiency progression model of Newcomer (A1), Explorer (A2), Integrator (B1), Expert (B2), Leader (C1) and Pioneer (C2). Each response is assigned a score from 1 to 6 points, with a maximum total score of 192 points across all items. Additionally, each item includes a seventh option, which scores 0 points, for users who select "I am not aware of this competence."

The English version of the tool was translated and adapted in Macedonian language (see Appendix 1). The Albanian version translated for the Albanian study, was also used for Albanian-speaking teachers in North Macedonia. The adaptation process involved a linguistic translation, followed by content and contextual validation by an appointed national expert. Furthermore, the translated tool was reviewed by a group of five teachers, and a 5% sample of the content underwent back-translation to verify accuracy.

### 2.2.2 Process

For the purposes of the study, a dedicated group was created on the platform specifically for the participating teachers in North Macedonia. This group was open for a period of four weeks, from April 19 to May 17, 2024. Additionally, a second group was created for an extended two-week period, from May 20 to June 2, 2024, to provide more teachers with the opportunity to participate. This extension was necessary due to national elections held in May, which may have contributed to a lower-than-expected response rate.

The invitation with dedicated group link for participation has been sent to all sample teachers after a kick-off online meeting where they were informed by the national authorities about the study and its goals. During the data collection, the participation monitoring was done by the school coordinator and the support of the study's national coordinator and ETF project coordinator.

## 2.3 Data processing

Quantitative data analysis of the responses was conducted primarily using SPSS. The perceived competence levels of respondents were calculated based on their self-reflection results, focusing on overall competence, competence in each specific area, and competence for individual items. Additionally, the results were analysed in relation to various background variables.

A total of 476 responses were collected (382 during the first period and 94 during the second period), representing 19.6% of the sample. It is important to note that due to the relatively low response rate, any generalisations drawn from these results to the broader population of teachers should be approached with caution.

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<sup>5</sup> Online platform SELFIEforTEACHERS

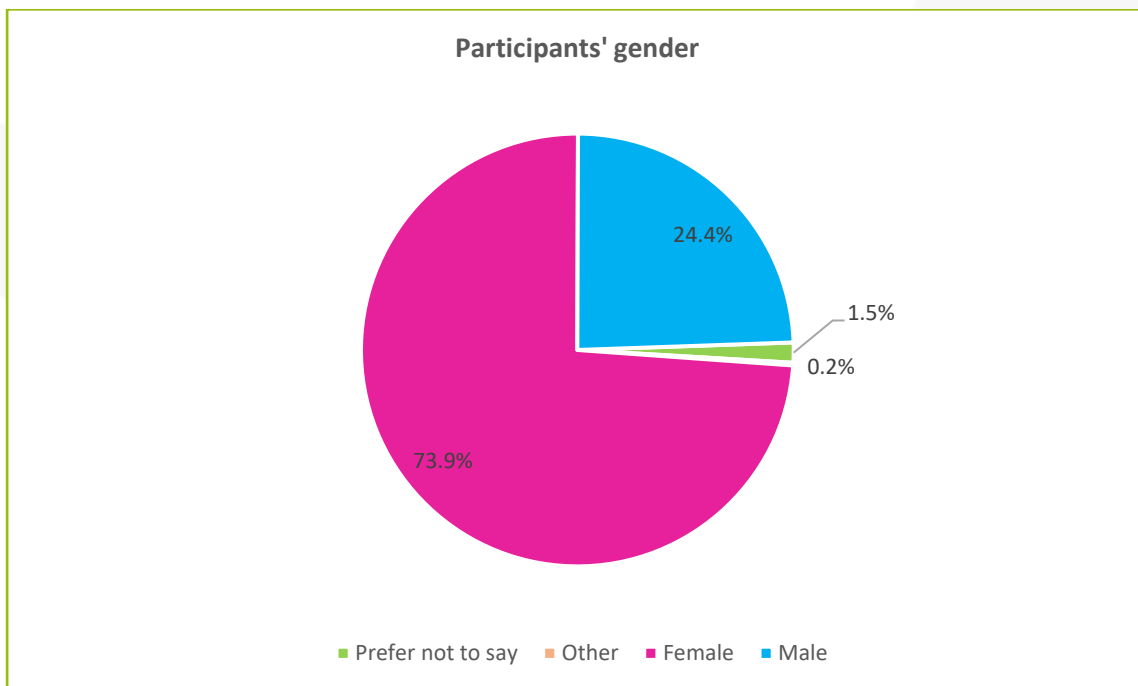
### 3. Findings

The results were analysed using the SfT collected data. The findings refer to participants' characteristics, followed by the self-reflection results and lastly to SfT digital competence in relation to participants' characteristics.

#### 3.1 Participants

The majority of participants were females. As shown in Figure 2, 73.9% were females and 24.4% were males.

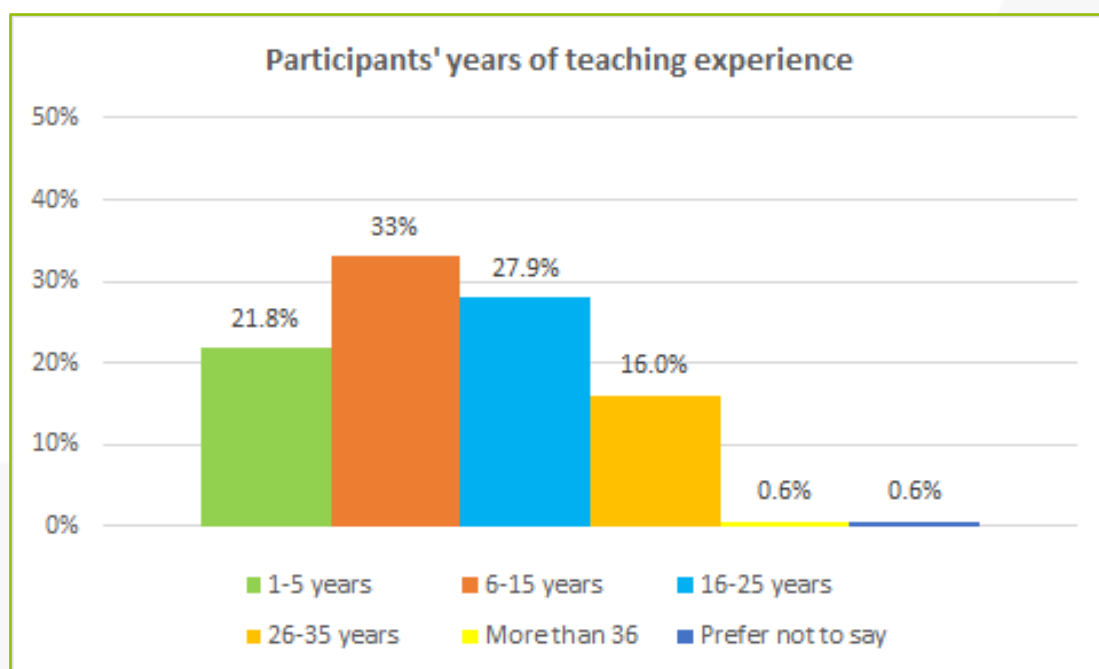
Figure 2. Participants' gender.



Regarding participants' experience in teaching, the majority of them (33%) had been teaching for 6-15 years, while 27.9% and 11.8% had been teaching for 16-25 and 1-5 years respectively (Figure 3).

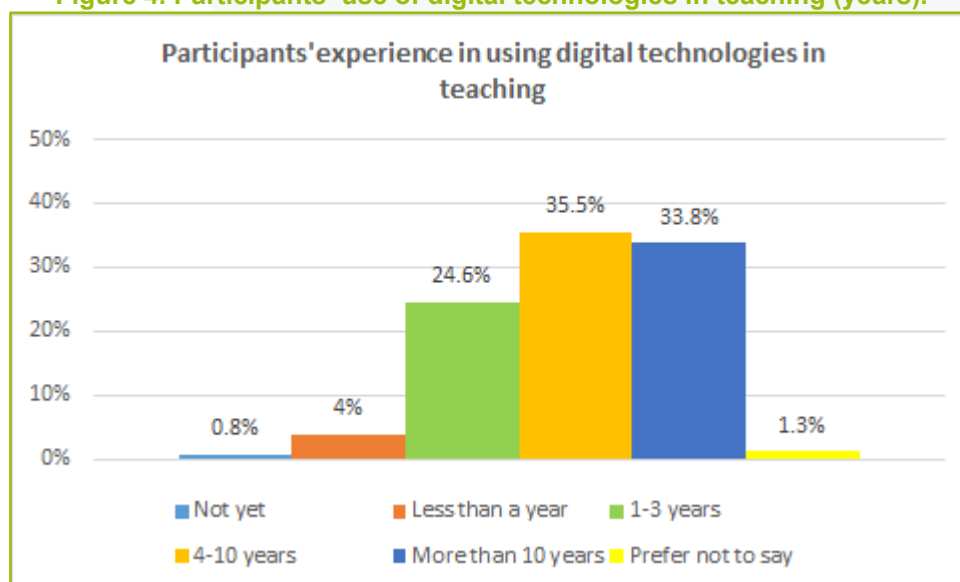


**Figure 3. Participants' years of experience in teaching.**



Study participants were also asked to indicate the number of years they have been using digital technologies in teaching. The majority of them have been doing so for 4-10 years (35.5%), while 33.8% for more than 10 years. Moreover, 0.8% responded that they have not yet use digital technologies in teaching and 4.0% for only 1-3 years (Figure 4).

