

DigiSET – The Academy of Digitally Sustainable European Teacher

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Teachers' Competences for Digital Sustainability in Ireland

A survey of teachers

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for the
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Disclaimer on Methodology and Authorship

The development of the survey instrument was a collaborative effort involving the entire consortium. However, the selection of scales and the final composition of the questionnaire were done by Dila Oral, Sezin Esfer and Sabiha Dulay (all BAU), Filiz Keser Aschenberger (UWK), Erina Guraziu (OpenCom), and Sandra Schön (TU Graz). The analysis template as well as the data analysis process — including data cleaning, selection, and the creation of all charts and diagrams — were carried out by Bettina Mair and Sandra Schön (both TU Graz). The textual descriptions, interpretations, and conclusions presented in this report reflect the views of the respective authors listed herein and are their sole responsibility. In addition, please note that certain descriptive and introductory sections of this report are based on consortium-wide templates applied uniformly across all country reports to ensure comparability. The specific analyses, interpretations, and country-specific findings remain the responsibility of the respective national teams.

Disclaimer on AI usage

Based on Academic Integrity and Transparency in AI-assisted Research and Specification Framework (Bozkurt, 2024, DOI: 10.55982/openpraxis.16.1.654), the author of this report acknowledge that ChatGPT was used during the editing of this report. The human author critically assessed and validated the content to maintain academic rigor. The author also assessed and addressed potential biases inherent in the AI-generated content. The final version of the paper is the sole responsibility of the human author.

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Foreword

I am pleased to present this Country Report Ireland as a contribution to the *DigiSET – The Academy of Digitally Sustainable European Teacher* project, which is funded by Erasmus+ scheme. The report provides a detailed examination of the Irish education and training context in relation to digitalisation, sustainability, inclusion, and the growing influence of artificial intelligence in teaching and learning. Its purpose is not only to describe policy and provision, but to explore whether current structures genuinely support teachers in doing their work well, ethically, and sustainably.

From the project reports there is no doubt that Irish teachers are already engaging positively with digital technologies, inclusive pedagogies, and sustainability education, often well ahead of formal requirements. This reflects the professionalism and commitment of the teaching workforce and the strength of Initial Teacher Education and Continuous Professional Development provision across the system. However, significant structural shortcomings are presented. Digital transformation, sustainability education, and artificial intelligence continue to operate largely in parallel policy streams rather than as a coherent whole. Teachers are encouraged to innovate yet are rarely provided with a unified competence framework that integrates digital capability, sustainability, ethics, inclusion, and wellbeing. The result is a fragmented landscape in which good practice exists but is uneven and often dependent on local initiative rather than system design.

This report notes the rapid expansion of Artificial Intelligence use in education without sufficiently robust safeguards. While national guidance rightly promotes ethical and responsible AI use, this report identifies gaps relating to data protection, algorithmic bias, environmental impact, and commercial influence on educational technologies. Teachers are increasingly expected to exercise professional judgement in complex AI-mediated environments, yet are not always supported with the time, training, or clarity required to do so safely. Responsibility is too often devolved to individuals rather than underpinned by appropriate system-level governance. Attention is also focused on an issue that is consistently under-acknowledged in reform agendas: teacher workload and lack of allocated time. Teachers in Ireland demonstrate a strong willingness to engage in professional learning, collaboration, and innovation. However, expectations continue to expand—digital competence, sustainability, inclusion, AI literacy, open education—without sufficient consideration of workload, substitution, or protected time for high-quality professional learning. Without addressing this imbalance, even the strongest policy intentions risk becoming unsustainable in practice.

Crucially, this report is grounded in teacher practice. It has been developed by a multidisciplinary team comprising practicing teachers, educators, academic researchers, and a social partner, drawing on extensive experience across secondary education, further and higher education, and teacher professional learning. The analysis combines research evidence with lived experience, using a collegial and reflective process throughout. This approach ensures that the findings reflect classroom reality as well as policy intent, and that teachers' voices remain central to the conclusions reached.

From a leadership perspective, the message is clear. Ireland does not suffer from a lack of innovation or professional commitment; rather, it requires greater coherence, stronger safeguards, and more realistic conditions for teachers' work. Digital transformation must be shaped by educational values, not driven by technological momentum. Sustainability must extend beyond curriculum content to include the environmental and human costs of digital systems. Artificial intelligence must support, not displace, teacher judgement and professional agency.

The digital divide in our schools is not simply about whether broadband reaches the front door. Many schools may have a connection available, but lack the internal infrastructure, devices, hardware, maintenance, and technical support needed to turn that connection into real learning opportunities for students. This creates stark differences between students who can access reliable digital tools and those who cannot. Without adequate devices, classroom infrastructure, and trained personnel to support teachers and students, broadband alone will not close the gap. Schools and workplaces need sustained investment in equipment, connectivity throughout buildings, technical expertise, and practical support so that every student can benefit equally from digital learning. In this context, DigiSET has a critical role to play. The project offers an opportunity to articulate an integrated, European-aligned framework that brings together digital pedagogy, sustainability, ethical AI, inclusion, and open practices—while recognising the realities of teacher workload and the primacy of professional practice. If DigiSET is to succeed, it must continue to be informed by teachers' experience, grounded in research, and uncompromising in its commitment to safe, ethical, and sustainable education.

Michael Gillespie

General Secretary, Teachers' Union of Ireland¹

July 2026

¹ The Teachers' Union of Ireland is a registered trade union representing over 25,000 members (teachers, trainers, lecturers, researchers) in post-primary and tertiary education sectors. TUI has in routes in providing representations for vocational and technical education and training for over 100 years.

Abstract

This report presents the findings of the DigiSET teacher survey conducted in Ireland as part of the Erasmus+ project DigiSET – The Academy of Digitally Sustainable European Teacher (Project No. 101249272). The survey explored teachers' self-perceived competences in digital teaching, artificial intelligence (AI), education for sustainable development (ESD), and open educational resources (OER), together with four DigiSET-specific topics: adaptive AI use, gender bias in AI, inclusive digital practices, and systems thinking for sustainability. Data were collected between May and June 2026 through an online questionnaire based on established instruments, including DigCompEdu Check-In, the Teacher AI Competence Self-Efficacy Scale (TAICS), the Attitudes Towards OER Scale (ATOER), and project-specific items.

A total of $N = 221$ responses were received, of which $N = 165$ were retained for analysis following data cleaning procedures. Respondents were predominantly experienced teachers working in publicly funded post-primary, vocational, and further education settings, with almost half reporting more than twenty years of teaching experience. The findings reveal a teaching workforce that is generally confident in established digital and sustainability-related practices but less confident in applying emerging technologies within teaching and assessment. Respondents reported particularly strong competence in digital resource management, professional engagement, and values-based aspects of sustainability education, suggesting that communication, collaboration, data protection, and ethical awareness are well embedded within professional practice. In contrast, confidence was lower in areas requiring more advanced pedagogical application, particularly digital assessment, AI-supported teaching, adaptive learning, and the use of AI for assessment. While teachers demonstrated growing awareness of artificial intelligence, many appeared uncertain about how to integrate AI effectively, ethically, and confidently into classroom practice. Competence relating to Open Educational Resources (OER) was moderate overall, indicating familiarity with open resources but less confidence regarding licensing and intellectual property issues. Among the DigiSET-specific topics, inclusive digital practices emerged as a relative strength, whereas adaptive AI use and addressing bias in AI represented the most significant competence gaps.

Overall, the findings suggest that Irish teachers have developed strong foundations in digital teaching and sustainability values but require further support to translate these strengths into confident use of AI, digital assessment, and digitally supported sustainability pedagogies. The most frequently identified professional development priorities were using AI in teaching, adaptive learning tools, and inclusive digital teaching. The principal barriers to professional development were lack of time, limited access to training opportunities, and insufficient institutional support. Qualitative responses further highlighted workload pressures, resource constraints, concerns regarding AI implementation, and the need for practical, classroom-focused professional learning. The findings should be interpreted considering several limitations, including the non-probability sampling approach, the self-reported nature of the data, and the overrepresentation of experienced post-primary and vocational educators. Nevertheless, the results provide valuable evidence to inform the design of the DigiSET Teacher Academy and the development of targeted learning outcomes and training modules that address emerging competence needs within the Irish educational context.

Content

Foreword.....	4
Abstract.....	6
1. Introduction	9
2. Methodology	10
2.1. Survey development, ethics and analysis	10
2.2. Sampling strategy and data collection.....	11
2.2.1. Target population and recruitment process	11
2.2.2. Data collection period and responses	12
3. Demographic profile of respondents	12
3.1. Gender and age (B6, B7)	13
3.2. Status of respondents (B1).....	13
3.3. School levels taught or expected to teach (B2)	14
3.4. Subjects currently taught or expected to be taught (B3)	14
3.5. Teaching Experiences (B4)	15
4. Results	15
4.1. Self-perceived digital teaching competence	16
4.1.1. Professional engagement (D1-D4)	16
4.1.2. Digital resources (D5-D7)	16
4.1.3. Teaching and learning (D8-D11)	17
4.1.4. Assessment (D12-D14)	17
4.1.5. Empowering learners (D15-D17)	18
4.1.6. Facilitating learners' digital competence (D18-D22)	18
4.2. Self-perceived AI competence.....	19
4.2.1. AI knowledge (A1-A4).....	19
4.2.2. AI pedagogy (A5-A8)	20
4.2.3. AI assessment (A9-A12).....	20
4.2.4. AI ethics (A13-A16)	21
4.2.5. AI human-centred education (A17-A20)	21
4.2.6. AI professional engagement (A21-A24)	22
4.3. Self-perceived education for sustainable development (ESD) competence... 22	
4.3.1. Systems and critical thinking (S1-S3)	22
4.3.2. Pedagogical practice for ESD (S4-S7)	22
4.3.3. Values and responsibility (S8-S10)	23
4.3.4. Reflective and action-oriented practice (S11-S13)	24

4.4. Self-perceived Open Educational Resource (OER) competence (O1-O5).....	24
4.5. Self-perceived competences for specific DigiSET topics	25
4.5.1. Adaptive AI use (AD1, AD2)	25
4.5.2. Gender bias in AI (GD1, GD2).....	25
4.5.3. Inclusive practices for students with learning disabilities (I1, I2)	26
4.5.4. System Thinking (S1-S3).....	26
4.6. Challenges faced in integrating digital teaching and sustainability in teaching, needed competences and existing barriers.....	27
4.6.1. Challenges faced in integrating digital technologies and sustainability into teaching (Q1).....	27
4.6.2. Competences that would help to address these challenge (Q2)	28
4.6.3. Professional development needs related to digital and sustainable teaching (P1)	29
4.6.4. Main barriers to professional development (P2).....	30
4.6.5. Additional Insights and comments (Q3).....	30
5. Discussion.....	31
5.1. Key results concerning teachers' competences	32
5.1.1. Teachers' competence in digital teaching, AI, ESD and OER.....	32
5.1.2. Teachers' competence concerning the four DigiSET topics	33
5.1.3. Teachers' learning needs and interest	34
5.2. Contextualisation within the national framework	35
5.3. Limitations	37
6. Implications	41
6.1. Implication for DigiSET	41
6.2. Additional insights.....	43
References	45
Appendices.....	48
1 Copy of main survey items and code	48
2 Copy of survey invitation email sent to Irish sample.....	53
3 Copy of survey means scores	54

1. Introduction

Digital transformation, artificial intelligence, and sustainability are increasingly shaping educational policy and practice across Europe. Teachers are expected not only to use digital technologies effectively but also to integrate them in ways that are ethical, inclusive, and sustainable. This report examines how Irish teachers perceive their competence in these areas and identifies priorities for future professional development. The DigiSET project (The Academy of Digitally Sustainable European Teacher²) represents a transformative education and training initiative seeking to address the urgent need for digital upskilling among European educators. The primary objective of DigiSET is to develop and implement a European Academy for Teachers. Providing learning resources to equip teachers with the knowledge, skills, and competencies needed to create, use, and adapt Open Educational Resources (OERs), digital technologies, and AI algorithms. DigiSET aims to enhance the digital skills of European educators, aligning with the European Union education policy agendas such as DigCompEdu, LifeComp, and GreenComp frameworks. The project seeks to explore specific needs for teachers to enhance upskilling in digital technologies through comprehensive training and a supportive community of practice, fostering a sustainable education system across Europe. To ensure that the projects' training programmes effectively meet the needs of teachers and educators across diverse national contexts, exploratory needs analysis were conducted. The applied research approach used could be described as 'mixed method' (L. Clark, Creswell 2008), using three difference methods of gathering data, Country Reports, Focus Groups and Surveys and synsthisng the results. Undertaking a standardised applied research approach in each of the project partner countries.

