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NOTE

From:	General Secretariat of the Council
To:	Permanent Representatives Committee/Council
Subject:	Proposal for a Council Recommendation on improving the provision of digital skills in education and training - <i>Adoption</i>

1. The Education Committee has examined the above proposal for a Council Recommendation at a number of meetings. The text now meets with the agreement of all delegations.
2. The Permanent Representatives Committee is invited to confirm the agreement of delegations on the attached text and submit it to the Council for adoption and subsequent publication in the Official Journal of the European Union.

**Proposal for a
Council Recommendation**

on improving the provision of digital skills and competences in education and training

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Articles 165 and 166 thereof,

Having regard to the proposal from the European Commission,

Whereas:

1. Digital skills and competences have become vital in almost every sector of society and the economy, and are a cornerstone of social inclusion, well-being, active citizenship, employability, productivity, security and growth. All citizens need digital skills and competences in order to live, learn, work, exercise their rights, be informed, access online services, communicate, consume, and create and disseminate digital content.
2. In particular, the European Council conclusions of 9 February 2023¹ emphasised the need for bolder, more ambitious action to further develop the skills that are required for the green and digital transitions through education, training, upskilling and reskilling. Under Decision (EU) 2023/936 of the European Parliament and of the Council², the period from 9 May 2023 to 8 May 2024 was designated as the ‘European Year of Skills’, the overall objective of which is to further promote a mindset of reskilling and upskilling in accordance with national competences, law and practice.

¹ EUCO 1/23.

² Decision (EU) 2023/936 of the European Parliament and of the Council of 10 May 2023 on a European Year of Skills (OJ L 125, 11.5.2023, p. 1).

3. The first principle of the European Pillar of Social Rights³ states that ‘everyone has the right to quality and inclusive education, training and lifelong learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market’. Furthermore, the 2022 European Declaration on Digital Rights and Principles for the Digital Decade⁴, which sets out how Europe’s values and fundamental rights should be applied to the digital world, states that everyone ‘should be able to acquire all basic and advanced digital skills’. In this context, education and training systems have been called on to support the development of the digital skills of all citizens. Non-formal providers are also addressing this need by supporting a rich and varied educational offer for young people and adults.

³ OJ C 428, 13.12.2017, p. 10.

⁴ OJ C 23, 23.1.2023, p. 1.

4. The Union of Equality strategies⁵ adopted by the Commission emphasise the important role of quality and inclusive education and training as an enabler for progress towards a Union of equality for all, regardless of gender, racial or ethnic origin, religion or belief, disability, age or sexual orientation. Furthermore, within this context, special attention should be paid to vulnerable and socio-economically disadvantaged groups, persons with disabilities and people living in rural and remote areas and the outermost regions. Stereotypical expectations limit girls' and women's aspirations to choose a field of study or training and to pursue a professional career in the digital sector. This in turn influences the design of digital products, where women's and girls' needs or specificities might not be adequately taken into account. In line with the declaration *Commitment on women in digital*, action is needed to achieve equal participation across sectors and in particular in the digital sector.
5. The Commission's Digital Education Action Plan 2021-2027⁶ sets out Europe's approach for education in the digital age and considers the development of digital skills and competences as a strategic priority. The plan states that a sound understanding of the digital world should be part of formal and non-formal education. This is particularly important in the context of the ongoing digital transformation and the impact of emerging digital tools, based for instance on generative artificial intelligence (AI) systems and other emerging technologies. This implies the need for education and training institutions to prepare people for a creative, safe, ethical and responsible use of technology, based on an understanding of how it functions.

⁵ Five equality strategies were adopted in 2020 and 2021 to make progress towards a Union of Equality: the Gender Equality Strategy 2020-2025 (COM(2020) 152 final); the LGBTIQ Equality Strategy 2020-2025 (COM(2020) 698 final); the EU anti-racism action plan 2020-2025 (COM(2020) 565 final); the EU Roma strategic framework for equality, inclusion and participation 2020-2030 (COM(2020) 620 final); and the Strategy for the Rights of Persons with Disabilities 2021-2030 (COM(2021) 101 final).

⁶ COM(2020) 624 final.

6. In 2022 the Commission launched a structured dialogue with Member States on digital education and skills. After the ministerial debate which took place during the November 2021 Education, Youth, Culture and Sport (EYCS) Council, Member States nominated their representatives for the high level group of national coordinators for the structured dialogue, with the mandate to represent the relevant departments in their countries responsible for different aspects of digital education, training and skills (including education, labour, digital, culture, industry and finance). The outcomes of the structured dialogue highlighted a number of common challenges and demonstrated Member States' need to share best practices and benefit from support and cooperation to strengthen the development of digital skills and to improve the provision of digital skills in a lifelong learning perspective.
7. The Council Recommendation on key competences for lifelong learning⁷ lists the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society as one of the eight key competences for lifelong learning. The Digital Competence Framework for Citizens (DigComp)⁸ sets out the key elements of digital competence in five interrelated areas with different proficiency levels. The framework is used by education, training and certification providers as a reference for the development and assessment of digital skills.