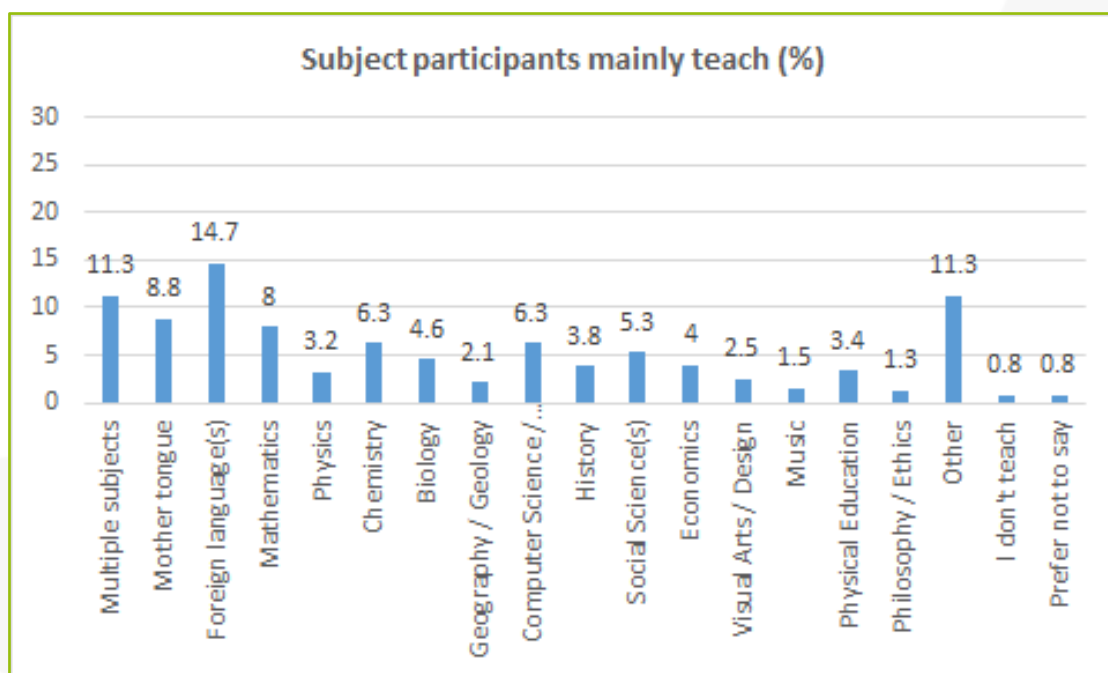
**Figure 4. Participants' use of digital technologies in teaching (years).**



In relation to the subject participants mainly teach, most of them (14.7%) responded 'Foreign language(s)' followed by 11.3% in 'Multiple subjects' and 'Other' (Figure 5). The 'Other' category

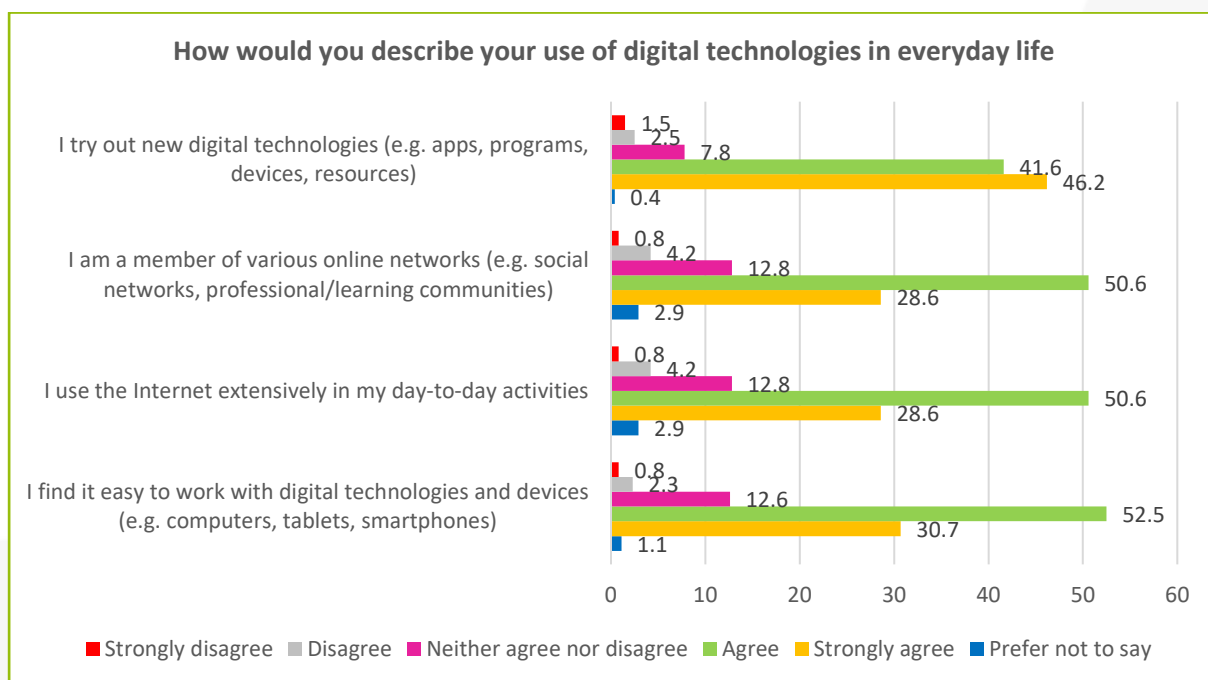
anticipated VET-specific subjects that were not included in the list provided as SfT is a tool for school education teachers in general.

**Figure 5. Participants' main subject of teaching.**



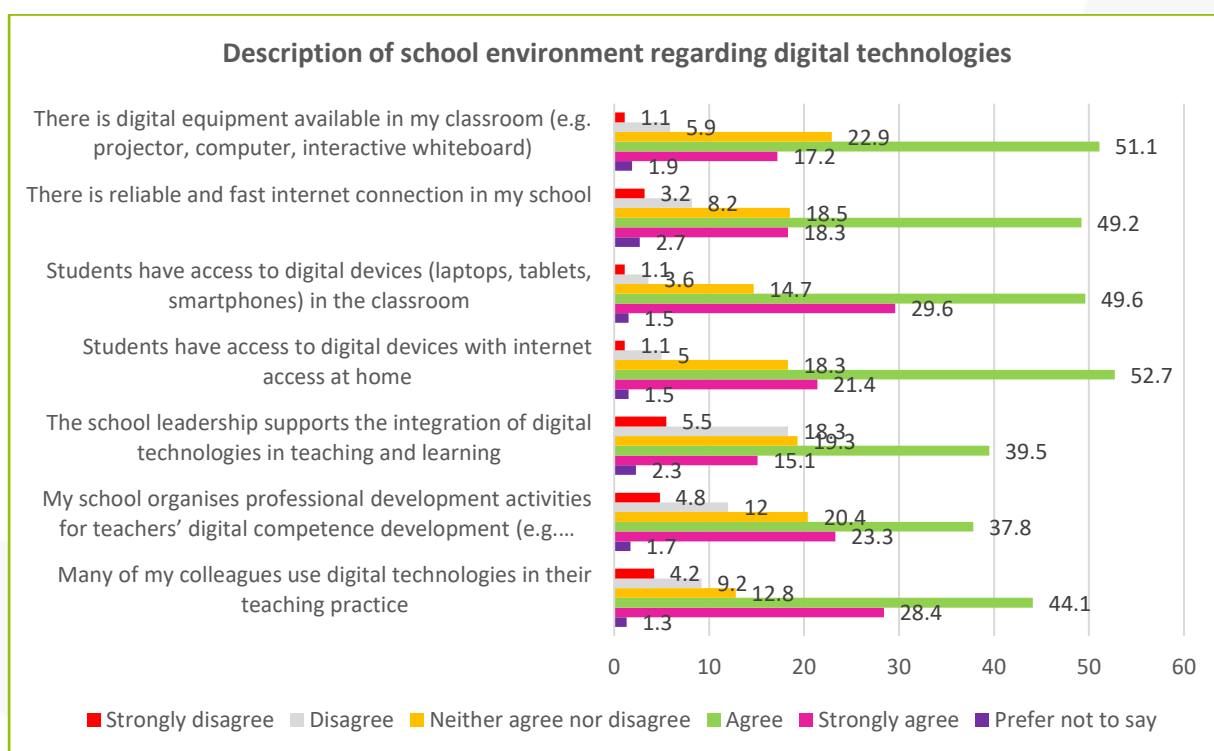
When asked about the use of digital technologies in their everyday life most participants agreed (41.6%) or strongly agreed (46.2%) that they try out new digital technologies, that they are members of various online networks (50.6% agreed & 28.6% strongly agreed), that they use the Internet extensively during their day-to-day activities (50.6% agreed & 28.6% strongly agreed) and that they find it easy to work with digital technologies and devices (52.5% agreed & 30.7% strongly agreed) (Figure 6).