This report details the process used to administer the DigiSET project Survey of teachers in Ireland. Outlining the approach used and providing both descriptive and statistical analysis of results. Providing some empirical evidence for understanding the status of digital and sustainability teaching competencies, identifying specific barriers to integration. The results will contribute towards the development of specific training programme and learning resources to support teacher's professional development and practice. Following this introduction, Section 2 outlines the research methodology, detailing the sampling strategy, and data collection processes specific to the national context. Section 3 provides a demographic profile of the respondents, offering essential context regarding their professional status, teaching experience, and subject specializations. The core empirical findings are presented in Section 4. This section systematically analyses teacher competencies across four primary domains: Digital Teaching Competence, AI Competence, Education for Sustainable Development (ESD), and Open Educational Resources (OER). Furthermore, it examines specific competence requirements regarding adaptive AI use, gender bias, inclusive practices, and systems thinking, alongside an analysis of faced challenges and professional development needs. Section 5 synthesizes these results through a critical discussion, contextualizing the findings within the national framework and current state of research while addressing the generalizability and limitations of the study. Finally, Section 6 details the implications derived from the data, offering evidence-based recommendations for the development of the DigiSET Framework of Learning Outcomes and proposing strategies for the integration of these outcomes into national teacher training provisions.

² DigiSET project details can be obtained from the following website, <https://digisetproject.eu>

2. Methodology

This section outlines the research design and methodological procedures used in the Irish implementation of the DigiSET project online survey. It describes the survey instrument, participant recruitment strategy, data collection process, and analytical approach. Understanding these procedures is essential for interpreting the findings and assessing their generalisability. The approach utilised is described including the survey development, sampling strategy, data collection procedures, and analytical methods employed.

Methodologically, the project can be considered as applying a 'mixed method' approach (Clark and Creswell 2008) combining qualitative and quantitative data gathering methods such as case-based reports (Byrne, Ragin, 2010), focus groups (Steward, Shamdasani 2015) and surveys (De Vaus 2014). Designed in a process similar to 'participatory research' (Martin and McLaren 2006). The Project Partner meetings (online and in-person) explored and developed the approach, tools and templates to guide each country consortium in their applied research. The research design reflects elements of participatory research (Kemmis and McTaggart, 2006), characterised by shared ownership among project partners and a focus on practice-based inquiry. A co-creation workshop, facilitated by the Lead Researcher, was conducted in Austria, where partners explored key research themes and collaboratively developed the approach for the mixed method research to be applied sequentially, first Country Reports, then Surveys and finally Focus Groups. Each research step was implemented by consortium partners who produced separate standardised reports for triangulation analysis.

2.1. Survey development, ethics and analysis

The DigiSET teacher survey was developed collaboratively by project partners to investigate teachers' competences in digital teaching, artificial intelligence (AI), education for sustainable development (ESD), and Open Educational Resources (OER). The questionnaire comprised of seven sections containing over 70 items. This included initial consent items, followed by a demographic item capturing information such as gender, age, employment status, professional role, and educational context. The remaining six sections explored the key competence domains and thematic areas relevant to the DigiSET project.

The questionnaire utilised structured Likert-scale items (De Vaus, 2014), enabling respondents to indicate the extent of their agreement, confidence, or experience in relation to specific statements. In addition, several sections incorporated open-ended questions to provide respondents with opportunities to elaborate on their experiences, challenges, and professional development needs. Participation was entirely voluntary, and respondents were free to skip any questions they did not wish to answer. This design facilitated the gathering of both quantitative data and the collection of qualitative insights through open text boxes. A detailed description of the survey design, translation procedures, and analytical framework is provided in the DigiSET survey methodology report (Keser Aschenberger et al., 2026). The survey instrument drew upon established frameworks and validated scales, including DigCompEdu Check-In, the Teacher AI Competence Self-Efficacy Scale (TAICS), and the Attitudes Towards Open Educational Resources Scale (ATOER), supplemented by project-specific items developed through a collaborative co-creation process involving consortium partners.

The research adhered to established ethical principles for educational and social science research (McNamee & Bridges, 2002; Lahman, 2018). Participants were fully informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time without consequence. All responses were treated confidentially and anonymised during analysis and reporting. Data were stored securely and used exclusively for purposes associated with the DigiSET project. The draft survey and online link were piloted by each consortium and refinements made based on feedback received. Attention was focused on survey language and meaning, clarity, usability, and functionality. It should be noted the survey would issue in several languages (Austrian, German, Italian, English, Romanian). Several measures were implemented to support the reliability, consistency, and trustworthiness of the research process across participating countries (Denzin & Lincoln, 2005). These included the use of a standardised survey protocol, shared guidance for survey administration, common procedures for data management, and centralised analysis processes. Cross-partner collaboration in the review and interpretation of findings further enhanced consistency and comparability across national reports. All data collection procedures were conducted in accordance with the European Union General Data Protection Regulation³ (GDPR). Participants provided informed consent prior to commencing the survey, and appropriate measures were implemented to ensure anonymity, confidentiality, and secure data management. Ethical approval for the study was granted by the University for Continuing Education Krems, Austria, as lead project partner. In addition, the Teachers' Union of Ireland (TUI), as lead partner within the Irish consortium, approved the national implementation of the study and managed local GDPR compliance requirements relating to data processing and storage.

2.2. Sampling strategy and data collection

2.2.1. Target population and recruitment process

The primary target group for the DigiSET project comprises teachers working in primary and secondary education (ISCED 1–3⁴) and post-secondary non-tertiary education (ISCED 4). Within the Irish context, teaching is a regulated profession governed by the Teaching Council of Ireland. Registration categories include Student Teacher, Primary Teacher, Post-primary Teacher, and Further Education Teacher. Registration with the Teaching Council is a prerequisite for teaching in recognised educational institutions in Ireland. The majority of Irish primary and post-primary schools are publicly funded through the Department of Education and Youth and are administered through a range of governance structures, including Education and Training Boards⁵ (ETBs), Community and Comprehensive Schools, and voluntary secondary school boards. Teachers employed within these sectors are subject to nationally negotiated terms and conditions of employment. The principal teacher representative organisations in Ireland are the Irish National Teachers' Organisation⁶ (INTO), the Teachers' Union of Ireland⁷ (TUI), and the Association of Secondary

³ European data protection is regulated by the Data Protection Commission based in Dublin, Ireland, see <https://www.dataprotection.ie/en>

⁴ Information about the International Standard Classification of Education (ISCED) can be found at [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_\(ISCED\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_(ISCED))

⁵ There are 16 ETBs in Ireland information about these can be found at <https://www.etbi.ie>

⁶ Information can be found at <https://www.into.ie>

⁷ Information can be found at <https://www.tui.ie>

Teachers, Ireland⁸ (ASTI). According to data published by the Minister for Education and Youth (2026) in government questions⁹ advised that there were approximately 79,221 teachers were employed in Irish schools in March 2025, including 43,221 teachers in primary education. In addition, approximately 1,490 students were enrolled in Initial Teacher Education¹⁰ (ITE) programmes during 2024, comprising 1,090 Bachelor of Education students and 400 Professional Master of Education students. For the Irish implementation of the DigiSET survey, the target population consisted of registered primary and post-primary teachers, further education teachers, and student teachers enrolled in Initial Teacher Education programmes.

2.2.2. Data collection period and responses

The survey was administered online between 12 May and 19 June 2026. Distribution was coordinated by the Irish consortium partners, namely the Teachers' Union of Ireland (TUI) and Bridgetown College. The Irish National Teachers' Organisation (INTO) assisted with dissemination to primary school teachers, while student teachers supported circulation through Initial Teacher Education networks and professional contacts. A copy of the invitation to participate in the survey is available in appendix 2. A total of N=221 responses were received. Following data cleaning procedures undertaken by the DigiSET project research team, N=165 responses were retained for analysis. The DigiSET project established a target of 100 completed responses for Ireland (a similar target was set for the other partner countries); therefore, the final sample exceeded this target by 65 responses. It should be noted that data collection coincided with a particularly demanding period within the Irish academic calendar, during which many teachers were preparing students for state examinations and managing end-of-year administrative responsibilities. Consequently, participation rates may have been affected by workload pressures and limited availability among potential respondents.

Table 1: Responses and used entries of the teacher survey in Ireland

Responses	
Total	221
Opened but no questions answered	54
Opened with a small number of questions answered	2
Opened all/most questions answered, included in the analysis (n)	165

3. Demographic profile of respondents

The demographic profile of respondents provides important context for interpreting the survey findings. Characteristics such as age, gender, educational sector, and teaching experience may influence perceptions of competence and professional development needs. The following section presents an overview of the participant sample. Providing the demographic characteristics of the survey participants in Ireland, including gender, age, professional status, school levels, subjects taught, and teaching experience, thereby providing the context for interpreting the subsequent findings.

⁸ Information can be found at <https://www.asti.ie/home/>

⁹ See the transcript of government questions and answers at <https://www.oireachtas.ie/en/debates/question/2025-10-08/223/>

¹⁰ ITE in Ireland is regulated by the Teaching Council see website for information <https://www.teachingcouncil.ie/professional-learning/initial-teacher-education/>

3.1. Gender and age (B6, B7)

The survey respondents were predominantly women (71.8%), while men accounted for 25.2% of the sample, see Table 2. A small proportion (3.1%) preferred not to disclose their gender. The gender profile broadly reflects the feminised nature of the Irish teaching profession, although women appear somewhat overrepresented in this sample. From government data¹¹ for the year 2024-2025 the ratio of female to male teachers in education was 5.4:1 Primary school, 2.13:1 Post-primary school.

Table 2: Gender of participants in the teacher survey in Ireland

	How do you identify your gender?	
	Frequency	Percent
Woman	94	71,8
Man	33	25,2
Non-binary / Another gender identiy	0	0,0
Prefer not to say	4	3,1
Total	131	100,0

The average age of respondents was 47.8 years (SD = 9.6), with a median age of 49 years see Figure 1. Participants ranged in age from 19 to 70 years, indicating representation across different career stages. The relatively high median age suggests that many respondents were experienced practitioners. This should be considered in the findings as the perspectives are from established educators rather than early-career teachers. The age profile is broadly consistent with evidence indicating an ageing teaching workforce in Ireland and across. At European level the issues of an ageing teaching professional were highlighted across several countries¹².

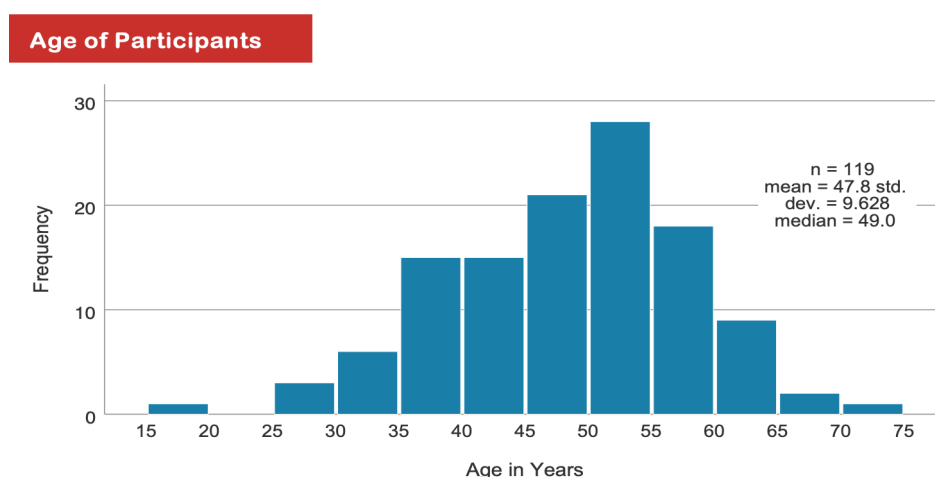


Figure 1: Age of participants in the DigiSET teacher survey in Ireland.

3.2. Status of respondents (B1)

Most respondents indicated that they were employed in publicly funded schools (82.4%) see Figure 2. Smaller proportions reported working in private or religiously affiliated schools. A notable minority identified with further education and training

¹¹ See government data <https://www.oireachtas.ie/en/debates/question/2026-02-11/147/>

¹² See EU report <https://education.ec.europa.eu/el/resources-and-tools/data-and-analysis-on-education-and-skills/key-trends-in-education/ageing-teaching-workforce>

(FET) or adult education settings both of which are publicly funded. This demonstrates that the survey primarily reflects experiences from the publicly funded education sector in Ireland. The diversity of educational settings provides reasonable insight into different teaching contexts.