⁷ Council Recommendation of 22 May 2018 on key competences for lifelong learning (OJ C 189, 4.6.2018, p. 1).

⁸ Vuorikari, R., Kluzer, S. and Punie, Y., DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes, Publications Office of the European Union, Luxembourg, 2022.

8. The relevance of digital skills for society and employability is supported by a series of targets on attainment levels. With the Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030)⁹, the Council committed to a Union-level target on young people's digital skills, with the aim of reducing the share of low achievers in computer and information literacy to less than 15 % by 2030. The Digital Decade Policy Programme¹⁰ includes a commitment to achieve, by 2030, a digitally skilled population and highly skilled digital professionals, where at least 80 % of those aged 16-74 have at least basic digital skills and at least 20 million ICT specialists are employed within the Union, while promoting the access of women to the field and increasing the number of ICT graduates.
9. However, available data show that across Member States participating in the International Computer and Information Literacy Study, on average approximately 34 % of eighth-grade students were rated as underachieving in computer and information literacy in 2018¹¹ (against a target of 15 %). In 2021, only 54 % of people in the Union aged 16-74 had at least basic digital skills¹², over half of Union companies reported difficulties filling vacancies for ICT specialists¹³, and only 9 million people across the Union worked as ICT specialists¹⁴. In ICT-related professions, men accounted for 81 % of the overall figure¹⁵. These figures confirm the need to further support the development of digital skills, including by addressing the gap between rural areas and cities and the high impact that age, socio-economic background and education have on the level of digital skills.

⁹ OJ C 66, 26.2.2021, p. 1.

¹⁰ Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030 (OJ L 323, 19.12.2022, p. 4).

¹¹ Fraillon, J., Ainley, J., Schulz, W., Friedman, T. and Duckworth, D., Preparing for Life in a Digital World: IEA International Computer and Information Literacy Study 2018 International Report, Springer Open, IEA, Amsterdam, 2019.

¹² Eurostat (2021). ICT usage in households.

¹³ Eurostat (2021). ICT specialists - statistics on hard-to-fill vacancies in enterprises.

¹⁴ Eurostat (2021). ICT usage in households and by individuals.

¹⁵ Eurostat (2021). ICT specialists in employment.

10. Efforts are needed for basic as well as advanced digital skills. In this context, the New European Innovation Agenda¹⁶ emphasises the need to focus on talent development in the deep tech sector. To this end, the European Institute of Innovation and Technology has been entrusted with coordinating the Deep Tech Talent initiative, which aims to train one million people within deep tech fields throughout the Member States by 2025. Other strategic initiatives of the Commission include the Cybersecurity Skills Academy, which has already been launched and which aims to promote cybersecurity skills and increase the number of cybersecurity professionals in Europe¹⁷.
11. The Commission's Digital Education Action Plan 2021-2027 proposed the development of a European Digital Skills Certificate to enhance the transparency and recognition of digital skills certification. While work has already been done to establish standards for the ICT profession, which covers all ICT sectors with a well-established body of knowledge that has been adopted by the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC)¹⁸, further work is needed to attract a larger and more diversified pool of talent into the digital sector. As stated in the 2022 skills and talent package¹⁹, in order to remain globally competitive, the EU needs to become more attractive to talent from around the world. The Blue Card Directive,²⁰ which was adopted in 2021, makes it easier for highly skilled migrants to join the EU's workforce, including by facilitating the recognition of their professional skills. Moreover, the Commission is launching, together with interested Member States, Talent Partnerships with key partner countries. These partnerships combine direct support for mobility schemes with capacity building and investments in human capital. Talent Partnerships are open to all skill levels and could concern various labour market sectors, such as ICT.

¹⁶ COM(2022) 332 final.

¹⁷ COM(2023) 207 final.

¹⁸ The European e-Competence Framework (e-CF) is currently maintained by 'CEN/TC 428 - ICT Professionalism and Digital Competences'.

¹⁹ COM(2022) 657 final.

²⁰ Directive (EU) 2021/1883 of the European Parliament and of the Council of 20 October 2021 on the conditions of entry and residence of third-country nationals for the purpose of highly qualified employment, and repealing Council Directive 2009/50/EC (OJ L 382, 28.10.2021, p. 1).

12. The Council conclusions on digital education in Europe's knowledge societies²¹ call for digital education that covers media, digital and data literacy, critical thinking and the fight against mis- and disinformation, hateful and harmful speech, and cyberbullying and addiction. Furthermore, the Council conclusions on supporting well-being in digital education²² reflect upon the need to consider the key role that digital skills play in ensuring the well-being of all players involved in the teaching and learning process.
13. In education and training, the development of digital skills and competences is ensured through various approaches²³, and each level of education and training faces different challenges²⁴. Furthermore, considering that children are engaging with digital technologies from an increasingly young age and mostly from home²⁵, digitally competent teachers in early childhood education and care (ECEC) play a key role in supporting families and young children in better understanding the opportunities and risks of the digital world in a more equal and inclusive manner. In this context, it is particularly important to ensure that children can safely navigate the digital environment and harness its opportunities, and also to anticipate and counter the misuse by learners of AI and other emerging technologies, by promoting a good understanding of these technologies and explaining how to safely exploit their potential.