**Figure 6: Participants' use of digital technologies in everyday life.**



Regarding digital technologies in their school environment, participants agreed (49.6%) or mostly agreed (29.6%) that students have access to digital devices in the classroom, that students have access to digital devices with internet access at home (52.7% agreed & 21.4% strongly agreed), that their school organises professional development activities for teachers' digital competence development (37.8% agreed & 23.3% strongly agreed) and that many of their colleagues use digital technologies in their teaching practice (44.1% agreed & 28.4% strongly agreed). On the other hand, even though 51.1% agreed and 17.2% strongly agreed that there is digital equipment available in their classroom, 22.9% neither agreed or disagreed. The same with the statement that there is reliable and fast internet connection in their school, where 49.2% agreed and 18.3% strongly agreed but 18.5% neither agreed or disagreed. Finally, only 54.6% agreed or strongly agreed (39.5% & 15.1% respectively) that the school leadership supports the integration of digital technologies in teaching and learning with 18.3% that disagreed and 19.3% that neither agreed or disagreed (Figure 7).

**Figure 7: Participants' school environment regarding digital technologies.**



### 3.2 Self-reflection results

Teachers' perception of their digital competence was calculated based on the SfT scoring scheme and categorised into the SfT proficiency levels. Each of the 6 statements in each item receives from 0 to 6 points with a maximum number of points for each item 6 points and a maximum total score of 192 points for all 32 items.

Most of the responses in the study fall in levels A2-Explorer and B1-Integrator competence levels. However, this is not the case for nine of the 32 items: 1.2-Online learning environments, 3.4- Self-regulated learning, 3.5-Emerging technologies, 4.3-Feedback and planning, all items in area 5-Empowering learners (5.1-Accessibility and inclusion, 5.2-Differentiation and personalisation, 5.3-Actively engaging learners and 5.4-Blended learning) and 6.5-Responsible use), where there were more cases under A1-Newcomer competence level than the B1-Integrator or A2-Explorer. Moreover, items 3.5-Emerging technologies, 4.3-Feedback and planning, 5.1-Accessibility and inclusion and 5.3-Actively engaging learners had the highest percentage of responses under A1-Newcomer competence level. Finally, items 1.9-Computational thinking and 3.5-Emerging technologies had the highest percentage of responses at "I am not aware of" with 3.6% and 3.8% respectively. In the most advanced levels of C1-Leader and C2-Pioneer, item 1.1-Organisational communication had the most responses with 18.5% (13.0% in C1 & 5.5% in C2) (Table 2, Figure 8).

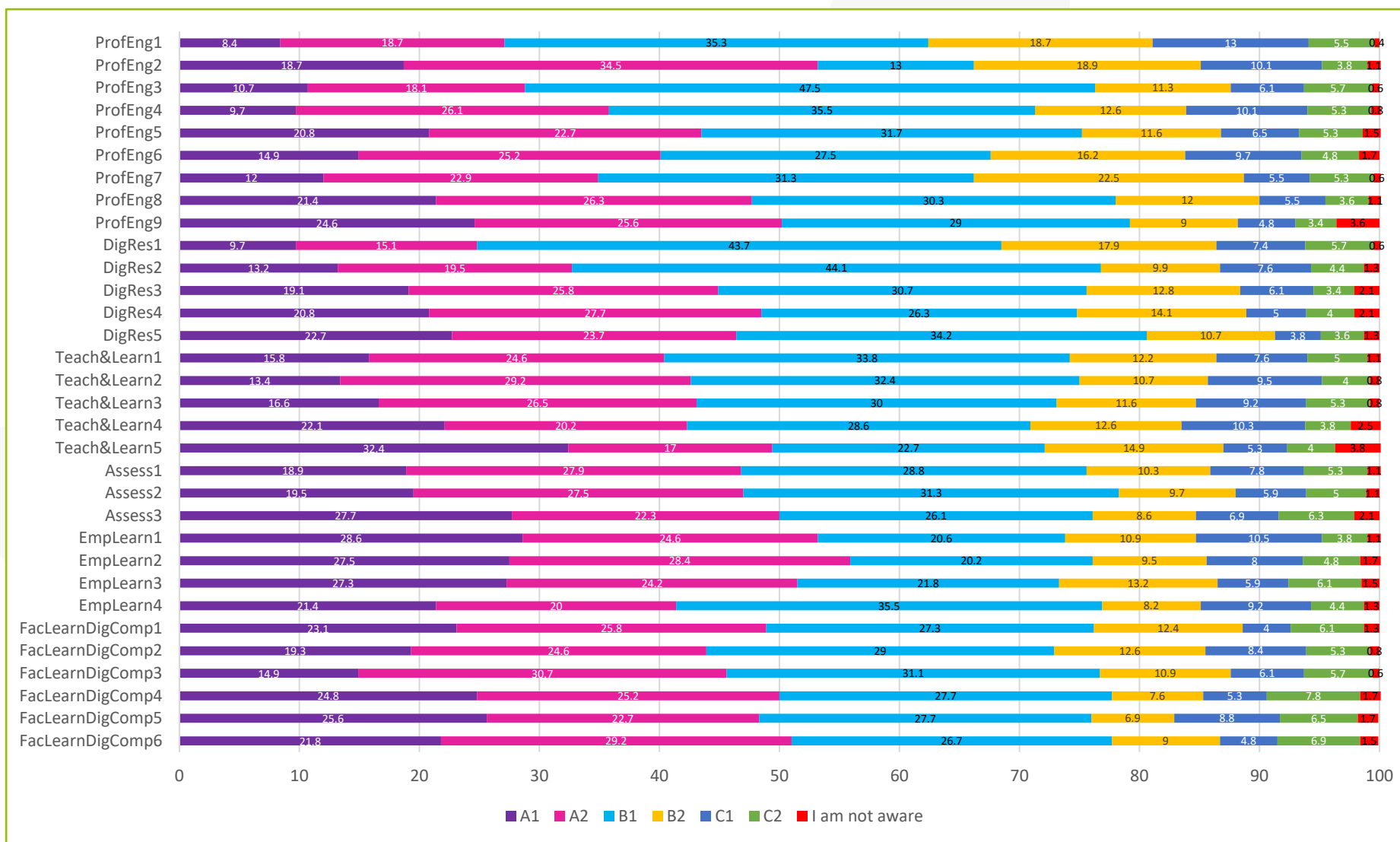
**Table 2. Overall responses (in %) to the 32 SELFIEforTEACHERS items.**

	A1 (%)	A2 (%)	B1 (%)	B2 (%)	C1 (%)	C2 (%)	I am not aware
1.1 ProfEng1	8.4	18.7	35.3	18.7	13	5.5	0.4

1.2 ProfEng2	18.7	34.5	13	18.9	10.1	3.8	1.1
1.3 ProfEng3	10.7	18.1	47.5	11.3	6.1	5.7	0.6
1.4 ProfEng4	9.7	26.1	35.5	12.6	10.1	5.3	0.8
1.5 ProfEng5	20.8	22.7	31.7	11.6	6.5	5.3	1.5
1.6 ProfEng6	14.9	25.2	27.5	16.2	9.7	4.8	1.7
1.7 ProfEng7	12	22.9	31.3	22.5	5.5	5.3	0.6
1.8 ProfEng8	21.4	26.3	30.3	12	5.5	3.6	1.1
1.9 ProfEng9	24.6	25.6	29	9	4.8	3.4	3.6
2.1 DigRes1	9.7	15.1	43.7	17.9	7.4	5.7	0.6
2.2 DigRes2	13.2	19.5	44.1	9.9	7.6	4.4	1.3
2.3 DigRes3	19.1	25.8	30.7	12.8	6.1	3.4	2.1
2.4 DigRes4	20.8	27.7	26.3	14.1	5	4	2.1
2.5 DigRes5	22.7	23.7	34.2	10.7	3.8	3.6	1.3
3.1 Teach&Learn1	15.8	24.6	33.8	12.2	7.6	5	1.1
3.2 Teach&Learn2	13.4	29.2	32.4	10.7	9.5	4	0.8
3.3 Teach&Learn3	16.6	26.5	30	11.6	9.2	5.3	0.8
3.4 Teach&Learn4	22.1	20.2	28.6	12.6	10.3	3.8	2.5
3.5 Teach&Learn5	32.4	17	22.7	14.9	5.3	4	3.8
4.1 Assess1	18.9	27.9	28.8	10.3	7.8	5.3	1.1
4.2 Assess2	19.5	27.5	31.3	9.7	5.9	5	1.1
4.3 Assess3	27.7	22.3	26.1	8.6	6.9	6.3	2.1
5.1 EmpLearn1	28.6	24.6	20.6	10.9	10.5	3.8	1.1
5.2 EmpLearn2	27.5	28.4	20.2	9.5	8	4.8	1.7
5.3 EmpLearn3	27.3	24.2	21.8	13.2	5.9	6.1	1.5