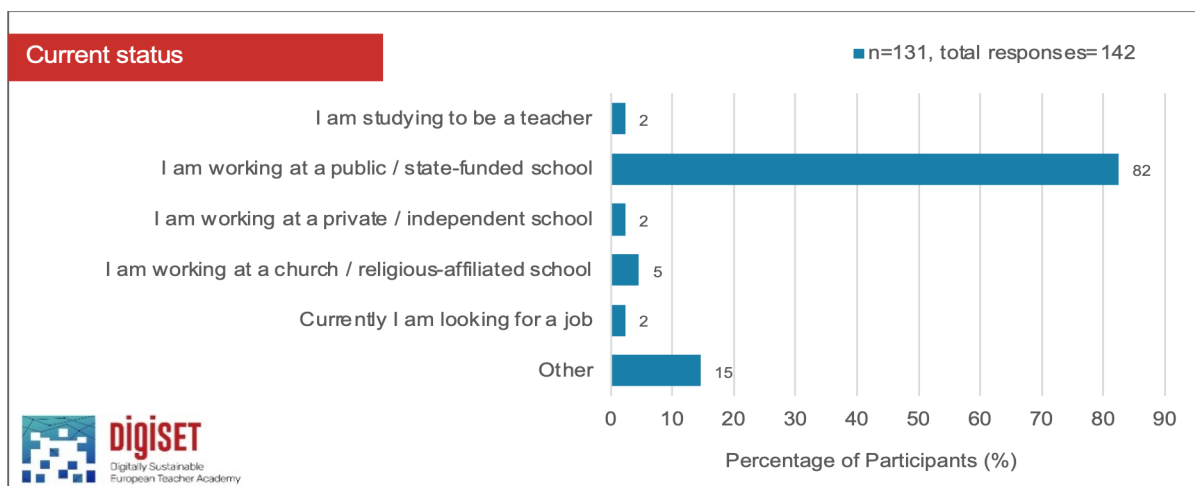


Figure 2: Current status of participants in the DigiSET teacher survey in Ireland. Note: Multiple responses were allowed; therefore, totals exceed 100%.

3.3. School levels taught or expected to teach (B2)

Upper secondary education was the most frequently represented teaching level (49.6%), followed by lower secondary education (42.0%) see Figure 3. Vocational education accounted for 28.2% of responses, while primary education was less represented (6.9%). The findings therefore predominantly reflect post-primary and vocational education perspectives. The relatively low participation of primary teachers should be considered when interpreting findings across the entire Irish teaching profession.

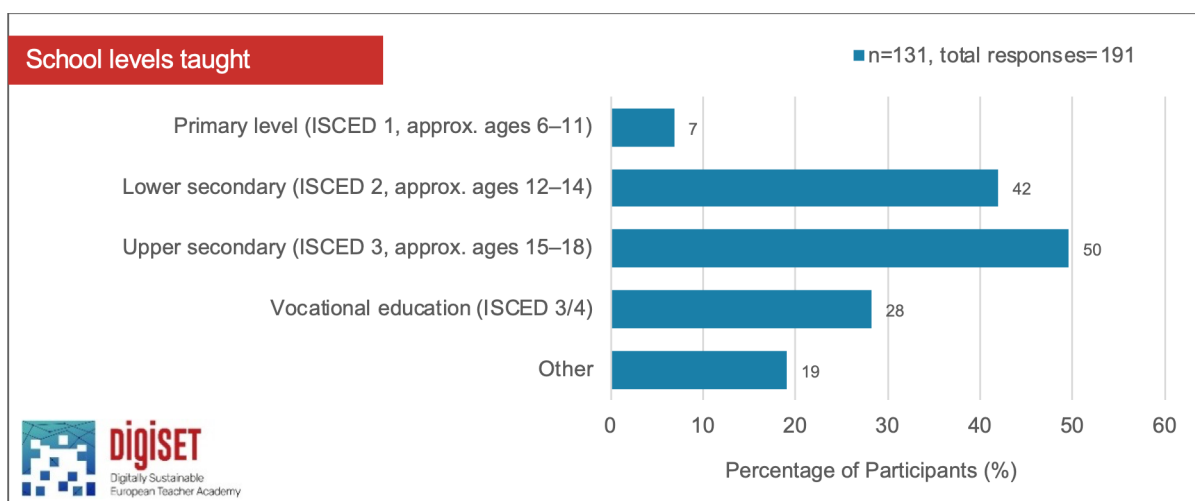


Figure 3: School levels taught or expected to be taught by participants in the DigiSET teacher survey in Ireland. Note: Multiple responses were allowed; therefore, totals exceed 100%.

3.4. Subjects currently taught or expected to be taught (B3)

Respondents represented a broad range of subject areas (Figure 4). Vocational subjects (26.6%), mathematics (24.2%), native language/reading (21.1%), social sciences (19.5%), and natural sciences (18.8%) were among the most frequently

reported. The diversity of subject backgrounds strengthens the relevance of the findings across multiple curriculum areas. However, vocational education appears particularly well represented.

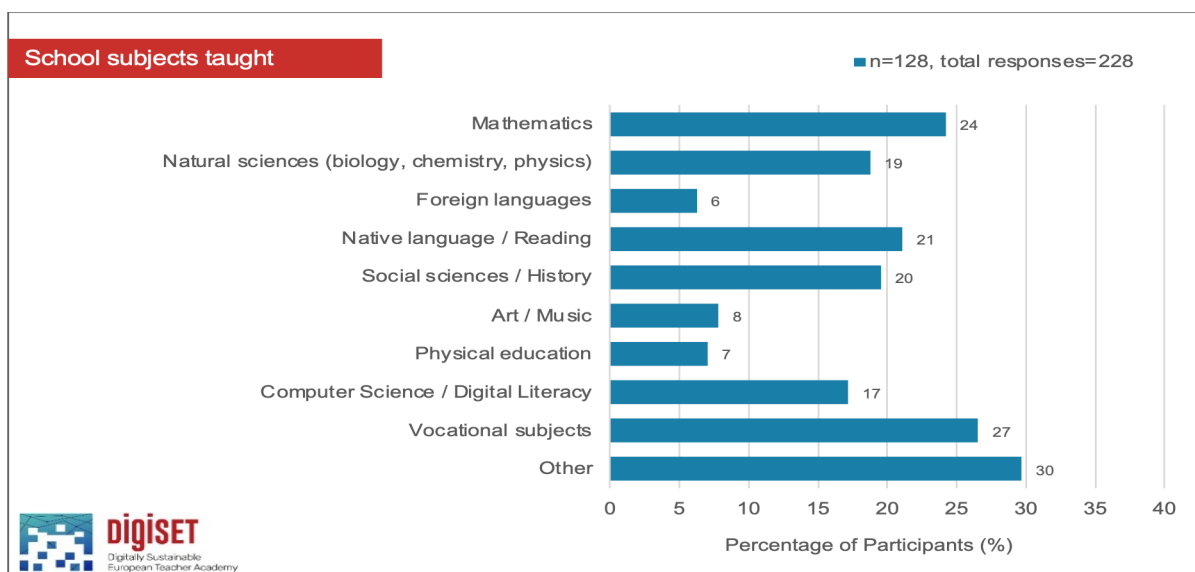


Figure 4: Subjects currently taught or expected to be taught by participants in the DigiSET teacher survey in Ireland. Note: Multiple responses were allowed; therefore, totals exceed 100%.

3.5. Teaching Experiences (B4)

Nearly half of respondents (48.9%) reported more than 20 years of teaching experience (Figure 5). Only a small proportion had fewer than five years' experience. The sample therefore consists primarily of highly experienced educators. This may contribute to the relatively strong self-reported confidence observed in several competence areas.

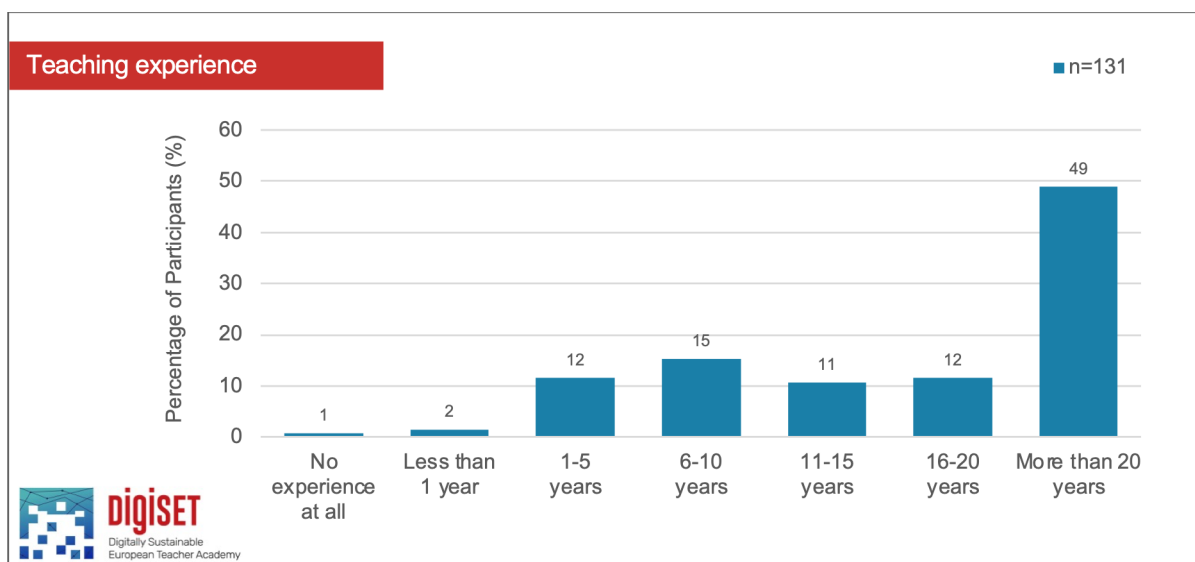


Figure 5: Teaching experiences of participants in the DigiSET teacher survey in Ireland.

4. Results

This section presents the empirical findings of the DigiSET survey in Ireland. Results are organised according to the major competence domains examined by the study,

including digital teaching, artificial intelligence, sustainability education, and open educational resources. Quantitative findings are complemented by qualitative insights from open-ended responses. It reports the findings of the DigiSET teacher survey in Ireland across four core competence domains — digital teaching, AI, education for sustainable development (ESD), and open educational resources (OER) — as well as specific DigiSET focus topics, followed by an analysis of challenges faced and professional development needs identified by respondents.

4.1. Self-perceived digital teaching competence

4.1.1. Professional engagement (D1-D4)

Respondents reported high levels of digital professional engagement. Between 60.7% and 76.2% indicated that they often or always use digital technologies for communication, collaboration, and professional development. The strongest result concerned collaboration with colleagues using digital technologies (76.2% often/always) see Figure 6. Participation in online training opportunities was comparatively lower, although a majority still reported engaging often or always (60.7%). These findings suggest that digital technologies are well embedded in teachers' professional practice. Professional engagement emerges as one of the strongest DigCompEdu areas. Teachers appear comfortable using digital tools for communication and collaboration, this could be taken to indicate that foundational digital practices are already established.

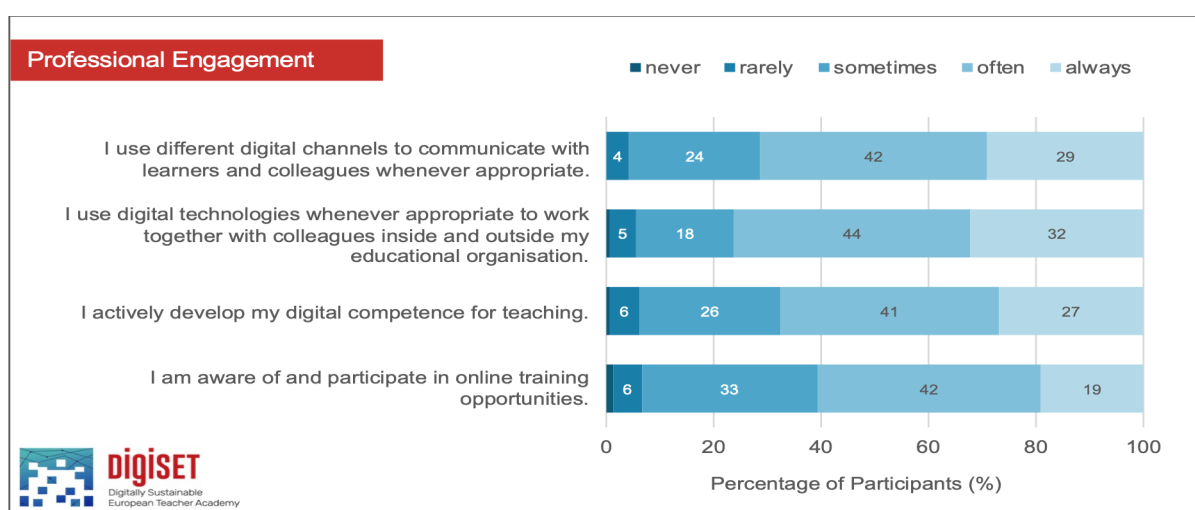


Figure 6: Self-perceived digital teaching competence – professional engagement. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “professional engagement”, JRC, n.d., p. 11ff.

4.1.2. Digital resources (D5-D7)

Respondents demonstrated strong confidence in managing digital resources (see Figure 7). More than three quarters reported often or always using multiple online sources to identify digital resources (76.1%). The highest-rated item concerned protecting personal data, with 92.6% indicating that they often or always engage in this practice. Creating and adapting digital resources was slightly less common, though nearly two thirds reported doing so frequently. Overall, the findings indicate strong digital resource management skills among participants. Data protection represents a notable strength and likely reflects growing awareness of GDPR requirements within Irish education.