²¹ OJ C 415, 1.12.2020, p. 22.

²² OJ C 469, 9.12.2022, p. 19.

²³ See, for instance, the Council conclusions on countering the COVID-19 crisis in education and training (OJ C 212I, 26.6.2020, p. 9), the Council conclusions on digital education in Europe's knowledge societies (OJ C 415, 1.12.2020, p. 22) and the Council conclusions on supporting well-being in digital education (OJ C 469, 9.12.2022, p. 19).

²⁴ See, among others, the Council Recommendation of 22 May 2019 on High-Quality Early Childhood Education and Care Systems (OJ C 189, 5.6.2019, p. 4) and the Council Recommendation (EU) 2021/1004 of 14 June 2021 establishing a European Child Guarantee (OJ L 223, 22.6.2021, p. 14).

²⁵ European Commission, Joint Research Centre, Chaudron, S., Di Gioia, R., Gemo, M., Young Children (0-8) and Digital Technology - A qualitative study across Europe, Publications Office of the European Union, Luxembourg, 2017.

14. The Council Recommendation on blended learning approaches for high-quality and inclusive primary and secondary education²⁶ specifically calls for efforts in boosting the development of the digital skills and competences of learners and teachers, taking into account the digital divide and the digital gender gap. In this context, the structured dialogue confirmed that in primary and secondary education, digital skills are developed with a combination of approaches²⁷, and that many Member States are reviewing their curricula in order to better promote digital skills (either as a dedicated subject or integrated within or across subjects). Another emerging trend in some Member States is the introduction of informatics²⁸ or computational thinking as separate subjects or their inclusion in an existing core curricular area such as mathematics or science. Regardless of curricular choices, it is necessary to promote quality education in these areas, supported by age and developmentally appropriate teaching methods, quality resources, gender-balanced uptake, representation, and proper evaluation²⁹.

²⁶ Council Recommendation of 29 November 2021 on blended learning approaches for high-quality and inclusive primary and secondary education (OJ C 504, 14.12.2021, p. 21).

²⁷ For example the cross-curricular approach, the introduction of a separate subject, or the inclusion of digital skills within another subject. For further details see staff working document SWD(2023) 205 final.

²⁸ In this Recommendation, informatics is considered to be a distinct scientific discipline characterised by its own concepts, methods, body of knowledge, and open issues. It covers the foundations of computational structures, processes, artefacts and systems, and their software designs, their applications, and their impact on society. In certain Member States this discipline is known as computer science.

²⁹ European Commission, European Education and Culture Executive Agency, Informatics education at school in Europe, Publications Office of the European Union, Luxembourg, 2022.

15. A range of Council acts³⁰ have highlighted the importance of digital skills and competences at all levels and in all types of education and training. They encourage major efforts towards the promotion of excellence in the development of digital skills and competences for all learners in schools, vocational education and training (VET), higher education, adult learning and for all levels of digital skills, from basic to advanced. In addition, these acts underline that education and training institutions are instrumental in accelerating the green and digital transitions in Europe and that education and training institutions play an important role in effectively integrating digital skills across all of their activities, for instance by providing a learning offer that addresses ICT professionals and provides digital skills in sector-specific curricula.

³⁰ The Council Recommendation of 24 November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience (OJ C 417, 2.12.2020, p. 1), the Council Conclusions on the inclusion of persons with disabilities in the labour market (15134/22), the Council conclusions on a European strategy empowering higher education institutions for the future of Europe (OJ C 167, 21.4.2022, p. 9), the Council Recommendation of 16 June 2022 on learning for the green transition and sustainable development (OJ C 243, 27.6.2022, p. 1) and the Council Recommendation of 16 June 2022 on a European approach to micro-credentials for lifelong learning and employability (OJ C 243, 27.6.2022, p. 10).

16. The European Pillar of Social Rights Action Plan³¹ proposes clear targets for adult participation in training (60 % by 2030), including in the area of digital skills. The Council Resolution on a new European agenda for adult learning 2021-2030³² focuses, among other things, on formal, non-formal and informal learning opportunities for adults, specifically how to increase and improve the provision, promotion and take-up of adult learning, including in view of the green and digital transitions, while the Council Recommendation on Upskilling Pathways: New Opportunities for Adults³³ recognises digital competence as one of the three basic skills that all adults should develop. Despite policy attention, adult participation in training is low, including in the area of digital skills, and the provision of digital skills to adults is scattered and uneven³⁴. Member States are seeking to address this through existing and new initiatives included in their recovery and resilience plans and by involving various stakeholders such as the social, voluntary, non-governmental sector and non-formal education institutions. Individual learning accounts, as set out in the related Council Recommendation³⁵, may help increase the number of people engaging in training each year through a combination of incentives, including financial incentives.

³¹ COM(2021) 102 final.

³² OJ C 504, 14.12.2021, p. 9.

³³ Council Recommendation of 19 December 2016 on Upskilling Pathways: New Opportunities for Adults (OJ C 484, 24.12.2016, p. 1).