5.4 EmpLearn4	21.4	20	35.5	8.2	9.2	4.4	1.3
6.1 FacLearnDigComp1	23.1	25.8	27.3	12.4	4	6.1	1.3
6.2 FacLearnDigComp2	19.3	24.6	29	12.6	8.4	5.3	0.8
6.3 FacLearnDigComp3	14.9	30.7	31.1	10.9	6.1	5.7	0.6
6.4 FacLearnDigComp4	24.8	25.2	27.7	7.6	5.3	7.8	1.7
6.5 FacLearnDigComp5	25.6	22.7	27.7	6.9	8.8	6.5	1.7
6.6 FacLearnDigComp6	21.8	29.2	26.7	9	4.8	6.9	1.5

Figure 8. Graphic representation of overall responses (in %) to the 32 SELFIEforTEACHERS items.



### 3.2.1 Area 1 - Professional Engagement

Digital technologies can help teachers in their professional practice to access information and enhance their teaching and learning practices. Teachers can also use technology to communicate with and support students and parents and to share and learn with colleagues and others beyond school context. Through digital technologies, teachers can enhance their own professional development and support the overall improvement of their organisation and profession. The proficiency level statements are organised by increasing level of engagement with digital technologies with a focus on contributing to organisational development. This is the focus of Area 1, which is covered by questions 1.1-1.9.

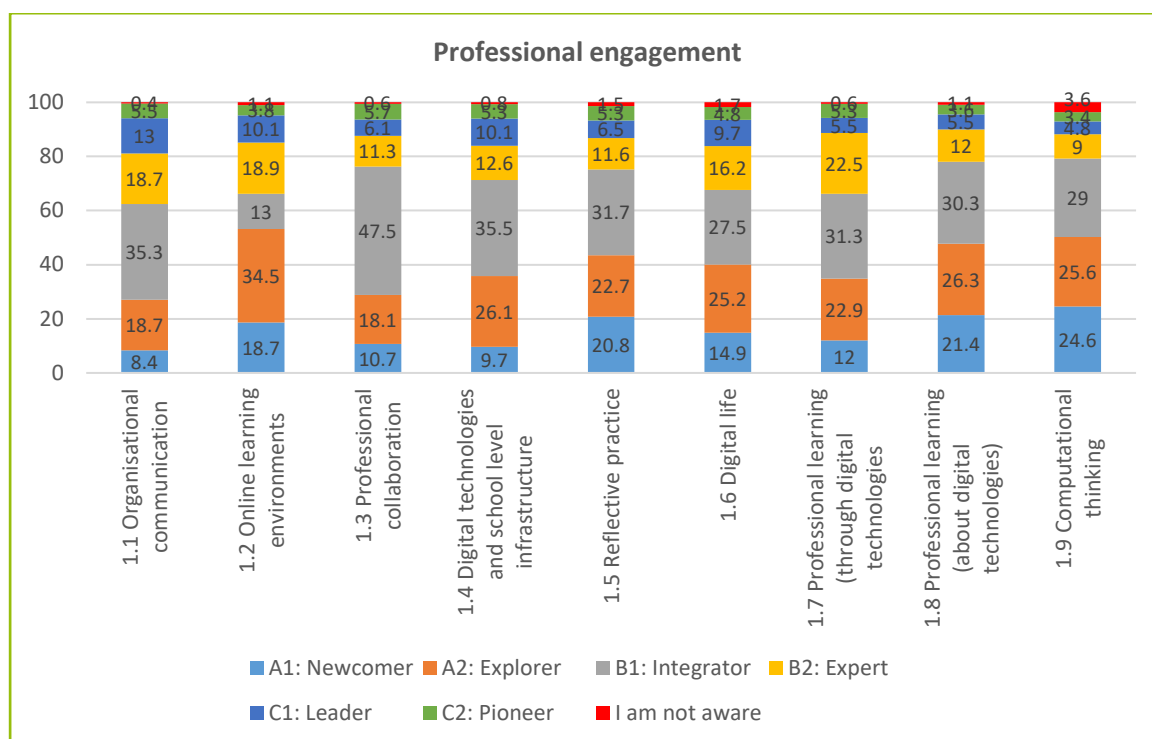
Overall, regarding the items that covered the area of Professional Engagement, the majority of the responses fall within the A2-Explorer and B1-Integrator competence levels, except from the case of 1.2-Online learning environments where more responses are under A1-Newcomer and B2-Expert competence levels than B1-Integrator level. Moreover, 3.6% of the responses are under the “I am not aware of this competence” option (Table 3, Figure 9).

**Table 3. Response percentages to the ‘Professional Engagement’ area items.**

Professional Engagement	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
1.1 Organisational communication	8.4	18.7	35.3	18.7	13	5.5	0.4
1.2 Online learning environments	18.7	34.5	13	18.9	10.1	3.8	1.1
1.3 Professional collaboration	10.7	18.1	47.5	11.3	6.1	5.7	0.6
1.4 Digital technologies and school level infrastructure	9.7	26.1	35.5	12.6	10.1	5.3	0.8
1.5 Reflective practice	20.8	22.7	31.7	11.6	6.5	5.3	1.5
1.6 Digital life	14.9	25.2	27.5	16.2	9.7	4.8	1.7
1.7 Professional learning (through digital technologies)	12	22.9	31.3	22.5	5.5	5.3	0.6
1.8 Professional learning (about digital technologies)	21.4	26.3	30.3	12	5.5	3.6	1.1
1.9 Computational thinking	24.6	25.6	29	9	4.8	3.4	3.6



**Figure 9. Graphic representation of response percentages to the ‘Professional Engagement’ area items.**



### 3.2.2 Area 2: Digital Resources

Teachers have potentially a wide range of digital resources available to use. It is important for them to effectively identify resources that best fit their needs, their teaching style and their learners. They may also need to learn how to modify and adapt resources to meet their exact requirements or create new ones. At the same time, they need to learn how to share digital resources responsibly, protect sensitive data, manage content ethically and respect copyright rules. The proficiency level statements are organised by increasing level of engagement with digital resources. These issues are at the heart of Area 2, which is covered by questions 2.1-2.5.

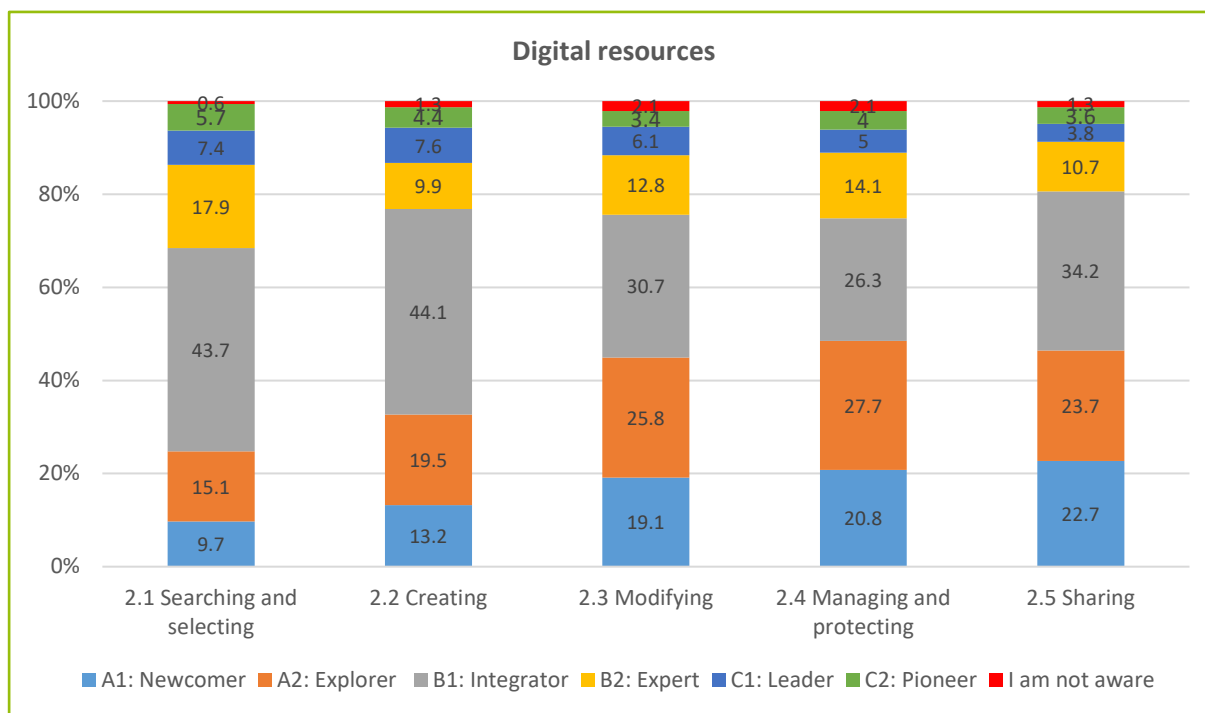
Overall, regarding the area of Digital Resources, all responses fall within the A2-Explorer and B1-Integrator competence levels (Table 4, Figure 10). In all items, except from item 2.1- Searching and selecting, the distribution of responses is higher in the first three competence levels (A1, A2, B1).