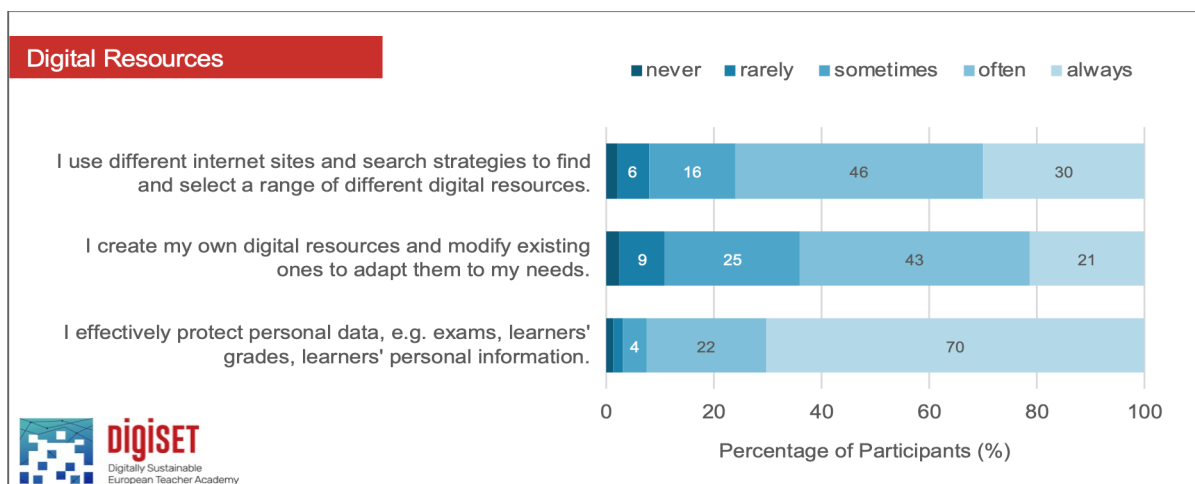


Figure 7: Self-perceived digital teaching competence – digital resources. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “digital resources”, JRC, n.d., p. 17ff.

4.1.3. Teaching and learning (D8-D11)

Teachers reported strong confidence in using digital technologies strategically in teaching and learning (see Figure 8). Nearly four out of five respondents (79.8%) indicated that they often or always consider the pedagogical value of digital technologies before using them. However, lower levels of adoption were observed for learner self-regulation and collaborative digital learning activities. Only around one third reported frequently enabling learners to plan, document, and monitor their own learning using digital technologies. These findings suggest that technology is more commonly used by teachers than by learners themselves. This area highlights a shift from teacher-centred to learner-centred digital pedagogy as a potential development need.

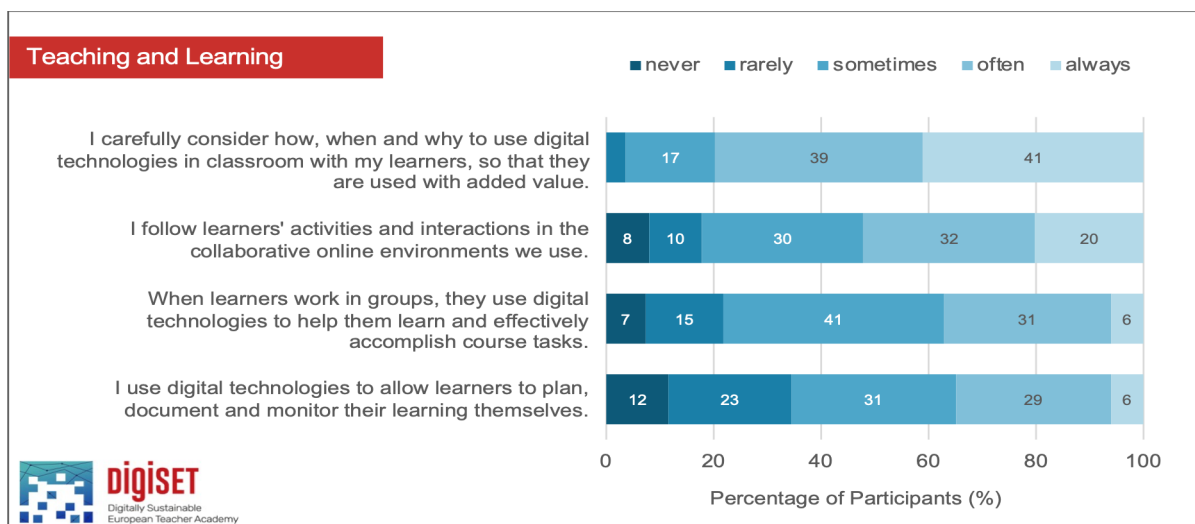


Figure 8: Self-perceived digital teaching competence – teaching and learning. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “teaching and learning”, JRC, n.d., p. 21ff.

4.1.4. Assessment (D12-D14)

Digital assessment represents one of the weaker dimensions of digital competence (see Figure 9). Digital assessment was consistently weaker than digital communication and resource management. Although most teachers reported

analysing learner data to identify support needs (63.5% often/always), the use of digital technologies for assessment and feedback was comparatively limited. These findings indicate that assessment remains an area where digital technologies have not yet been fully integrated into practice. The gap between digital teaching and digital assessment mirrors findings reported in international DigCompEdu studies.

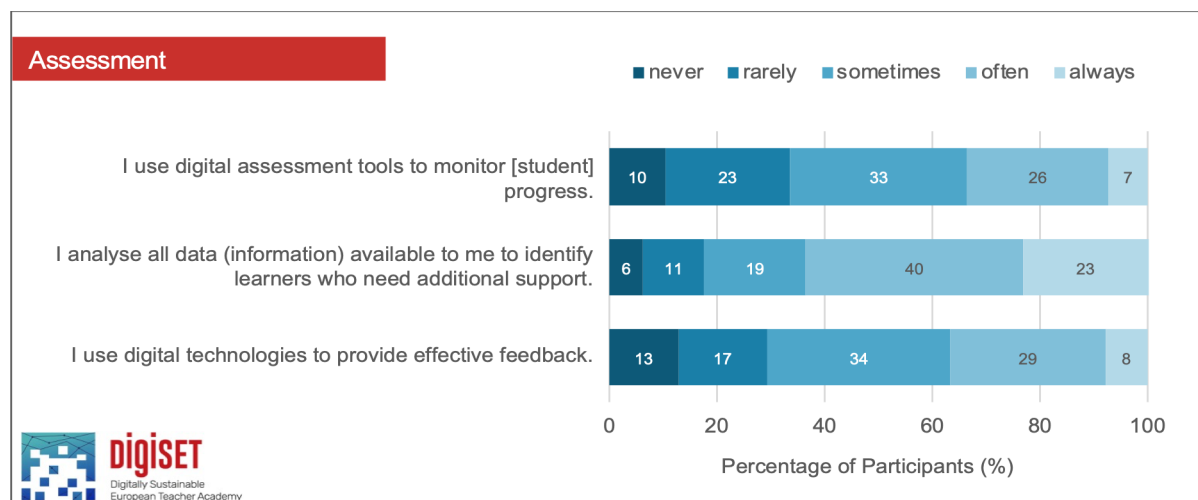


Figure 9: Self-perceived digital teaching competence – assessment. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “assessment”, JRC, n.d., p. 27ff.

4.1.5. Empowering learners (D15-D17)

Teachers generally reported positive practices in relation to learner empowerment (see Figure 10). Around two thirds indicated that they frequently consider learners' practical and technical difficulties when designing digital activities. However, personalised learning through digital technologies was less widespread, with fewer than half reporting frequent use. The results suggest that inclusion and accessibility are well recognised, while personalisation remains an emerging area of practice.

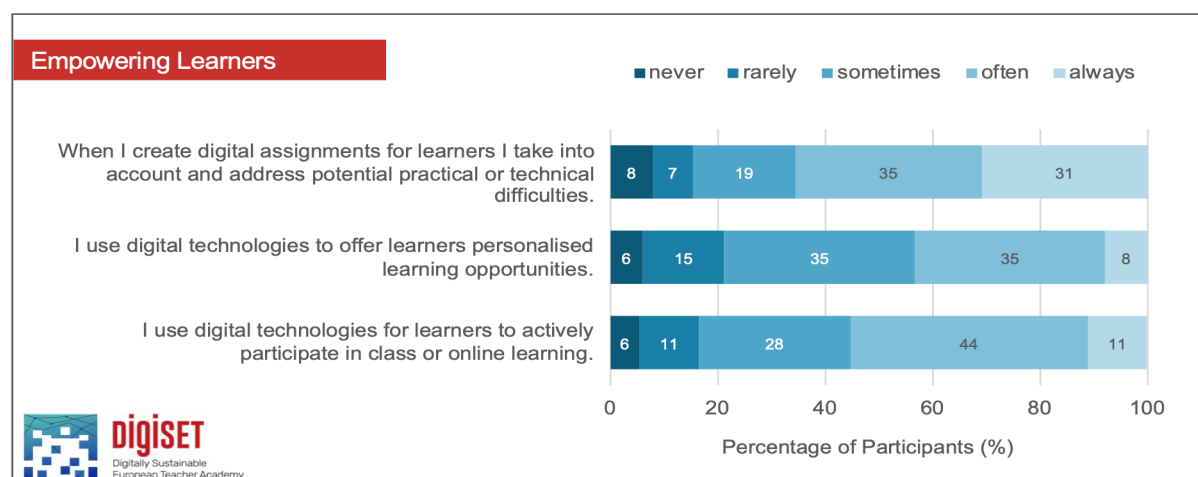


Figure 10: Self-perceived digital teaching competence – empowering learners. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “empowering learners”, JRC, n.d., p. 32ff.

4.1.6. Facilitating learners' digital competence (D18-D22)

Results in this area were mixed. Strongest scores were observed for teaching safe and responsible use of digital technologies and evaluating information reliability (see

Figure 11). In contrast, considerably fewer respondents reported frequently designing activities requiring digital content creation or online collaboration. Overall, teachers appear more confident in developing critical digital literacy than in fostering advanced digital production skills. The findings suggest that digital citizenship is better established than creative digital competence.

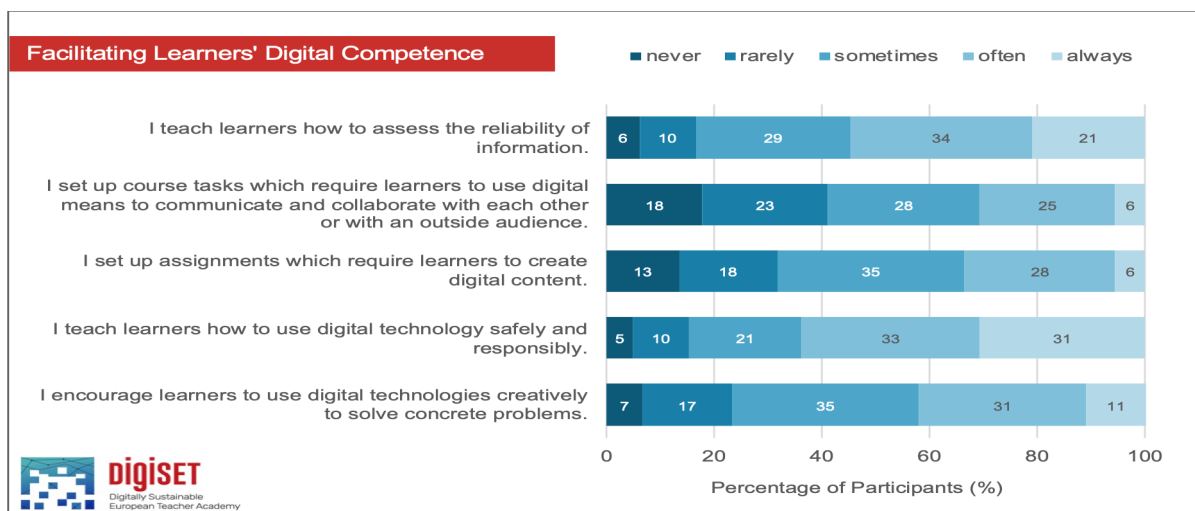


Figure 11: Self-perceived digital teaching competence – facilitating learners' digital competence. Note: Responses to the DigiSET teacher survey in Ireland, utilizing the items from DigCompEdu CheckIn questionnaire, area “facilitating learners’ digital competence”, JRC, n.d., p. 37ff.

4.2. Self-perceived AI competence

4.2.1. AI knowledge (A1-A4)

Respondents reported moderate levels of AI knowledge, Figure 12. Confidence was highest in explaining what AI is and creating content with AI tools. However, confidence declined when respondents were asked about generative AI specifically, 41.8% reported being not confident or only slightly confident in explaining generative AI. This suggests that while AI awareness is increasing, understanding of newer generative AI technologies remains uneven.