³⁴ Beblavý, M., Bačová, B., Literature review on the provision of digital skills for adults, European Expert Network on Economics of Education (EENEE) report, Publications Office of the European Union, Luxembourg, 2022. Righi, R., Lopez Cobo, M., Papazoglou, M., Samoilis, S., Cardona, M., Vazquez-Prada Baillet, M. and De Prato G., Academic Offer of Advanced Digital Skills in 2020-21. International Comparison, Publications Office of the European Union, Luxembourg, 2022.

³⁵ Council Recommendation of 16 June 2022 on individual learning accounts (OJ C 243, 27.6.2022, p. 26).

17. The Council conclusions on European teachers and trainers for the future³⁶ highlight that teachers are a driving force who need to be involved in the creation of education and training policies but who also need to be supported through a comprehensive approach to their initial education, induction and continuing professional development. It is in the area of digital competence that most teachers feel a strong need for professional development³⁷. Moreover, the structured dialogue highlighted the challenges most Member States face in recruiting, retaining and preparing teachers, especially in informatics (for primary/secondary education and VET) or other specific/advanced digital areas (for higher education).
18. Various initiatives by Member States and the Commission, for instance the Erasmus+ Teacher Academies, aim to support competent, motivated and highly qualified teachers, trainers, educators and school leaders, and promote their continuing professional development, including in the area of digital skills. Furthermore, EU Code Week and the Digital Education Hackathon intend to promote stakeholder engagement and grass-roots innovation in digital education and skills. Similarly, the new European strategy for a better internet for kids (BIK+)³⁸ promotes engagement with stakeholders, including through the network of Safer Internet Centres, to create a safer internet for children. These initiatives support the development of digital skills and competences in the non-formal sector and should be further promoted as a means to support the development of digital skills and competences using an integrated approach, with the participation of all relevant stakeholders at national, regional and local level.

³⁶ OJ C 193, 9.6.2020, p. 11.

³⁷ OECD, TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners, OECD Publishing, Paris, 2019.

³⁸ COM(2022) 212 final.

19. Companies play a crucial role in upskilling and reskilling their staff, but large discrepancies exist. According to 2022 Eurostat data, only a small proportion of SMEs (20.9 %) provided training to their staff to enhance their ICT-related skills, compared with 69.5 % of large companies³⁹. The Pact for Skills invites businesses, social partners and public organisations to join forces and take concrete action to upskill and reskill the workforce across the Union. Furthermore, the Digital Skills and Jobs Coalition brings together Member States, companies, social partners, non-profit organisations and education providers to work together to address the lack of digital skills in Europe.
20. The national recovery and resilience plans demonstrate Member States' political impetus for further developing digital skills for learners, teachers and the workforce and for ensuring an adequate legal framework and the equipment and infrastructure required for that purpose. While most Member States have developed strategies for digital skills, it is also important to foresee a coherent and progressive path going through all levels and types of education and training⁴⁰. A recent report from the Commission on quality investments in education and training⁴¹ highlights the need for an impact assessment of the various programmes on learners' learning outcomes. The issue is of a general nature and applies equally to digital skills. The findings also underline that the use of digital technologies for teaching and learning can, if properly planned and designed, offer huge opportunities to boost educational outcomes. At the same time, it is vital to mitigate the risks of digital exclusion or the inappropriate use of technology.

³⁹ Eurostat (2022). Enterprises that provided training to develop/upgrade ICT skills of their personnel by size class of enterprise.

⁴⁰ As indicated in staff working document SWD(2023) 205 final and the 2022 Eurydice report (European Commission, European Education and Culture Executive Agency, Informatics education at school in Europe, Publications Office of the European Union, 2022).

⁴¹ European Commission, Directorate-General for Education, Youth, Sport and Culture, Investing in our future: Quality investment in education and training, Publications Office of the European Union, Luxembourg, 2022.

21. This Recommendation fully respects the principles of subsidiarity and proportionality. Member States will decide, according to their national circumstances, how to implement the Recommendation,

RECOMMENDS THAT MEMBER STATES:

1. Agree, preferably through a whole-of-government approach, and involving key stakeholders, on coherent and consistent national, and where appropriate regional, strategies or strategic approaches for digital education and skills and competences, developed, further strengthened or updated taking inspiration from the principles of this Recommendation, and monitor their effectiveness and impact. In pursuit of their strategies or strategic approaches, Member States are recommended to:
 - a) set or review national objectives for the provision of digital skills and competences and ensure their regular review and update;
 - b) where relevant, take into consideration within the national objectives the strategic priorities of the Commission's Digital Education Action Plan 2021-2027; where possible, build on this process to inform the national roadmaps to be submitted by Member States under the Digital Decade Policy Programme 2030;
 - c) identify 'priority or hard-to-reach groups'⁴² and establish appropriate measures to facilitate their participation in formal and non-formal education for digital skills, taking into account accessibility, territorial⁴³ and socio-economic gaps in digital skills;

⁴² For instance, those living in rural areas, disadvantaged or marginalised groups such as persons with disabilities, Roma, and third-country nationals with limited knowledge of the host country, and those with a low or medium level of education, or not in education, employment or training.