**Table 4. Response percentages to the ‘Digital Resources’ area items.**

Digital resources	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
2.1 Searching and selecting	9.7	15.1	43.7	17.9	7.4	5.7	0.6
2.2 Creating	13.2	19.5	44.1	9.9	7.6	4.4	1.3

2.3 Modifying	19.1	25.8	30.7	12.8	6.1	3.4	2.1
2.4 Managing and protecting	20.8	27.7	26.3	14.1	5	4	2.1
2.5 Sharing	22.7	23.7	34.2	10.7	3.8	3.6	1.3

Figure 10. Graphic representation of response percentages to the ‘Digital Resources’ area items.



### 3.2.3 Area 3: Teaching and Learning

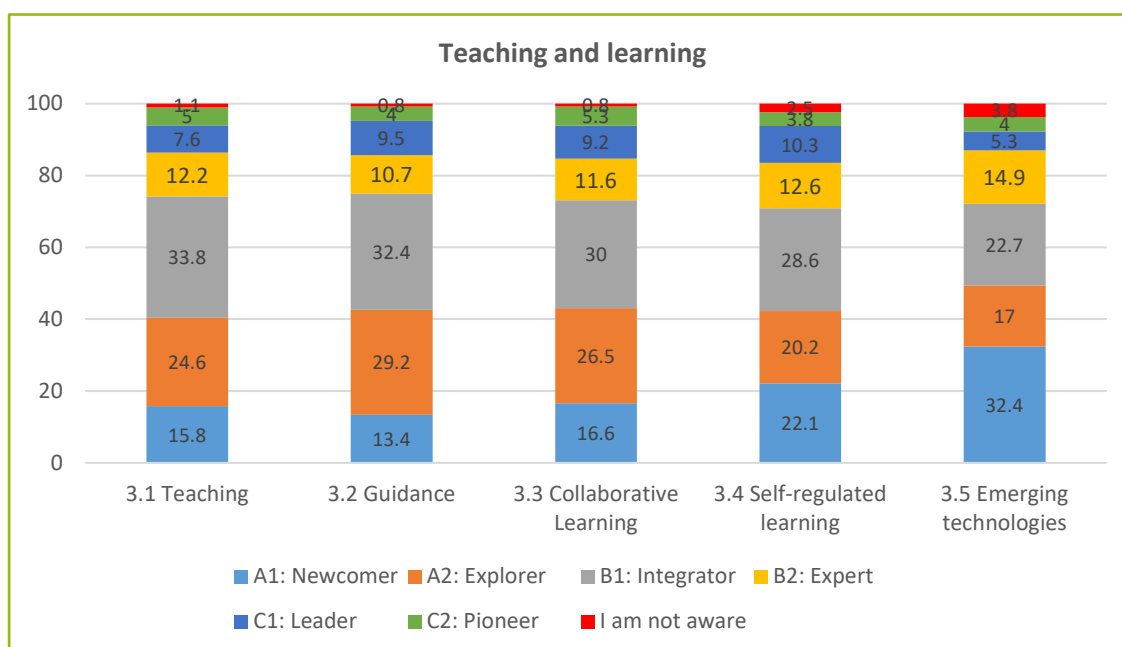
Digital technologies can enhance and improve teaching and learning practice in a number of ways. A key skill of teachers is to design learning with the use of digital technologies to help students actively engage in authentic learning experiences. Advanced practice involves a shift from teacher-led to learner-centred activities. The proficiency level statements are organised by increasing level of engagement with digital technologies in teaching and learning, with a focus on students' active involvement in using them for their learning. This is the focus of Area 3, which is covered by questions 3.1-3.5.

Overall, in the Teaching and Learning area, in three of the area items the majority of responses fall within the A2-Explorer and B1-Integrator competence levels (3.1-Teaching, 3.2-Guidance & 3.3-Collaborative learning), while in the case of 3.5-Emerging technologies the majority of responses are under A1-Newcomer competence level (Table 5, Figure 11). Moreover, in item 3.5-Emerging technologies there is a 3.8% of the responses -the highest response rate in all items- who declare “I am not aware of this competence”.

Table 5. Response percentages to the ‘Teaching and Learning’ area items.

Teaching and Learning	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
3.1 Teaching	15.8	24.6	33.8	12.2	7.6	5	1.1
3.2 Guidance	13.4	29.2	32.4	10.7	9.5	4	0.8
3.3 Collaborative Learning	16.6	26.5	30	11.6	9.2	5.3	0.8
3.4 Self-regulated learning	22.1	20.2	28.6	12.6	10.3	3.8	2.5
3.5 Emerging technologies	32.4	17	22.7	14.9	5.3	4	3.8

Figure 11. Graphic representation of response percentages to the 'Teaching and Learning' area items.



### 3.2.4 Area 4: Assessment

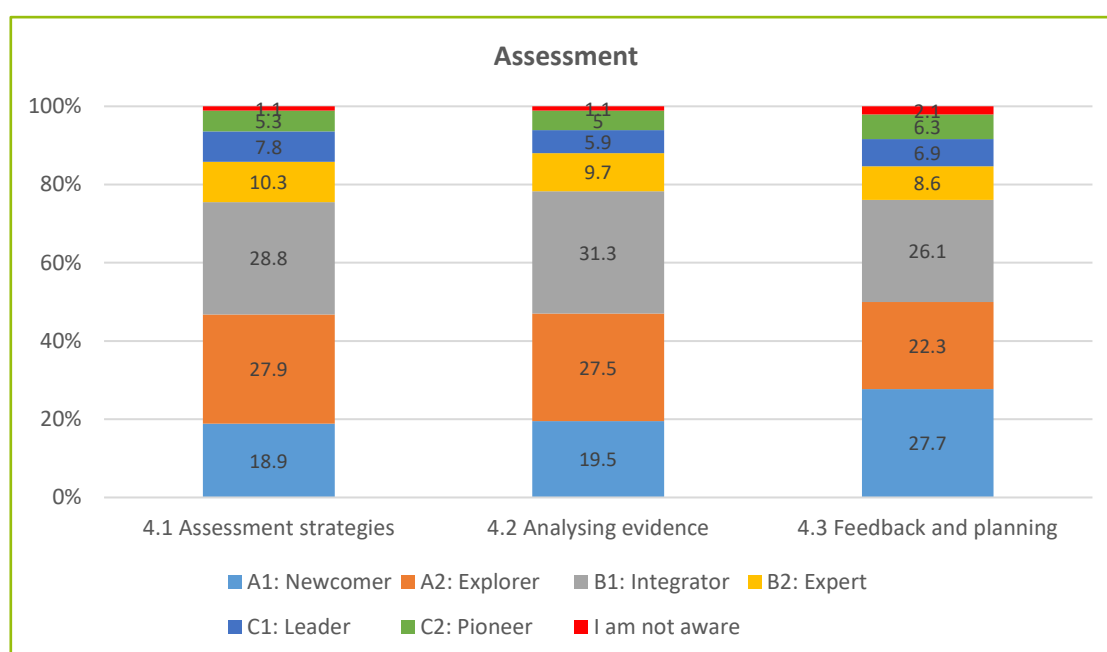
Digital technologies can enhance existing assessment practices and facilitate new and innovative ones. Teachers can use digital technologies to collect data to better support and assess learners, while enabling them to reflect and adapt their teaching practice. The proficiency level statements are organised by increasing level of engagement with digital assessment and learners' involvement in the assessment practices. Area 4 with questions 4.1-4.3 addresses this shift in assessment strategies.