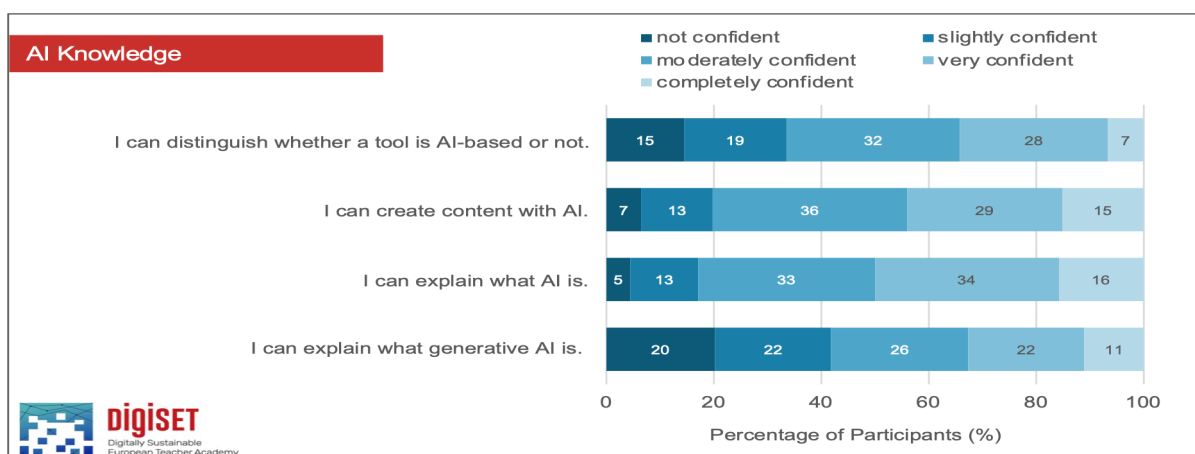


Figure 12: Self-perceived AI competence – AI knowledge. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “AI knowledge”.

4.2.2. AI pedagogy (A5-A8)

Teachers reported moderate confidence in using AI pedagogically (see Figure 13). The largest proportion selected the middle confidence category across all items. Confidence was lowest for helping colleagues design AI-enhanced learning activities. These findings indicate that many teachers are still developing the pedagogical knowledge needed to integrate AI effectively into teaching practice.

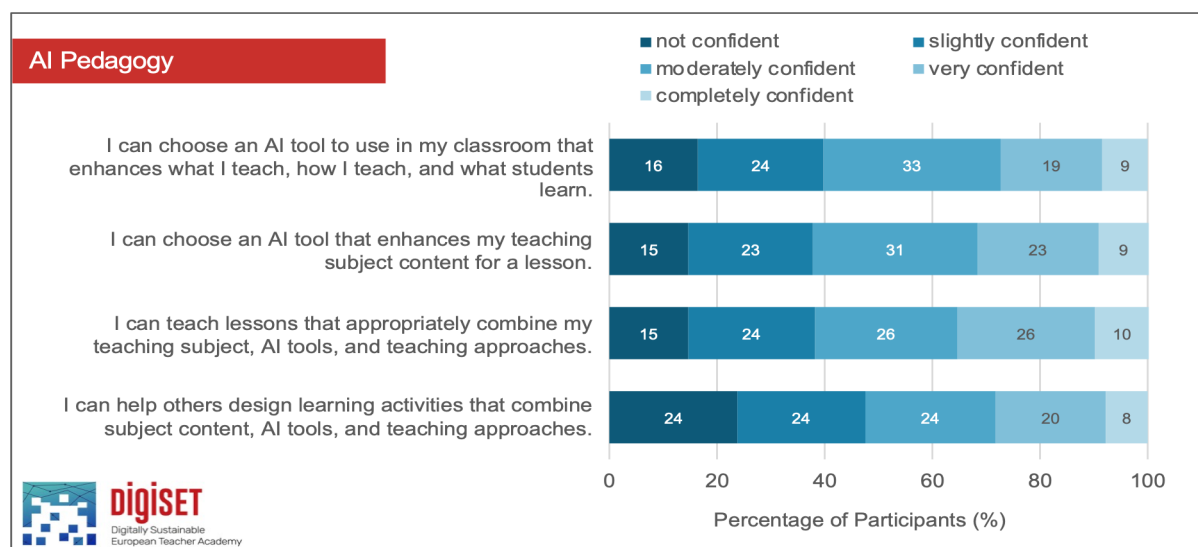


Figure 13: Self-perceived AI competence – AI pedagogy. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “AI pedagogy”.

4.2.3. AI assessment (A9-A12)

AI assessment emerged as the weakest AI dimension (see Figure 14). More than half of respondents reported low confidence in assessing learning in AI-supported environments or using AI tools for grading and assessment purposes. Relatively few participants selected the highest confidence categories. This suggests considerable uncertainty regarding assessment practices in the context of AI-enhanced learning. AI assessment should be considered a priority area for professional development within DigiSET.

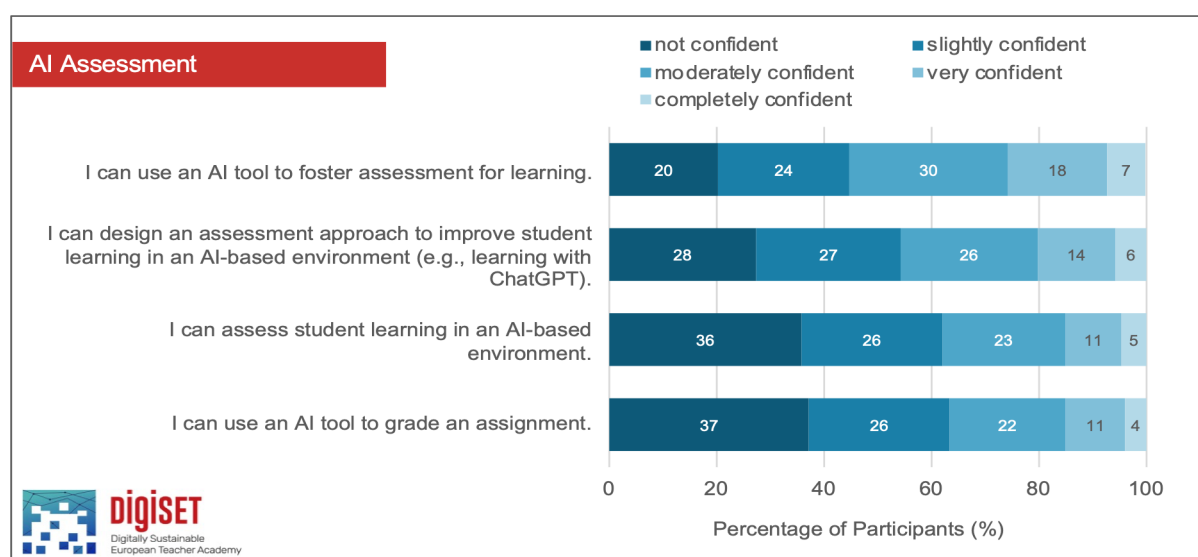


Figure 14: Self-perceived AI competence – AI assessment. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “AI assessment”.

4.2.4. AI ethics (A13-A16)

Responses revealed moderate confidence in AI ethics (see Figure 15). Participants were most confident regarding their own well-being when using AI and least confident in protecting sensitive content from AI systems. Confidence levels were distributed relatively evenly across categories, suggesting substantial variation among respondents. Ethical aspects of AI therefore remain an important area for future training.

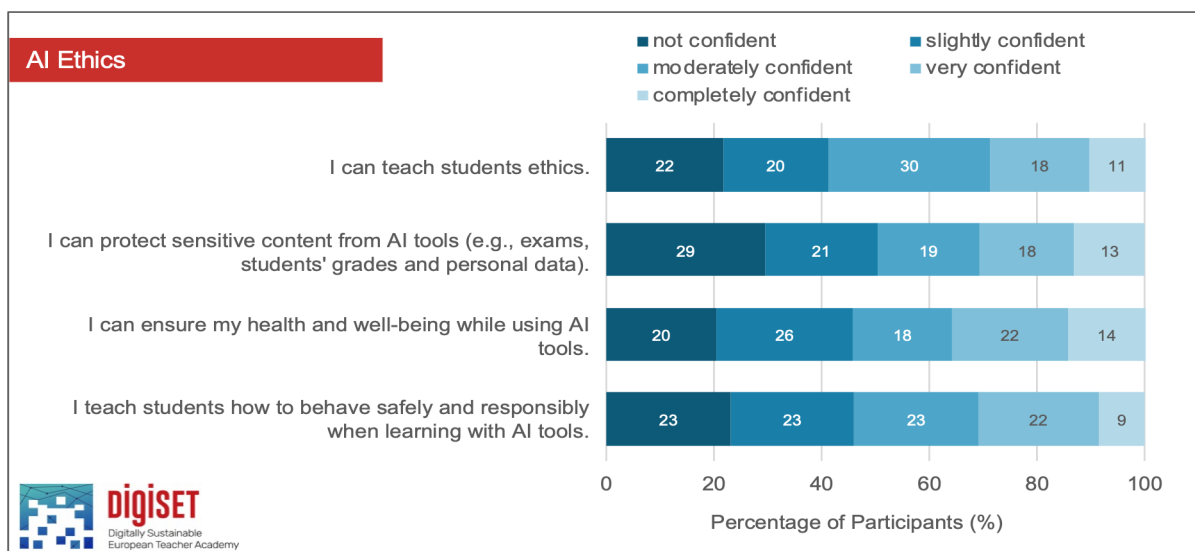


Figure 15: Self-perceived AI competence – AI ethics. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “AI ethics”.

4.2.5. AI human-centred education (A17-A20)

Participants reported moderate confidence in understanding the societal implications of AI, see Figure 16. Awareness of human responsibility for AI bias was comparatively strong, while confidence in evaluating AI risks and benefits was lower. These findings suggest growing awareness of broader societal issues associated with AI but limited confidence in applying this knowledge systematically.

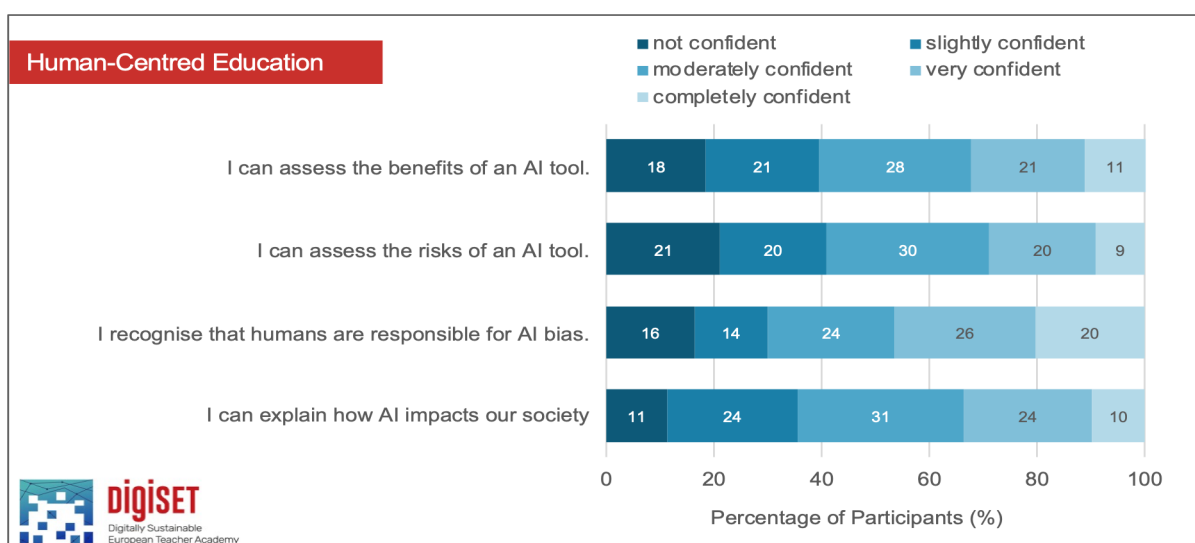


Figure 16: Self-perceived AI competence – human-centred education. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “human-centred education”.

4.2.6. AI professional engagement (A21-A24)

Professional engagement with AI was relatively limited (see Figure 17). Many respondents reported low confidence in sharing AI-related experiences with colleagues or supporting others in designing AI-enhanced learning activities. Confidence was somewhat stronger regarding independent professional development activities. These findings indicate that collaborative AI expertise within schools remains underdeveloped.