⁴³ E.g. urban/rural, remote and outermost regions, cross-border territories.

- d) seek a coherent and age-appropriate approach to the provision of digital skills and competences throughout all levels and types of education and training, from a lifelong learning perspective, by structuring this from early childhood education and care, through primary, secondary and vocational education and training to higher education and adult learning in a progressive manner, in close consultation with relevant stakeholders and social partners, reaching a joint understanding on key aspects to be covered in developing digital skills for specific age groups and education and training levels and types;
- e) address in a coherent way the full spectrum of digital skills, from basic to advanced digital skills in all labour market sectors, including for ICT professionals;
- f) strive for relevant and methodologically sound monitoring, evaluation and assessment of educational initiatives and training programmes on digital skills at local, regional and national levels to prove and improve the effectiveness and quality of the actions taken, while avoiding excessive administrative burdens;
- g) contribute to peer learning, exchange of practices and coordination, including across policy sectors, at European and global level, in order to find common solutions to cross-continental, international and inter-regional challenges.

2. Start early with guiding learners in the digital world and offering equal opportunities to develop digital competences that are appropriate to learners' age. Promote their well-being, paying particular attention to vulnerable groups, and consider an appropriate balance between the use of digital devices and other forms of learning. In particular, Member States are recommended to:
- a) in accordance with the overall priorities of ECEC, support pre-primary pupils and especially their parents, carers and families to develop relevant digital competences, and to be aware of and better understand the opportunities and risks that come with digitalisation;
 - b) use age and developmentally appropriate activities, for example, in ECEC, unplugged and non-screen digital education activities⁴⁴ and the play-based learning of digital competences⁴⁵ in line with the child's socio-emotional and cognitive development.
3. Further strengthen the provision of digital skills and competences in primary and secondary education, as well as in VET. Special attention should be paid to the provision of the skills required to enable the appropriate understanding of digital technologies and meaningful, healthy, safe, and sustainable engagement with digital and other relevant technologies and their functioning, including generative AI systems. Safe individual and collective practices that tackle the risks of hyperconnectivity and cyberbullying, especially those faced by vulnerable groups, should also be encouraged.

⁴⁴ For example, educational activities that promote the development of digital skills without using digital devices.

⁴⁵ For example, pedagogical approaches on digital skills where young children can explore, experiment, discover and solve problems in imaginative and playful ways.

4. Expand, where appropriate, the cross-curricular approach (i.e. digital skills taught transversally in different subjects) and improve assessment and teacher training. In particular, Member States are recommended to:
- a) support cross-curricular approaches for the provision of digital skills and competences at all levels and in all types of education and training and promote the cross-curricular assessment of digital skills, with a means and frequency comparable to the assessment of other basic skills, in order to keep track of progress;
 - b) [address, in line with the Council Recommendation on the key enabling factors for successful digital education and training, barriers to the cross-curricular approach by encouraging quality training on the use of digital technology in all initial teacher education programmes for pre-service teachers, and supporting providers of those programmes with the necessary resources and facilities;]
 - c) take more concerted action to close the gender gap in the level of digital skills between female and male teachers;
 - d) promote the use of the ‘Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training’⁴⁶ and the toolkit on how to spot and fight disinformation, as well as the ‘Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators’⁴⁷, in classrooms;

⁴⁶ European Commission, Directorate-General for Education, Youth, Sport and Culture, Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training, Publications Office of the European Union, 2022.

⁴⁷ European Commission, Directorate-General for Education, Youth, Sport and Culture, Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators, Publications Office of the European Union, 2022.

- e) encourage and facilitate the participation of schools in the Digital Education Hackathon and EU Code Week as an icebreaker to break down any barriers to integrating a cross-curricular approach to digital skills and competences in everyday teaching practices in an innovative and engaging manner. This participation should be leveraged to support new school or local/regional strategies and policies;
 - f) foster an interdisciplinary approach that integrates the development of digital skills and competences across different subject areas, especially within science, technology, engineering, arts and mathematics (STEAM) education.
5. Continue to improve measures to recruit and train teachers with expertise in the areas of informatics or computational thinking in primary and secondary education, and advanced digital technologies in higher education, while acknowledging their need for a varied range of pedagogical and didactic skills. In particular, Member States are recommended to:
- a) consider ongoing initiatives, such as the Pact for Skills and the Digital Skills and Jobs Coalition, or new initiatives to support a two-way exchange and collaboration between education and training institutions and the private sector⁴⁸, in order to allow:
 - i) professionals working in the digital sector (for instance in informatics) to support classroom teachers at primary or secondary level (as well as in VET); and
 - ii) teachers to acquire specific skills in the field of informatics or computational thinking and in specific digital technology domains (for instance AI, cybersecurity).
 - b) where relevant, update the continuing professional development offer to support creating specific learning opportunities to enable further professionalisation in informatics or computational thinking.

⁴⁸ Primary, secondary and tertiary sector.