Overall, the majority of the responses regarding Assessment fall within A2-Explorer and B1-Integrator competence levels in the first two items (4.1-Assessment strategies & 4.2-Analysing evidence), while the majority of responses in item 4.3- Feedback and planning fall under the B1-Integrator competence level (Table 6, Figure 12).

**Table 6. Response percentages to the ‘Assessment’ area items.**

Assessment	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
4.1 Assessment strategies	18.9	27.9	28.8	10.3	7.8	5.3	1.1
4.2 Analysing evidence	19.5	27.5	31.3	9.7	5.9	5	1.1
4.3 Feedback and planning	27.7	22.3	26.1	8.6	6.9	6.3	2.1

**Figure 12. Graphic representation of response percentages to the ‘Assessment’ area items.**



### 3.2.5 Area 5: Empowering Learners

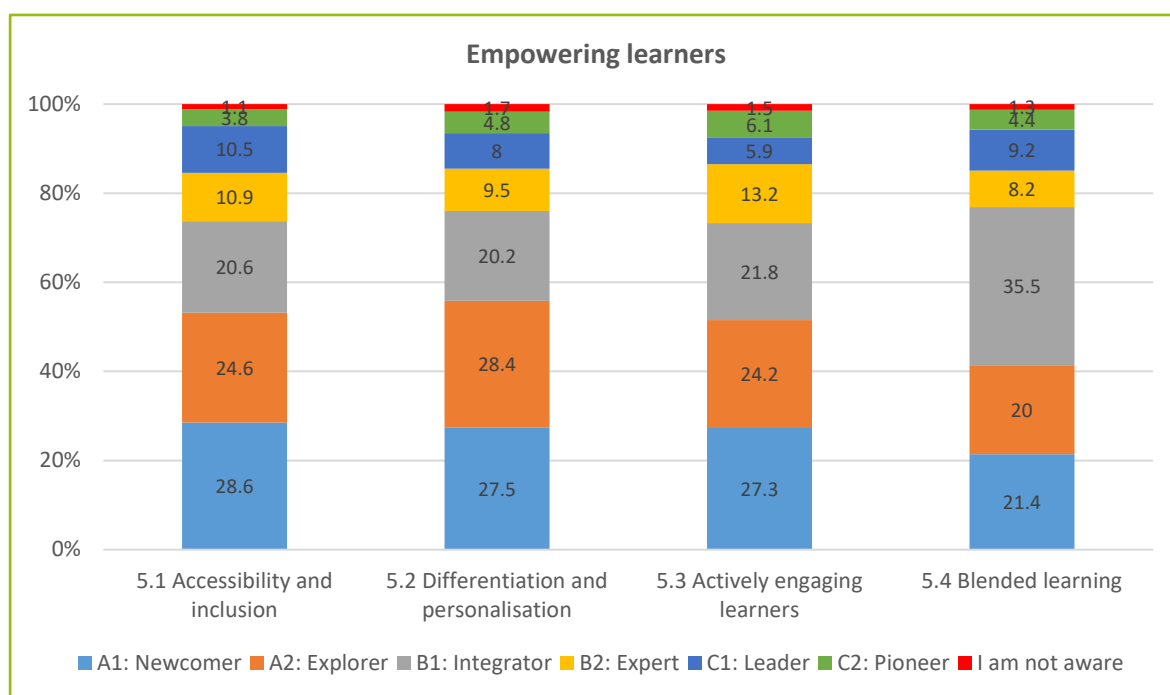
Using digital technologies can help teachers to create innovative learning experiences, resulting in learners becoming more actively engaged in their learning. Digital technologies can be used by teachers to personalise learning and tailor it according to individual learners’ levels, interests and needs. However, it is important to avoid amplifying inequality, for example in terms of learner access to technology or lack of skills. Accessibility for all learners is crucial, including those with special educational needs. The proficiency level statements are organised by increasing focus on students’ individual learning needs. Area 5 with questions 5.1-5.4 tackles these issues.

The area Empowering Learners, seems to be an area where the responses distribution differentiates from the one in the other areas. In items 5.1-Accesibility and inclusion and 5.3-Actively engaging learners the majority of responses falls within the A1-Newcomer competence level. In item 5.2-Differentiation and personalization, the majority of responses fall under the A1-Newcomer and A2-Explorer competence levels, while in item 5.4 Blended learning the majority of responses fall under A1-Newcomer and B1-Integrator competence levels (Table 7, Figure 13).

**Table 7. Response percentages to the ‘Empowering Learners’ area items.**

Empowering Learners	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
5.1 Accessibility and inclusion	28.6	24.6	20.6	10.9	10.5	3.8	1.1
5.2 Differentiation and personalisation	27.5	28.4	20.2	9.5	8	4.8	1.7
5.3 Actively engaging learners	27.3	24.2	21.8	13.2	5.9	6.1	1.5
5.4 Blended learning	21.4	20	35.5	8.2	9.2	4.4	1.3

**Figure 13. Graphic representation of response percentages to the ‘Empowering Learners’ area items.**



### 3.2.6 Area 6: Facilitating Learners' Digital Competence

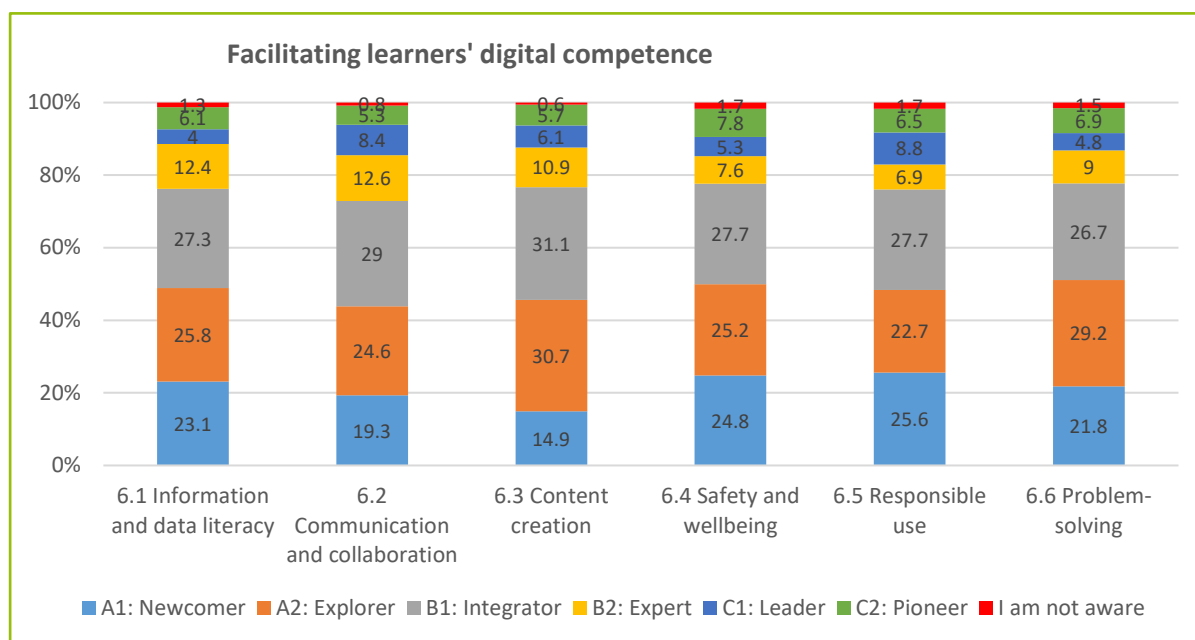
Teachers' digital competence is important to support and facilitate the development of their learners' digital competence. The proficiency level statements are organised by increasing level of students' engagement and complexity of digital competence in the learning activities. Therefore, questions 6.1-6.6 cover the area of facilitating learners' digital competence.

Overall, regarding the items covered, the area of Facilitating Learners' Digital Competence, the majority of responses fall within the A2-Explorer and B1-Integrator competence levels, except those from item 6.5-Responsible use, where there are more responses A1-Newcomer competence level than under A2-Explorer level (Table 8, Figure 14).