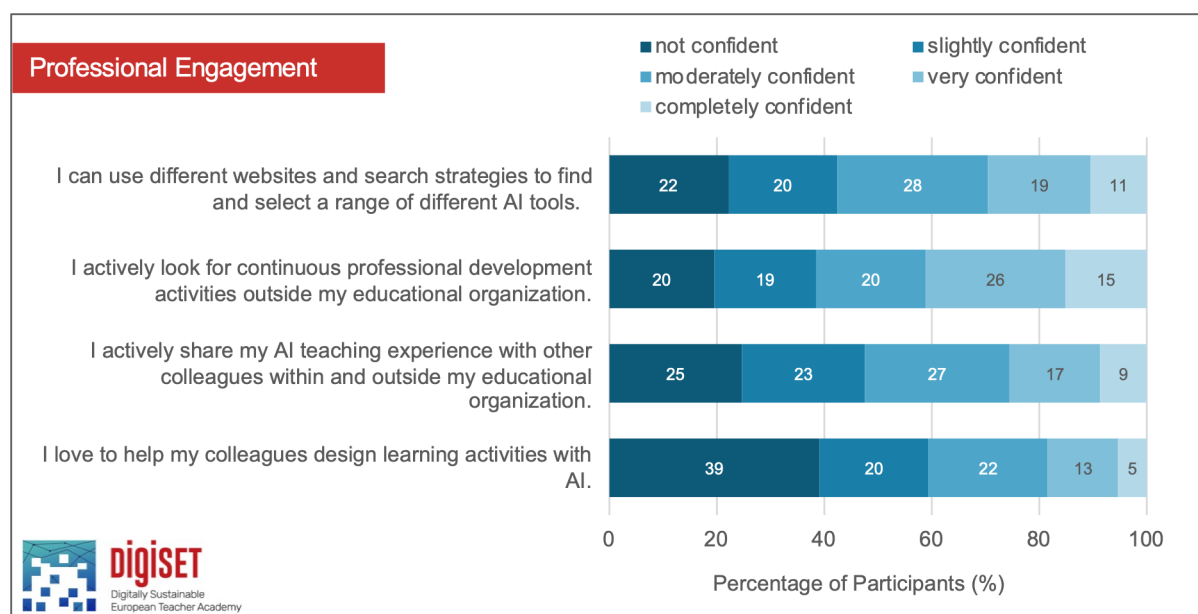


Figure 17: Self-perceived AI competence – professional engagement. Note: Responses to the DigiSET teacher survey in Ireland, utilizing items from Chiu, Ahmad, & Çoban (2025) section “professional engagement”.

4.3. Self-perceived education for sustainable development (ESD) competence

4.3.1. Systems and critical thinking (S1-S3)

Note responses to questions on systems and critical thinking are presented in part 4.5.4 of this report (p. 25ff) as they are specifically addressing a DigiSET project core topic relevant to that section of the report.

4.3.2. Pedagogical practice for ESD (S4-S7)

Figure 18 indicates generally positive attitudes towards integrating sustainability into teaching practice. Between 44.2% and 54.3% of respondents agreed or strongly agreed that they incorporate sustainability topics, use learner-centred approaches, and design learning activities promoting engagement with sustainability challenges. However, the use of digital technologies to engage learners with real-world sustainability issues received comparatively lower endorsement, with only 30.7% agreeing or strongly agreeing. A substantial proportion of respondents selected the neutral category across all items, suggesting ongoing development rather than fully established practice. These findings imply that teachers may be more confident with sustainability pedagogy generally than with the use of digital technologies to support sustainability education. The comparatively weaker response concerning digital technologies may indicate a gap between sustainability education and digital innovation, suggesting an area where DigiSET training could provide practical support.

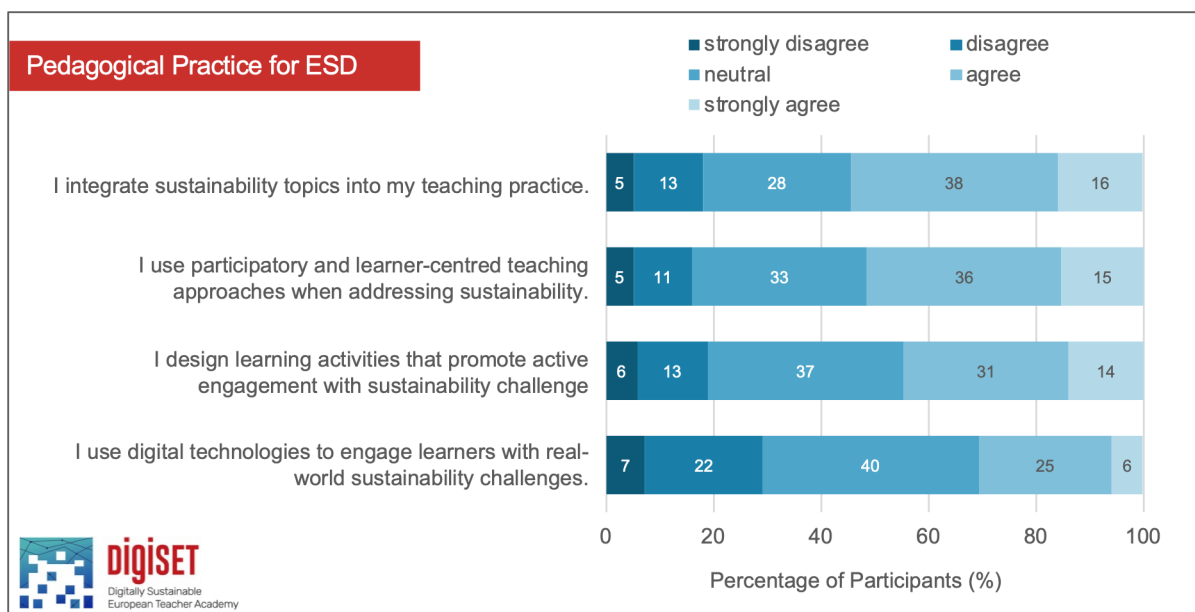


Figure 18: Self-perceived ESD competence – pedagogical practice for ESD. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.3.3. Values and responsibility (S8-S10)

Figure 19 presents some of the strongest results across the ESD dimensions. More than 80% of respondents agreed or strongly agreed that they promote values such as responsibility, equity, and respect for diversity in their teaching. Similarly, approximately 62% reported encouraging learners to consider ethical implications of sustainability issues, while 65.2% indicated that they support learners in developing responsibility for sustainable development. Levels of disagreement were relatively low across all three indicators. These findings suggest that values-based aspects of sustainability education are well embedded in respondents' professional practice. The results demonstrate that teachers appear particularly confident when addressing ethical, social, and values-oriented dimensions of sustainability, which may provide a strong foundation for expanding other ESD competencies.

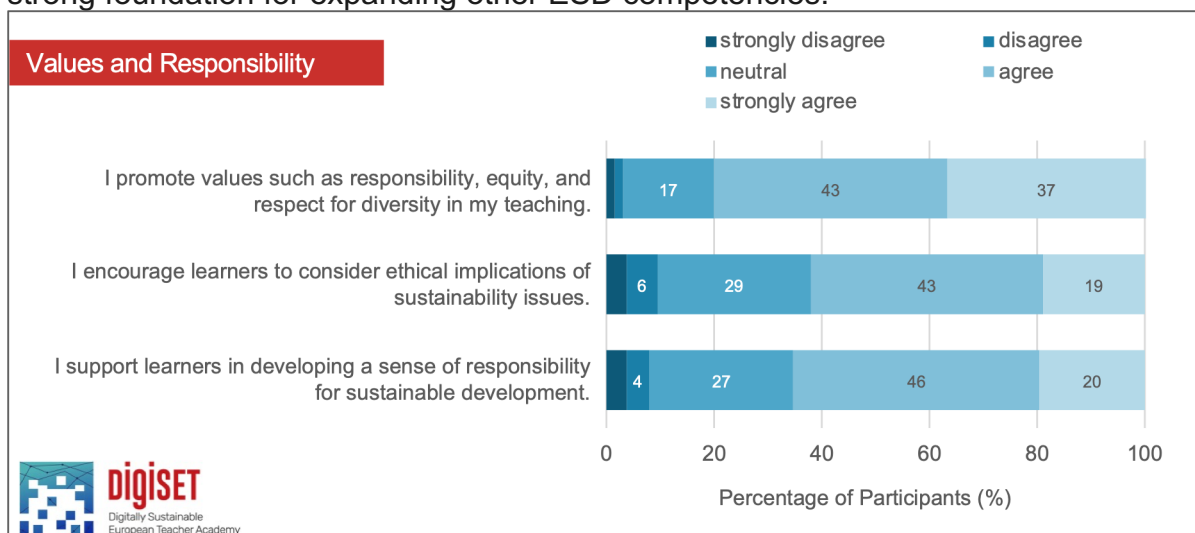


Figure 19: Self-perceived ESD competence – values and responsibility. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.3.4. Reflective and action-oriented practice (S11-S13)

Responses in Figure 20 suggest moderate confidence in reflective and action-oriented sustainability practice. Just over half of respondents agreed or strongly agreed that they reflect on their teaching practice in relation to sustainability and seek continuous improvement. Similar levels were reported for supporting learners in applying sustainability knowledge to real-life situations. Confidence was slightly lower regarding facilitating discussions on complex or controversial sustainability issues. The findings indicate that while many teachers engage in reflective ESD practice, some uncertainty remains when addressing challenging sustainability topics in classroom settings. The relatively high proportion of neutral responses may suggest that many teachers are still developing confidence in translating sustainability concepts into practical classroom action.

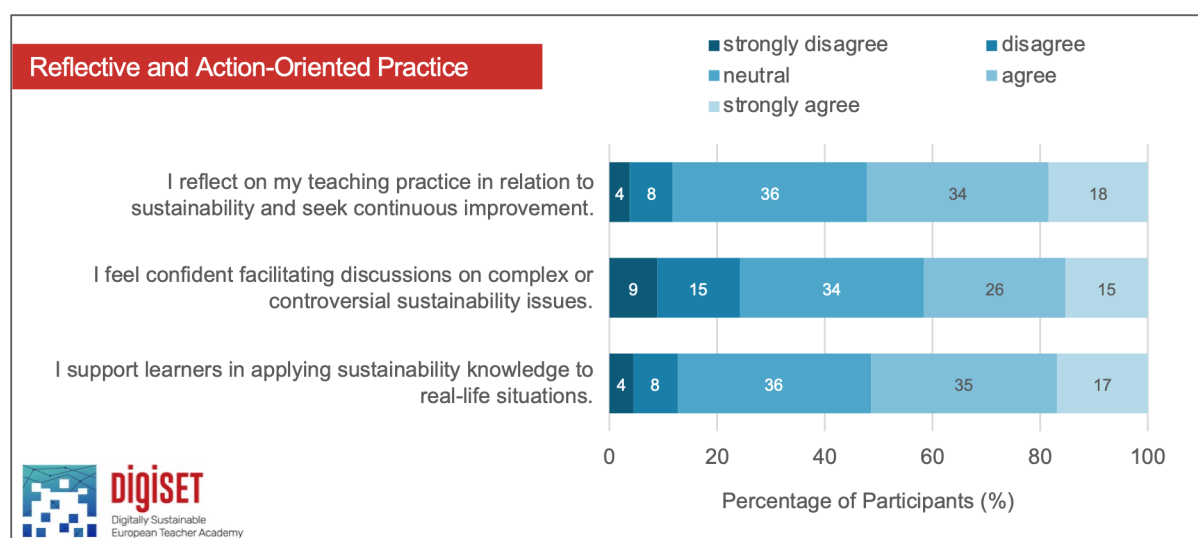


Figure 20: Self-perceived ESD competence – reflective and action-oriented practices. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.4. Self-perceived Open Educational Resource (OER) competence (O1-O5)

Figure 21 reveals mixed levels of confidence regarding Open Educational Resources (OER). Approximately half of respondents reported agreement or strong agreement that they had prior experience using OER, while lower levels of confidence were evident regarding intellectual property rights and knowledge required to adopt OER effectively. Perceived ICT competence for using OER was somewhat stronger, with over 43% reporting positive responses. Nevertheless, substantial proportions selected either neutral or negative response categories across all items. These findings suggest that although some familiarity with OER exists, broader knowledge and practical confidence remain underdeveloped. Knowledge of intellectual property and copyright appears to represent a particular development need that should be addressed in future training activities.