6. Support high-quality education in informatics or computational thinking at primary and secondary level taking into account specific contexts. In particular, Member States are recommended to:
- a) foster the provision of high-quality education in these areas from the start of compulsory education, with clear learning objectives, dedicated time and structured assessment, with the aim of offering all learners the opportunity to develop their digital skills and competences through scientifically sound pedagogical methods;
 - b) ensure that teaching and learning on informatics or computational thinking, whether as a specific subject or delivered in a cross-curricular way, is provided by qualified teachers with access to quality and accessible learning resources and taking into account school sizes and contexts and with the appropriate assessment of learning outcomes;
 - c) promote diversity and a gender-balanced uptake and reduce any possible stereotype in the teaching and learning of informatics or computational thinking. This should be supported by research, firstly on cultural, socio-economic and institutional barriers to girls' aspirations and access to the digital sector (including girls with a minority racial or ethnic background), and secondly on the impact of textbooks and other resources that teach digital subjects in a more inclusive manner;

- d) promote cooperation through the exchange of good practices among all relevant stakeholders in education and training on curriculum development, delivery and assessment, as well as the cooperation of the teacher-training institutions of the Member States within the Erasmus+ Teacher Academies and other relevant initiatives.
7. Encourage the development of advanced and specialist digital skills in VET, including on AI, deep tech and in other key capacity areas. In particular, Member States are recommended to:
- a) strengthen the provision of digital skills and ease learners' access (both in initial and continuing VET) to the advanced and specialist digital skills that are increasingly required for many vocational profiles, including through work-based learning and apprenticeship placements, interdisciplinary programmes or short courses leading to micro-credentials;
 - b) support VET students in acquiring the digital skills required to, for example, recognise the use of AI and use immersive technologies such as virtual reality, augmented reality, simulation and gaming as well as adaptive learning and take the necessary steps to attract more learners to vocational programmes in areas such as AI, cybersecurity and software development, in line with labour market needs.

8. Foster the development of a wide range of digital skills and competences in higher education and address ongoing and emerging mismatches. In particular, and with due regard to academic freedom and the autonomy of higher education institutions, Member States are recommended to:
- a) encourage higher education institutions to promote a provision of digital skills and competences that is both general and, where relevant, sector-specific, and promote the cooperation and exchange of good practices among higher education institutions and all relevant actors on curriculum development, delivery and assessment. This could include, for example:
 - i) learning opportunities and courses for the development of digital competence across levels and disciplines with the objective of strengthening the provision for all students, regardless of the sector of their professional career;
 - ii) flexible, tailored, and digitally accessible learning opportunities on advanced and specialist digital skills, including through short courses that may lead to micro-credentials.
 - b) facilitate and encourage exchanges between different sectors of industry (including SMEs) or professional groups and higher education institutions to develop interdisciplinary courses and further embed advanced and specialist courses on digital skills across degrees and respond to specific labour market needs;
 - c) provide support for transparency and quality assurance, and for the recognition of academic qualifications and, if appropriate, micro-credentials on digital skills;

- d) recognise the efforts of teaching staff and higher education institutions in strengthening the provision of digital skills and competences to all students. Encourage and promote the mobility of teaching staff between higher education institutions and, when relevant, between academia and the private sector;
 - e) support higher education institutions in encouraging students, and particularly women, to enrol in and complete studies focusing on developing advanced skills in a number of digital domains (e.g. hardware, software, digital design, digital integration, data science, AI or cybersecurity) and promote, where relevant, the development of advanced digital skills within other disciplines.
9. Support the development of the digital skills of adults and offer equal opportunities. In particular, Member States are recommended to:
- a) mainstream digital skills opportunities across the adult learning system, for instance by integrating these, where relevant, into national skills strategies, and ensure adequate attention to and support for the implementation of measures at all levels of digital skills, including in non-formal education and training;
 - b) promote public-private partnerships, including among actors such as social partners, national and local authorities, local schools and community centres, and associations, organisations and groups in digital civil society, industry and other sectors, to design, develop, deliver, monitor and evaluate new programmes and initiatives addressing specific adult learning needs, including for work-based learning. The exchange of practices should be promoted at EU level on curriculum development, delivery and assessment;

- c) run targeted awareness-raising campaigns on the importance of digital skills and provide specific support for those adults most in need of developing their digital skills, including access to career guidance;
 - d) promote and recognise regular training for adults on digital skills, namely within existing education and training provision, and by using, where applicable, individual learning accounts, in accordance with the related Council Recommendation⁴⁹. Include, among the available courses, quality-assured training opportunities for different levels of digital skills in line with the needs of the labour market and society as a whole. Employers should be encouraged and motivated to prioritise upskilling and reskilling of employees during working time;
 - e) strengthen efforts to better embed companies, particularly SMEs and start-ups, in the existing sectoral, industrial and national ecosystems, in order to provide them with the necessary support, including knowledge-sharing, guidance and learning opportunities;
 - f) encourage and promote the creation of additional local and regional Digital Skills and Jobs Coalitions to develop concrete measures for digital skills in line with local and regional needs.
10. Promote the development of the recognition and certification of digital skills, particularly within the existing processes. In this respect, Member States are recommended to:
- a) support and promote the recognition and/or certification of digital skills across different levels and types of education and training, including those gained through training provided via individual learning accounts or other funding measures;

⁴⁹ Council Recommendation of 16 June 2022 on individual learning accounts (OJ C 243, 27.6.2022, p. 26).