**Table 8. Response percentages to the 'Facilitating Learners' Digital Competence' area items.**

Facilitating Learners' Digital Competence	A1: Newcomer (%)	A2: Explorer (%)	B1: Integrator (%)	B2: Expert (%)	C1: Leader (%)	C2: Pioneer (%)	I am not aware (%)
6.1 Information and data literacy	23.1	25.8	27.3	12.4	4	6.1	1.3
6.2 Communication and collaboration	19.3	24.6	29	12.6	8.4	5.3	0.8
6.3 Content creation	14.9	30.7	31.1	10.9	6.1	5.7	0.6
6.4 Safety and wellbeing	24.8	25.2	27.7	7.6	5.3	7.8	1.7
6.5 Responsible use	25.6	22.7	27.7	6.9	8.8	6.5	1.7
6.6 Problem-solving	21.8	29.2	26.7	9	4.8	6.9	1.5

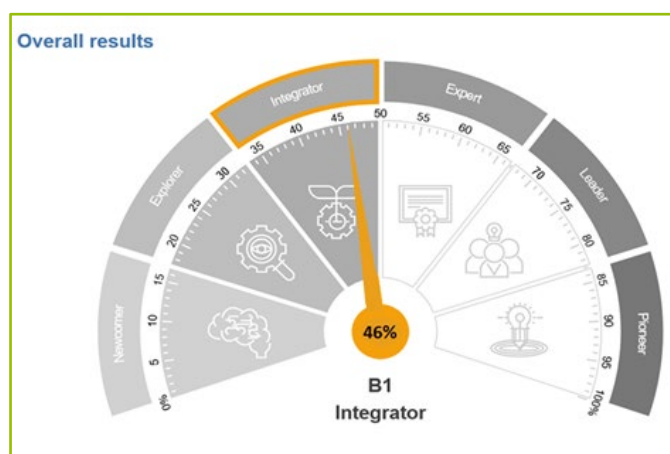
**Figure 14. Graphic representation of response percentages to the 'Facilitating Learners' Digital Competence' area items.**



### 3.3 Averages of results

In this section, the self-reflection results were analysed in relation to the responses means. The mean of the overall SfT digital competence as perceived by the participants in North Macedonia is 87.65 (out of the total SfT 192 points) with a standard deviation of 34.7 (Figure 15).

**Figure 15: Participant perception of overall digital competence (mean).**



When broken down into the six SfT competence areas (Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners, and Facilitating Learner’s Digital Competence), the means of the responses (on a 100-point scale) indicate that participants tended to perceive themselves strongest in the area of Professional Engagement and weakest in the area of Facilitating Learner’s Digital Competence (Figure 16).

**Figure 16: Means of SfT results and competence level per competence area.**

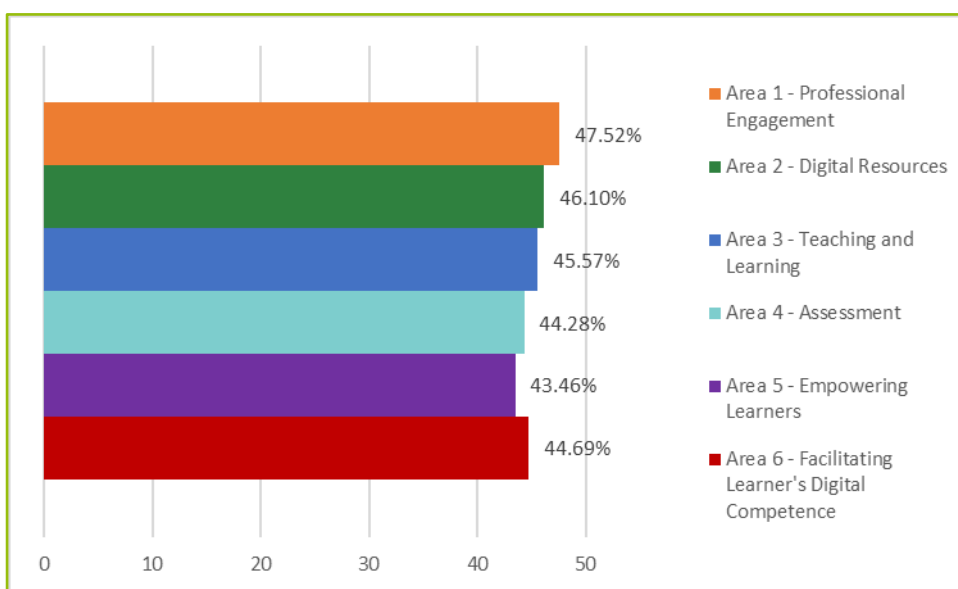


Table 9 below shows the means of the responses per item of the SfT self-reflection tool. The results indicate that participants tend to perceive themselves as more competent in items 1.1 - Organisational communication (M=3.24, SD=1.3) and 2.1 - Searching and selecting (M=3.13, SD=1.3) and weaker in 1.9 - Computational thinking (M=2.43, SD=1.3) and 3.5 - Emerging technologies (M=2.44, SD=1.5).

**Table 9. Means of SfT results per item (North Macedonia).**

Competence item	Mean (0-6 points)	SD
1.1 Organisational communication	3.24	1.3
1.2 Online learning environments	2.75	1.4
1.3 Professional collaboration	2.99	1.2
1.4 Digital technologies and school level infrastructure	3.01	1.3
1.5 Reflective practice	2.72	1.4
1.6 Digital life	2.90	1.4
1.7 Professional learning (through digital technologies)	3.00	1.3
1.8 Professional learning (about digital technologies)	2.61	1.3
1.9 Computational thinking	2.43	1.3
2.1 Searching and selecting	3.13	1.3
2.2 Creating	2.88	1.3
2.3 Modifying	2.65	1.3
2.4 Managing and protecting	2.61	1.4
2.5 Sharing	2.56	1.3
3.1 Teaching	2.83	1.4
3.2 Guidance	2.83	1.3
3.3 Collaborative Learning	2.84	1.4
3.4 Self-regulated learning	2.73	1.5
3.5 Emerging technologies	2.44	1.5
4.1 Assessment strategies	2.73	1.4
4.2 Analysing evidence	2.67	1.4
4.3 Feedback and planning	2.57	1.5
5.1 Accessibility and inclusion	2.58	1.5
5.2 Differentiation and personalisation	2.51	1.5
5.3 Actively engaging learners	2.60	1.5
5.4 Blended learning	2.73	1.4



6.1 Information and data literacy	2.63	1.4
6.2 Communication and collaboration	2.79	1.4
6.3 Content creation	2.78	1.3
6.4 Safety and wellbeing	2.62	1.5
6.5 Responsible use	2.65	1.5
6.6 Problem-solving	2.62	1.4

### 3.4 SELFIEforTEACHERS digital competence and user characteristics

This section provides an overview of the mean and standard deviation of the SfT digital competence of the participants, broken down by background variables.

When broken down by gender, there were not major differences among males and females with their average SfT competence being 86.30 and 87.72 respectively. When broken down by years of teaching, the highest average levels of digital competence were found among participants with 36 or more years (M=92.33, SD=3.2) followed by participants with 16-25 years of teaching (M=91.32, SD=38.7), 6-15 years of teaching (M=89.32, SD=33.5) and 26-35 years of teaching (M=84.43, SD=38.3). The lowest was in the category 1-5 years (M=82.86, SD=27.2) and Prefer not to say (M=80.00, SD=56.3). As expected, the more years participants had in using digital technologies in the classroom the higher the mean of their SfT digital competence was, with the ones having more than 10 years 100.86 (SD=39.4) (Table 10).

**Table 110: Descriptive statistics of SfT digital competence by background variables (gender, years of teaching & years of using digital technologies).**

Description		Mean* (SD)	N
Gender	Male	86.80 (36.01)	116
	Female	87.72 (34.1)	352
Years of teaching	1-5	82.86 (27.2)	104
	6-15	89.32 (33.5)	157
	16-25	91.32 (38.7)	133
	26-35	84.43 (38.3)	76
	36 or more	92.33 (3.2)	3
	Prefer not to say	80.00 (56.3)	3
Years of using digital technologies	Not yet	60.75 (26.5)	4
	Less than 1 year	60.63 (27.09)	19

	1-3 years	80.07 (25.6)	117
	4-10 years	84.64 (31.4)	169
	More than 10 years	100.86 (39.4)	161
	Prefer not to say	69.33 (44.2)	6

\* Total=192

In an attempt to understand digital competence of the self-perception of teachers who indicated that their main teaching subject as “Other” in relation to the rest we created a new group of all subjects excluding the ‘Other’ category. This categorisation is arbitrary; hence any conclusions should be made cautiously.

As shown in Table 11, the average SfT overall competence was higher for the participating teachers, who taught various subjects not categorised as ‘Other’ (M=89.17, SD=34.5).

**Table 211: Overall SELFIEforTEACHERS Digital Competence score by the background variable “Main subject teaching”**

Main subject teaching	N	Mean (0-192 points)	SD
Grouped subjects*	414	89.17	34.5
Other	54	77.20	32.0
I don't teach	4	86.00	65.4
Prefer not to say	4	73.00	39.0

\* Multiple subjects, Mother tongue, Foreign language(s), Mathematics, Physics, Chemistry, Biology, Geography/Geology, Computer science/Informatics, History, Social Science(s), Economics, Physical Education, Drama, Religious Education, Political Science(s), Philosophy/Ethics, Home economics, Visual arts/Design, Music

When looking at the average SfT competence per area (Table 12), it seems that again participating teachers teaching various subjects not categorised as ‘Other’ had higher scores, except from Area 2 – Digital resources where participants’ under the ‘I don’t teach’ category had slightly higher results (M=14.25, SD=11.3). However, as this category had only four participants this difference could not be taken into account.