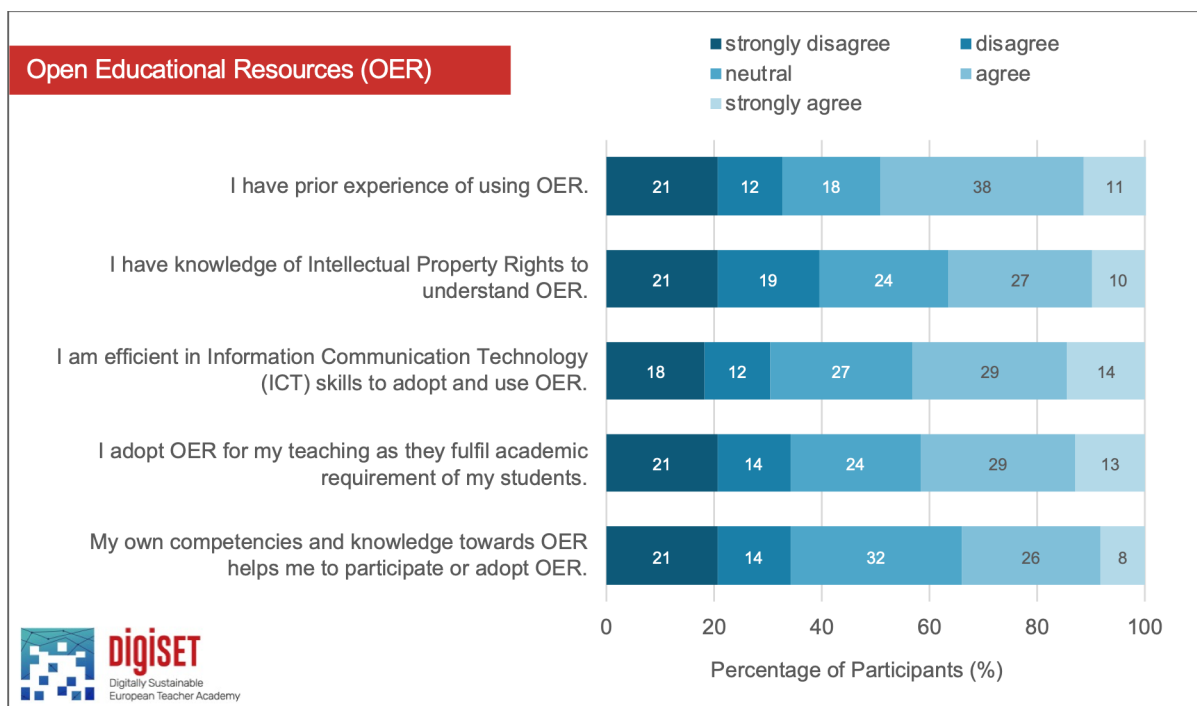


Figure 21: Self-perceived OER competence. Note: DigiSET teacher survey results for Ireland, utilizing a subset of items from Mishra et al. (2016).

4.5. Self-perceived competences for specific DigiSET topics

4.5.1. Adaptive AI use (AD1, AD2)

Figure 22 indicates relatively low confidence in adaptive applications of AI. More than 60% of respondents reported being either not confident or only slightly confident in using AI tools to personalise learning for individual students. Similar patterns emerged regarding the use of AI to support differentiated instruction according to student needs. Only a small minority selected the highest confidence categories. These results suggest that adaptive and personalised uses of AI have not yet become established aspects of classroom practice among Irish respondents. Given the increasing emphasis on personalised learning in educational policy, adaptive AI represents a significant competence gap for future professional development initiatives.

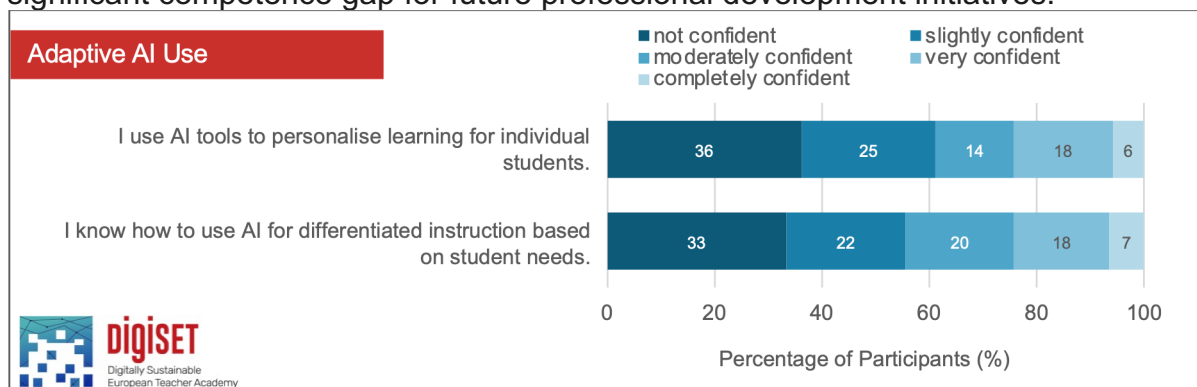


Figure 22: Adaptive AI use. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.5.2. Gender bias in AI (GD1, GD2)

Figure 23 highlights limited confidence regarding gender bias in AI. While awareness of gender bias in AI-generated content was distributed relatively evenly across response categories, almost half of respondents reported low confidence. Confidence

was substantially lower regarding addressing gender stereotypes when using AI in teaching, with over 57% selecting the lowest two confidence categories. Only a small minority reported complete confidence in this area. These findings suggest that understanding and mitigating algorithmic bias remains a relatively unfamiliar topic for many teachers. The findings indicate a need for practical training on recognising and responding to bias within AI-generated outputs and educational applications.

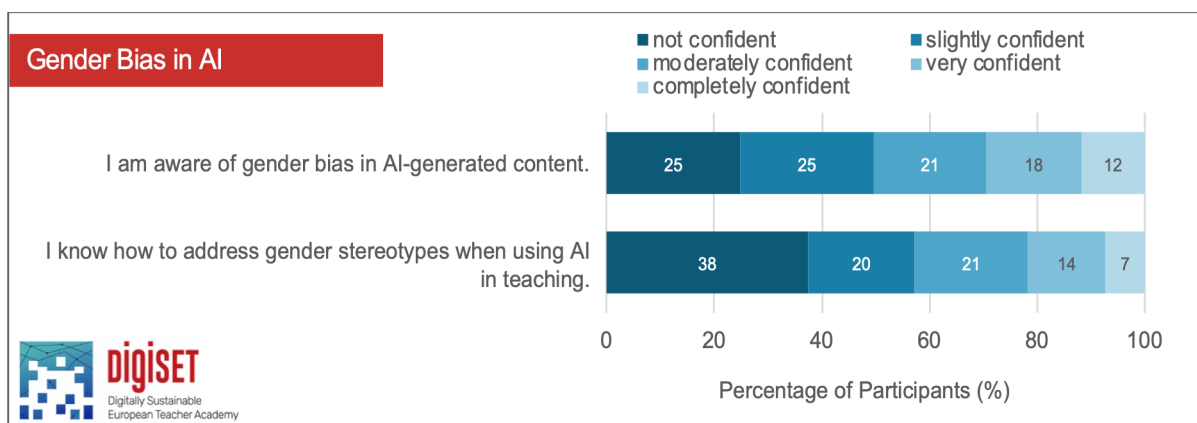


Figure 23: Gender bias in AI. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.5.3. Inclusive practices for students with learning disabilities (I1, I2)

Figure 24 reveals generally positive perceptions regarding inclusive digital practices. Approximately 59% of respondents reported that they often or always use digital tools to support students with learning difficulties, while 53.7% frequently adapt digital learning materials for students with special educational needs. Levels of disagreement were comparatively low. These results suggest that inclusive digital teaching practices are already embedded within many respondents' professional activities. However, there remains a sizeable group of teachers who report only occasional use of these approaches. Inclusive practice represents a relative strength within the survey findings and may provide a useful foundation for future work on adaptive and personalised learning technologies.

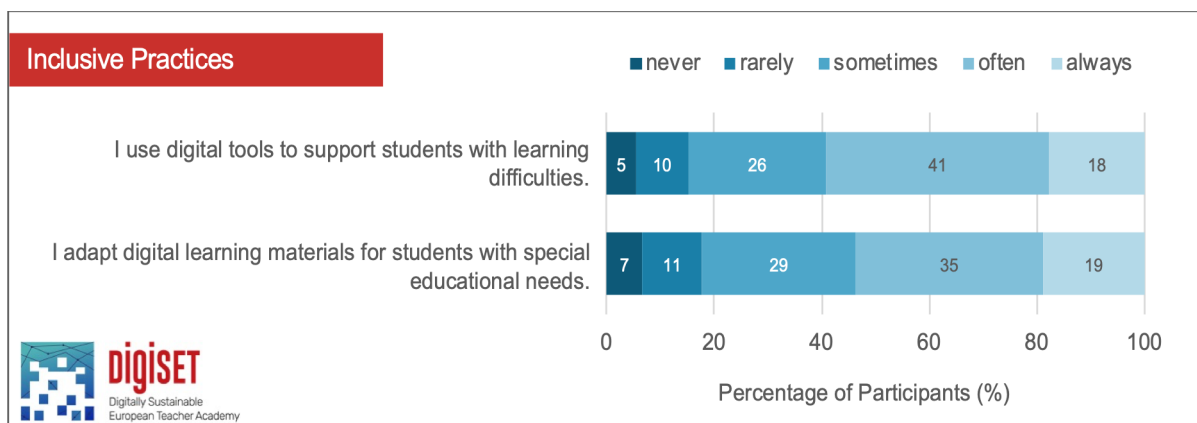


Figure 24: Inclusive practices. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.5.4. System Thinking (S1-S3)

Figure 25 suggests moderate confidence in systems thinking and critical reflection related to sustainability. More than 45% of respondents agreed or strongly agreed that

they help learners understand relationships between environmental, social, and economic dimensions of sustainability. Similar proportions reported encouraging critical reflection on sustainability issues and supporting analysis of complex sustainability problems from multiple perspectives. However, large proportions selected the neutral response category, particularly regarding the analysis of complex sustainability challenges. These findings indicate emerging competence in systems thinking but also highlight opportunities for further professional learning. Systems thinking appears less established than values-oriented sustainability education, suggesting a need for practical approaches that help teachers address complexity in sustainability-related topics.

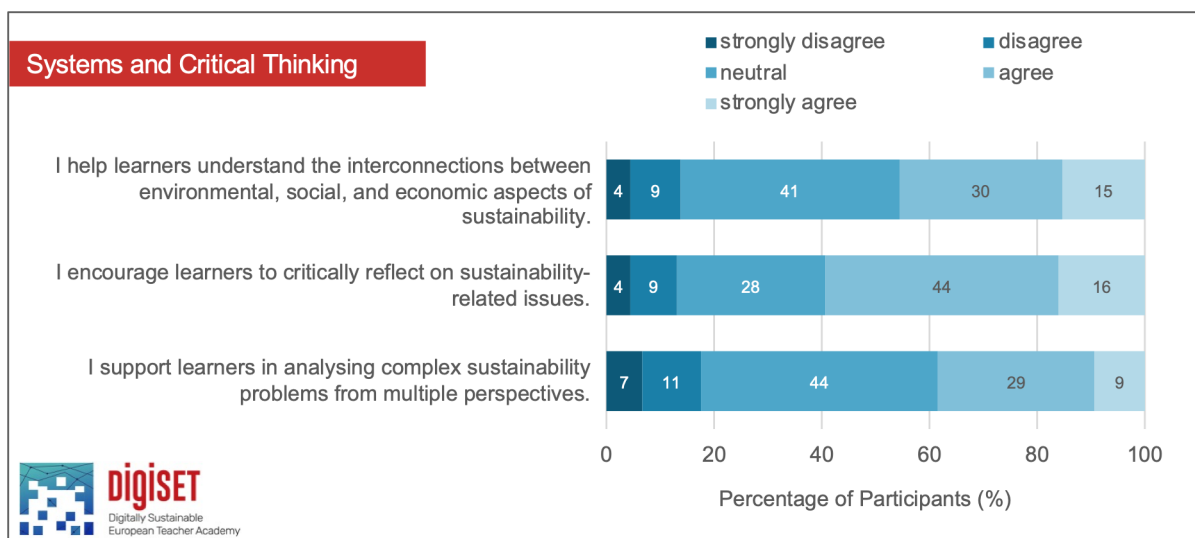


Figure 25: Education for sustainable development – systems and critical thinking. Note: Responses to the DigiSET teacher survey in Ireland, items were created for the DigiSET survey.

4.6. Challenges faced in integrating digital teaching and sustainability in teaching, needed competences and existing barriers

This section focuses on teachers faced challenge in integrating digital teaching and sustainability in teaching, professional development needs related to digital and sustainable teaching.

4.6.1. Challenges faced in integrating digital technologies and sustainability into teaching (Q1)

Analysis of the open responses identified five dominant themes: time constraints, lack of training and knowledge, insufficient infrastructure and resources, uncertainty regarding AI and digital technologies, and structural barriers within educational institutions. Respondents consistently emphasised that competing professional demands limited their capacity to explore new technologies and sustainability-related pedagogies. Time was by far the most frequently mentioned challenge, with many participants describing difficulties balancing curriculum delivery, administrative duties, and professional development activities. A second recurring theme concerned limited knowledge and training opportunities. Many respondents stated that they lacked confidence in using emerging technologies, particularly artificial intelligence, and highlighted the rapid pace of technological change. Several teachers described themselves as largely self-taught and expressed uncertainty regarding best practice, appropriate tools, and the pedagogical value of digital technologies. Infrastructure and access issues were also widely reported. Respondents referred to unreliable Wi-Fi,

limited access to devices, outdated equipment, and inequalities in learner access to technology. These concerns were particularly pronounced in schools serving disadvantaged communities and specialised settings such as prison education, where access to internet-based technologies is heavily restricted. Participants also expressed concerns regarding AI, including reliability, ethical implications, plagiarism, learner overdependence, and potential negative impacts on learner wellbeing. While some viewed AI as a significant opportunity, others questioned its educational value and sustainability implications. Finally, respondents highlighted systemic barriers, including insufficient funding, limited institutional support, curriculum pressures, and restricted access to CPD opportunities. These structural issues frequently appeared alongside concerns regarding workload and professional autonomy.