- b) encourage, in cooperation with the competent authorities, the recognition of digital skills certificates and qualifications, including micro-credentials, also when working towards fulfilling the commitment to take steps to introduce the automatic mutual recognition⁵⁰ of qualifications by 2025;
 - c) provide incentives where appropriate and give visibility to digital skills for learning or career progression by facilitating their identification, documentation, assessment and certification, whether acquired through formal, non-formal or informal learning. Recruiters and third-country nationals should be assisted in all steps related to the recognition and certification of skills and qualifications;
 - d) follow the development of the European Digital Skills Certificate.
11. Develop a strategic and systematic approach to addressing the shortage of ICT professionals. In particular, Member States are recommended to:
- a) use skills forecasting to assess the future needs for digital skills among different target groups in the market, particularly those of SMEs, and conduct research to better understand the digital skills gaps;
 - b) consider, in national strategies and action plans or strategic approaches, initiatives addressing specific digital skills shortages (for instance in cybersecurity, AI and robotics) that are relevant at national level, and take into consideration the Cybersecurity Skills Academy initiative;

⁵⁰ Council Recommendation of 26 November 2018 on promoting automatic mutual recognition of higher education and upper secondary education and training qualifications and the outcomes of learning periods abroad (OJ C 444, 10.12.2018, p. 1).

- c) attract and retain talent from abroad by making full use of the Blue Card Directive⁵¹ and Talent Partnerships, and enhance cooperation with other Member States to exchange practices and solutions for attracting digitally talented individuals to the Union and facilitating their mobility, where applicable;
- d) pursue a more strategic and systematic approach to training and attracting ICT professionals, including from third countries, with a particular focus on SMEs;
- e) provide comprehensive career and study guidance at school, VET and higher education level to stimulate interest among young people, particularly among girls and young women, in taking up studies in ICT and/or pursuing a career as ICT professionals. Targeted campaigns should be carried out to address preconceptions regarding the accessibility of tech careers (particularly addressing those not having an ICT background) and the different possible career paths when studying ICT. Various communication channels should be used to reach out to different segments, and to highlight the possibility of having a meaningful ICT career that is beneficial for society;
- f) prioritise, in line with the declaration *Commitment on women in digital* and in synergy with relevant initiatives by the European Institute of Innovation and Technology and the European Innovation Council, efforts aimed at tackling gender bias, in order to close the gender and pay gap in ICT and provide targeted upskilling and reskilling opportunities to girls and women at all levels of education and training, thereby recognising the value of their contribution and talent;
- g) increase the attractiveness of the digital sector for women, for instance by working with the national Digital Skills and Jobs Coalitions to develop awareness-raising campaigns and tailor national messages;

⁵¹ Directive (EU) 2021/1883 of the European Parliament and of the Council of 20 October 2021 on the conditions of entry and residence of third-country nationals for the purpose of highly qualified employment, and repealing Council Directive 2009/50/EC (OJ L 382, 28.10.2021, p. 1).

- h) create opportunities for schools, VET providers and higher education institutions to attract students to digital careers (for instance by organising open days, family days and seminars, and by promoting participation in initiatives such as the Innovation Talent Platform, EU Code Week, the Digital Education Hackathon, and extracurricular activities).
12. Provide the necessary funding for the development of digital skills and competences. In particular, Member States are recommended to:
- a) implement the various aspects of this Recommendation by using national and Union funds, including Erasmus+, the European Social Fund Plus, Just Transition Fund, European Regional Development Fund, European Agricultural Fund for Rural Development, Digital Europe Programme, Horizon Europe, and proceed with the implementation of the national recovery and resilience plans;
 - b) use the Technical Support Instrument, including its multi-country approach, to design and implement reforms to strengthen the provision of digital skills in a lifelong learning perspective, in line with this Recommendation;
 - c) encourage private investment in digital skills development and consider blending different sources of funding to upscale initiatives and increase their impact and sustainability;
 - d) promote the contribution to and use of open source, open content or open data solutions and digital commons⁵² in general.

⁵² [For a definition of the concept of ‘digital commons’, please see the Council Recommendation on the key enabling factors for successful digital education and training.]

13. Entrust the High Level Group on Education and Training with the task of providing steering on the key strategic topics addressed in this Recommendation. This will take place mainly through discussions, a regular exchange of information and the provision of guidance on strategic issues⁵³ related to digital education and training and to digital skills and competences. The High Level Group should receive support and draw on expertise as it requires, including from the Working Group on Digital Education: Learning, Teaching and Assessment (DELTA) and expert groups in other sectors, such as the Digital Decade Board, in order to build on a horizontal, cross-departmental approach. The topics to be covered could be announced in the successive 18-month policy agendas.

⁵³ Such issues could include, among others, the assessment and certification of digital skills and competences, quality requirements for digital education tools and content or the integration of artificial intelligence into education and training, including through informatics and computational thinking.