**Table 12. Overall SELFIEforTEACHERS Digital Competence score by the background variable “Main subject teaching” (North Macedonia).**

Main subject teaching	Area 1 (0-54 points)		Area 2 (0-30 points)		Area 3 (0-30 points)		Area 4 (0-18 points)		Area 5 (0-24 points)		Area 6 (0-36 points)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Grouped subjects*	26.13	9.5	14.02	5.4	13.95	6.1	8.15	3.9	10.61	5.2	16.32	7.5

Other	22.44	9.2	12.54	5.1	11.80	5.4	6.74	3.8	9.24	4.8	14.44	7.2
I don't teach	25.75	14.0	14.25	11.3	12.75	12.3	7.25	7.3	9.75	9.3	16.25	12.1
Prefer not to say	20.50	11.9	11.50	5.5	10.75	5.4	6.75	3.3	9.00	5.1	14.50	8.4

\* Multiple subjects, Mother tongue, Foreign language(s), Mathematics, Physics, Chemistry, Biology, Geography/Geology, Computer science/Informatics, History, Social Science(s), Economics, Physical Education, Drama, Religious Education, Political Science(s), Philosophy/Ethics, Home economics, Visual arts/Design, Music

## 4. Discussion

The digital competence as perceived by the SfT study participants in North Macedonia was at B1 competence level (mean, SD).

Moreover, the study findings indicate that topics where participating teachers in North Macedonia might need to further develop their competence, include online learning environments, computational thinking, self-regulated learning, emerging technologies, providing feedback and planning, empowering learners (e.g. accessibility and inclusion, differentiation and personalisation, actively engaging learners and blended learning) and safety and wellbeing.

Moreover, competence related to emerging technologies, feedback and planning, accessibility and inclusion and actively engaging learners seems to be of highest need, as the majority of the responses in the related items were under A1-Newcomer competence level. In addition, competence related to computational thinking and emerging technologies should also be prioritised as the related items had the most responses under the option *“I am not aware of this competence”*.

Finally, raising awareness, as well as providing professional development and support to the school leadership should be included in future actions as participants' responses indicated that the school leadership support for the integration of digital technologies in teaching and learning is not as high.

### 4.1 Lessons learnt

One of the key lessons learned from the implementation of SELFIEforTEACHERS (SfT) in North Macedonia is the importance of establishing a national, multi-disciplinary team to manage the entire process from start to finish. For large-scale implementation, this team must be involved in every aspect, from designing and implementing the tool to analyzing, discussing, and reporting the results. The national teams participating in the study exemplify this approach.

It is crucial that the team is appointed by relevant policy authorities and operates under the supervision of a national body responsible for managing the specific education sector or level. Expertise in both education and training systems, as well as in data analysis, is essential for ensuring the quality and relevance of the work.

In addition to leadership and expertise, effective communication and engagement with schools play a pivotal role in the success of the study. Close collaboration with school administrators and teachers helps to secure participation and accurately monitor progress. A significant factor in this communication is the emphasis on the anonymity of the self-reflection process. Informing teachers that their responses would remain anonymous encouraged honest participation, reduce potential bias, and support a more authentic and meaningful self-reflection experience. This, in turn, contributes to the overall quality of the data collected and its usefulness for professional learning and development.

Timing also emerge as a critical factor in the success of data collection. In this instance, the initial data collection period coincided with national elections, annual Matura Exam and the teachers' workload, which likely contributed to a lower-than-expected response rate. Careful scheduling of data collection is necessary to avoid conflicts with major national and school events and to ensure full participation from teachers. Guaranteeing that teachers are able to fully engage without external distractions is essential for obtaining high-quality data.

Another important insight is the value of regular monitoring and assessment to continuously inform authorities about teachers' evolving professional development needs. Conducting the SfT exercise on a regular basis, such as every two years, would provide national authorities with ongoing data about in-service teachers' digital competence. This would allow for more precise planning of training programs and resources, better aligning them with teachers' current needs and helping to support continuous development.

Finally, building teacher awareness and encouraging participation in the SfT exercise is essential. Ensuring that teachers are well-informed about the purpose and benefits of the self-reflection process not only fosters engagement but also promotes professional growth. By continuously emphasizing the importance of digital competence and how it can enhance teaching practices, teachers are more likely to participate meaningfully and view the exercise as a valuable part of their professional development.

Incorporating these lessons learned could be crucial for future implementation of SfT at full scale, making them more efficient and impactful. These insights could contribute to the broader goal of developing teachers' digital competencies, improving the overall quality of education, and ensuring the system is responsive to the evolving needs of both educators and learners.

## 4.2 Policy recommendations

Integrating digital technologies into education and training has become a pivotal component of modern educational reform. As the demand for digital literacy in classrooms, remote learning environments, and vocational training programs continues to grow, the digital competence of educators is critical for improving both the quality and accessibility of these programs. Therefore, relevant data on teachers' professional learning needs is essential for evidence-based decision-making in the areas of continuing professional development and investment in educational resources<sup>6</sup>.

The regular use of the SELFIEforTEACHERS (SfT) tool could offer significant potential to engage educators actively in their professional learning journey. By fostering a better understanding of educators' digital skills and competence needs, it would allow for a more targeted and tailored approach to continuous professional development. As a self-reflection tool, SfT supports educators in identifying areas for improvement and charting their path toward enhanced digital competence.

To ensure the successful and autonomous use of SfT in North Macedonia, it is recommended that: (i) national education policies formally recognise self-reflection as a powerful cognitive process for professional learning and development and (ii) the DigCompEdu framework should be adopted as a scientifically grounded model to define and assess the digital competencies of educators. This would provide a standardized approach to understanding and addressing digital competence needs across the education sector.

Additionally, a national institution should assume responsibility for deploying and overseeing the use of the SfT tool, such as the Ministry of Education and Science or the Bureau for Development of Education in North Macedonia. This ensures national ownership of the tool and promotes its integration into broader educational strategies.

The establishment of a multidisciplinary national team is crucial for supporting continuous professional development (CPD) efforts. This team, akin to the one established for this study, should be led by the organization responsible for national CPD, such as the Bureau for Development of Education in North

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<sup>6</sup> [EUR-Lex - ST\\_15741\\_2023\\_INIT - EN - EUR-Lex \(europa.eu\)](#)

Macedonia. The team could provide oversight and coordination for the implementation of SfT, ensuring that the tool is effectively embedded into the national educational framework.

In schools participating in SfT activities, the assignment of a school-level SfT coordinator is necessary to inform, support, and monitor teacher participation. This coordinator will play a vital role in ensuring effective communication between the school and the national SfT team. Establishing a network of school SfT coordinators can foster good practice, knowledge sharing, and collaboration between schools. Such a network would facilitate the smooth execution of SfT activities and promote a culture of continuous professional development.

Teacher involvement in SfT exercises should remain voluntary and take place in a safe environment that guarantees anonymity. This approach encourages genuine self-reflection and critical evaluation of digital practices, enabling educators to engage in the process without fear of judgment. Participation in SfT activities should also be recognised as a sign of teachers' commitment to professional growth. In this study, digital badges were awarded to teachers and school managers, identifying them as 'innovative educators,' a practice that could be expanded to promote participation and acknowledgment of professional development efforts.

Furthermore, transparent and effective communication lines between the national SfT team, school coordinators, and school managers are essential. A similar model to the one used in this study can be adopted to ensure that all stakeholders are informed and supported throughout the process. Establishing communication channels with relevant EU bodies is also necessary to ensure coordination and access to needed support, particularly in expanding SfT use across the region.

While SfT provides valuable data on teacher digital competence, it is important to acknowledge that such data may contain biases. Careful interpretation of the results is required to avoid misrepresenting the findings and to ensure that decisions based on SfT data lead to meaningful improvements in teacher development programs.

In conclusion, the regular, structured use of SfT in North Macedonia and similar contexts can contribute significantly to enhancing the digital competence of educators. By embedding SfT into national strategies and fostering an environment of voluntary, reflective participation, education systems can better support teachers in their professional growth, ultimately leading to more effective and digitally literate educational practices.

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## List of abbreviations and definitions

DEAP	Digital Education Action Plan
DG EAC	Directorate General for Education and Culture
DigCompEdu	European Framework for the Digital Competence of Educators
EC	European Commission
ETF	European Training Foundation
EU	European Union
ICT	Information and Communications Technology
JRC	Joint Research Centre
SELFIEforTEACHERS	Self-reflection tool for teachers' digital competence
SfT	SELFIEforTEACHERS
VET	Vocational Education and Training
MoES	Ministry of Education and Science
BDE	Bureau for Development of Education



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# Annexes

5.1 Annex 1. SELFIEforTEACHERS tool content in Macedonian language

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