WELCOMES THE COMMISSION'S INTENTION TO:

Build upon existing initiatives, including the European Year of Youth and the European Year of Skills, to support and complement Member States' actions in the area of digital skills and competences. In particular, the Commission intends to:

1. Support reform efforts for digital skills and competences development and high-quality informatics or computational thinking. In particular, the Commission intends to:
 - a) facilitate Member State reforms, via Union instruments such as the Technical Support Instrument, including by facilitating exchanges on national approaches on the development of digital skills and competences and skills related to informatics or computational thinking. The Commission will promote the use and upscaling of existing tools for the evaluation of skills, and successful teacher-training initiatives in these areas;
 - b) support high-quality education in informatics or computational thinking, in close cooperation with Member States and stakeholders, by developing guidelines for teachers and educators as a voluntary offer for the Member States;
 - c) support peer learning and cooperation to share knowledge on curriculum development, delivery and assessment by the Member States via Union programmes such as Erasmus+ and tools including the European Digital Competence Frameworks for Citizens and Educators;
 - d) support Member States in monitoring the development of digital skills and competences through their participation in international surveys (such as ICILS, PISA, TALIS, PIAAC) and other European initiatives (such as Eurograduate), which can complement national data collection efforts.

2. Promote excellence in advanced and specialist digital skills courses in higher education and VET. In particular, the Commission intends to:
- a) support Member States in creating conditions conducive to developing advanced and specialist digital skills among students, researchers and lifelong learners, with such skills to be provided by higher education institutions and VET providers on a voluntary basis. This would be done both in interdisciplinary programmes and programmes focused on advanced ICT skills, taking into account the need to permanently upgrade these skills to follow the rapid pace of innovation, as well as the need to make such programmes inclusive and accessible to diverse learners;
 - b) sustain its support for the academic offer in advanced digital skills in digital technology areas and other transdisciplinary or multidisciplinary areas, and their applications in strategic sectors not sufficiently covered by previously adopted Digital Europe work programmes.
3. Support efforts for the provision of digital skills to adults. In particular, the Commission intends to:
- a) promote initiatives such as the Pact for Skills and the Digital Skills and Jobs Coalition, to join forces to offer upskilling and reskilling opportunities for adults to improve their digital skills;
 - b) support and encourage the development of accessible digital skills training courses, leading to micro-credentials where possible, and addressing specific adult learning needs, for example through the Technical Support Instrument and Union funding opportunities. A particular focus may be put on the provision of advanced digital skills to SME staff;

- c) facilitate exchanges on best practices for adult learning of digital skills through the Public Employment Services network, the Pact for Skills, the European Education Area working group on adult learning, the national coordinators for adult learning and other relevant fora.
4. Facilitate the recognition of the certification of digital skills. In particular, the Commission will:
- a) pilot and, if successful, roll out, in cooperation with the Member States and stakeholders⁵⁴, a European Digital Skills Certificate, which could be used by Member States on a voluntary basis. The certificate would be aimed at enhancing trust in and acceptance of digital skills certification across governments and industries. The pilot project seeks to identify and test minimum quality requirements that any certificate and certification process for digital skills should possess. The European Digital Skills Certificate could enable every European citizen to indicate in a reliable and transparent manner their level of digital skills corresponding to the DigComp framework;
 - b) support, in close cooperation with Member States, the development of guidelines and facilitate exchanges on best practices for the assessment and evaluation of digital skills and competences;
 - c) support the competent quality assurance and/or standardisation bodies in developing a recognition mechanism for the certification of digital skills, including micro-credentials, and continue providing support to the Member States in establishing the conditions that would enable the automatic mutual recognition of those digital skills by 2025.

⁵⁴ Stakeholders from education and training, social partners and digital skills certification providers.

5. Support efforts aimed at increasing the number and diversity of ICT professionals. In particular, the Commission intends to:
- a) build on, in close cooperation with the Member States, the declaration *Commitment on women in digital*, in order to further encourage women to play an active and prominent role in the digital technology sector and to promote advanced digital skills development and careers in the digital sector for women;
 - b) support Member States in promoting gender-responsive teaching of digital skills in primary and secondary education by identifying innovative scalable teaching practices to address institutional and cultural barriers to girls' aspirations and their access to ICT studies and careers in the Union;
 - c) maintain and, where needed, enhance efforts towards digital inclusion, ensuring that all individuals and communities, including the most disadvantaged (for example, vulnerable and socio-economically disadvantaged groups, persons with disabilities and people living in rural and remote areas), can contribute to and benefit from the digital transformation.

6. Monitor progress, disseminate good practices and increase exchanges with stakeholders. In particular, the Commission intends to:
- a) monitor progress towards the implementation of this Recommendation, taking into account Member States' strategies or strategic approaches, and including the specific outcomes and impacts on the provision of digital skills and competences. This should be done within the European Education Area and its Education and Training Monitor, and as part of the Member States' reporting through the Digital Decade, without increasing their administrative burdens;
 - b) strengthen international cooperation on digital education and skills and competences;
 - c) review the progress made towards implementing this Recommendation and report to the Council no later than five years after its adoption.

Done at Brussels,

For the Council

The President