Representative quotations

"The main challenges in every aspect of school life in Ireland are to do with time."

"Lack of time, training, resources and keeping up with technology."

"We cannot keep up with our European counterparts without strong investment in tech resources."

"The evolving nature of AI and the lack of troubleshooting options when learning to apply new technologies."

Overall, the findings indicate that barriers are primarily organisational and structural rather than attitudinal. Teachers generally recognise the potential value of digital technologies and sustainability education but require greater support, resources, and time to integrate these effectively into practice.

4.6.2. Competences that would help to address these challenge (Q2)

Responses to Q2 revealed a strong demand for practical professional development, AI competence, dedicated time for learning, improved digital skills, and access to resources and collaborative networks. The most frequently stated requirement was more structured training opportunities. Respondents repeatedly requested professional learning experiences that move beyond theory and provide practical examples, hands-on activities, and classroom-ready resources.

A substantial number of participants specifically identified AI-related competences as a priority. Teachers sought greater understanding of AI tools, ethical considerations, pedagogical applications, and techniques for integrating AI effectively into teaching and learning. There was particular interest in learning how AI could save time, support differentiated instruction and assist with assessment and resource creation. Time emerged not only as a challenge but also as a prerequisite for competence development. Numerous participants argued that the issue was not simply a lack of training opportunities but a lack of protected time to engage meaningfully with professional learning. Several respondents suggested that collaborative planning opportunities and dedicated CPD time would be more beneficial than increasing the number of training programmes available.

Teachers also highlighted the importance of developing broader digital competences, including digital content creation, use of educational technologies, accessibility tools, OER, and strategies for supporting learners with additional needs. Many respondents explicitly linked these competences with inclusive and learner-centred teaching practices.

Representative quotations

“More training in AI for positive use, technology support for diversifying assessment and equitable access.”

“Teachers love learning new skills and knowledge; we just want time to practise.”

“Professional development in the effective use of digital technologies, including AI tools, interactive learning platforms, and digital assessment methods, would be valuable.”

“Access to ready-made teaching resources, examples of best practice, and opportunities to collaborate with other teachers would help build confidence and competence.”

The responses suggest that teachers are seeking practical, applied competence development rather than conceptual awareness alone. Demand is particularly high for training related to AI, digital pedagogy, inclusive teaching practices, and sustainability integration within existing curricular structures.

4.6.3. Professional development needs related to digital and sustainable teaching (P1)

Figure 26 identifies clear priorities for future professional development. The most frequently selected training need was using AI in teaching (57.5%), followed by using adaptive learning tools (42.5%) and inclusive digital teaching (39.6%). Creating and sharing OER (38.8%) and ethical and responsible AI use (37.3%) were also highly ranked. By contrast, systems thinking for sustainability (14.2%) and addressing gender bias in AI (23.1%) were selected less frequently. Overall, the results demonstrate particularly strong interest in practical applications of AI within teaching and learning contexts. The reported training priorities align closely with the competence gaps identified in the AI dimensions, particularly adaptive AI use and AI pedagogy.

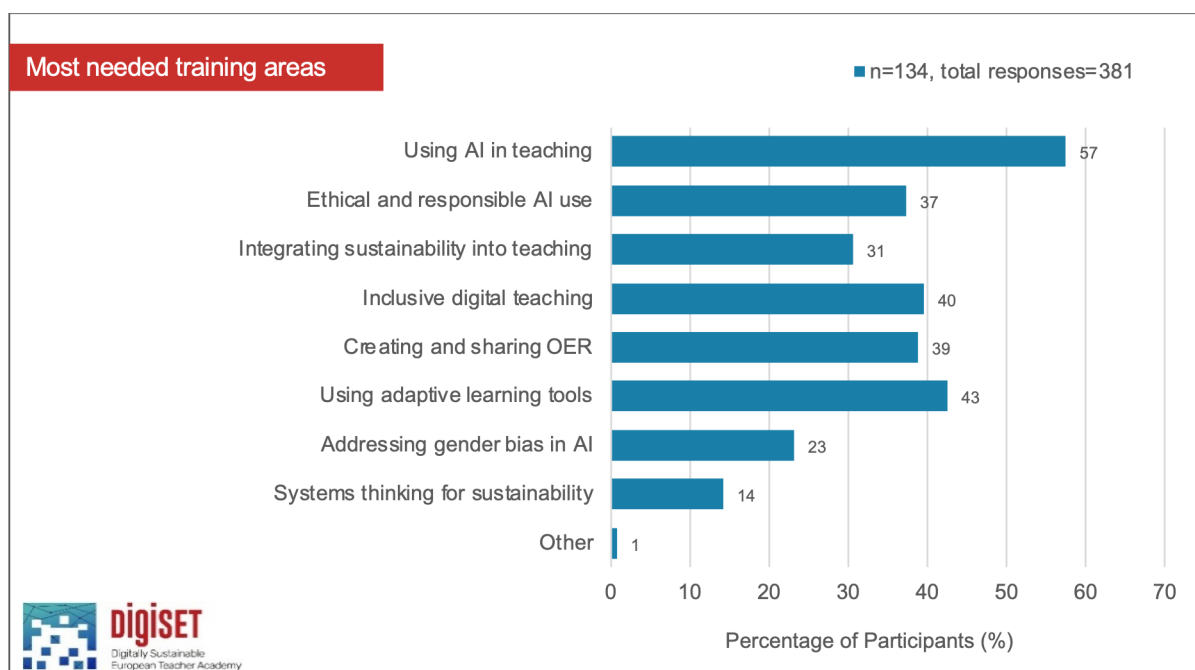


Figure 26: Most needed training areas. Note: Responses to the DigiSET teacher survey in Ireland. Note: Multiple responses were allowed; therefore, totals exceed 100%.

4.6.4. Main barriers to professional development (P2)

Figure 27 demonstrates that lack of time is the most significant barrier to professional development, identified by 80.5% of respondents. Lack of available training opportunities (64.7%) and lack of institutional support (46.6%) were also commonly reported. More than one third highlighted insufficient access to suitable resources and materials. Comparatively few respondents identified infrastructure issues as their primary barrier. These findings suggest that organisational and structural constraints may present greater obstacles than technological limitations. The dominance of time-related barriers indicates that future DigiSET training should prioritise flexible, modular, and self-paced learning opportunities that can be integrated into teachers' existing workloads.

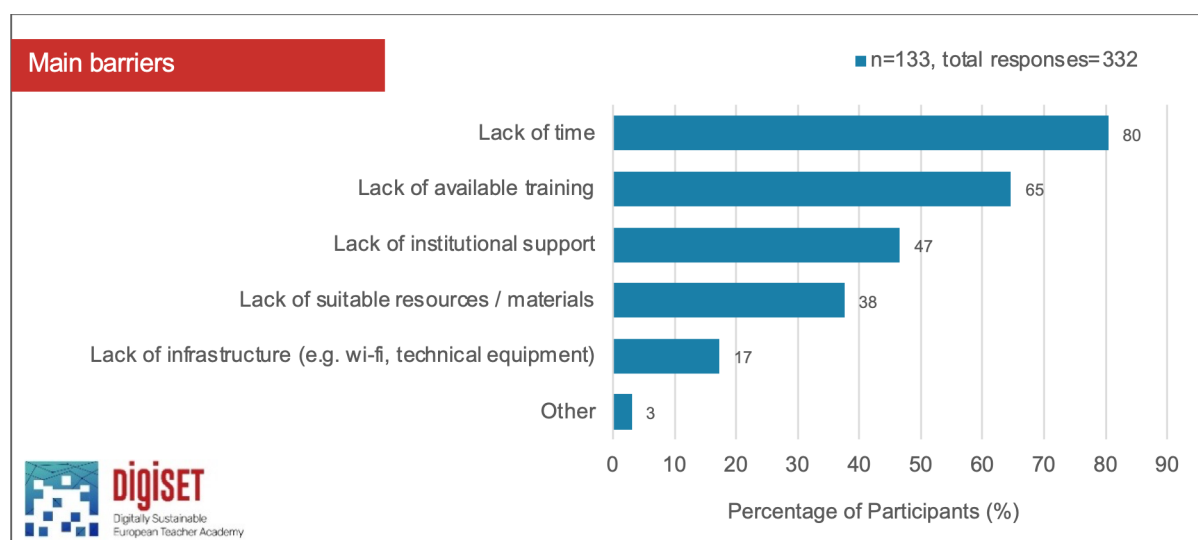


Figure 27: Main barriers to professional development in the addressed areas. Note: Responses to the DigiSET teacher survey in Ireland. Multiple responses were allowed; therefore, totals exceed 100%.

4.6.5. Additional Insights and comments (Q3)

The final open-ended question generated reflections that largely reinforced earlier findings while providing additional insights into participants' perspectives on AI, sustainability, teacher workload, and future educational developments. Four broad themes emerged: the need for further training, concerns regarding AI, the importance of time and institutional support, and the need for balanced digital transformation. Many respondents reiterated the importance of continuing professional development and expressed a desire for more structured training opportunities, particularly concerning AI literacy, ethical issues, and digital teaching methods. Several participants called for national investment in digital competence development for both teachers and learners. At the same time, a notable minority expressed reservations regarding AI. These concerns centred on academic integrity, overreliance on technology, environmental sustainability, learner wellbeing, and the potential erosion of critical thinking and interpersonal aspects of education. While some respondents viewed AI as inevitable and beneficial, others questioned whether its rapid adoption was pedagogically justified.

A further recurring theme concerned workload and lack of professional autonomy. Respondents repeatedly emphasised that successful digital and sustainability initiatives require protected planning time, adequate resources, and institutional support. Several comments suggested that teachers are willing to engage in innovation but feel constrained by existing workloads and accountability requirements. Finally, participants stressed the importance of balancing technological innovation with traditional educational values. While recognising the importance of digital competence, several respondents argued that educational policy should avoid excessive reliance on technology and ensure that human-centred teaching remains at the core of learning.

Representative quotations

“Digital literacy skills are going to be one of the most important skills going forward.”

“Teachers need the time and space and that will not be available because of the enormous demands of the job.”

“I would like more training on recognising and addressing gender, racial and cultural bias in AI.”

“Some forms of teaching require direct in-class contact. AI cannot substitute for in-person teaching.”

The additional comments reveal strong support for professional learning in digital technologies, AI, and sustainability, but also highlight a cautious and reflective attitude towards technological change. Participants broadly recognise the importance of digital transformation while emphasising that effective implementation depends on adequate training, resources, time, and a continued commitment to human-centred educational practice.

The qualitative findings align closely with the quantitative results presented in Figures 22–27. Areas where respondents reported the lowest confidence—particularly adaptive AI use, AI assessment, gender bias in AI, and OER-related competences—were also frequently identified as priority training needs. Furthermore, the dominance of time-related barriers in both the qualitative comments and Figure 27 suggests that the success of future DigiSET training provision will depend not only on content but also on accessibility, flexibility, and relevance to teachers’ daily professional realities. Teachers demonstrated considerable willingness to engage with digital innovation but emphasised the need for practical, context-sensitive, and well-supported professional learning opportunities

5. Discussion

The discussion interprets the survey findings within the broader Irish and European educational context. It identifies key strengths, competence gaps, and professional learning priorities emerging from the data. The section also considers the generalisability of the findings and acknowledges methodological limitations. Provides a synthesizes and critically discusses the key findings presented in Section 4, contextualizing them within the national educational landscape and existing research, while addressing the generalizability and limitations of the study.

5.1. Key results concerning teachers' competences

5.1.1. Teachers' competence in digital teaching, AI, ESD and OER

The survey findings reveal a generally positive profile of digital teaching competence among respondents, with notable variation across competence domains. Within the DigCompEdu framework, the strongest areas were Professional Engagement (Figure 6) and Digital Resources (Figure 7). Large majorities of respondents reported frequently using digital technologies for communication, collaboration, and professional learning, while particularly high levels of confidence were evident regarding the protection of personal data and the identification of suitable digital resources. These findings suggest that Irish teachers have largely integrated core digital practices into their professional activities. In contrast, lower levels of confidence were evident in the DigCompEdu dimensions of Assessment (Figure 9) and aspects of Facilitating Learners' Digital Competence (Figure 11). While many respondents indicated that they analyse learner data and provide digital feedback, considerably fewer reported frequent use of digital assessment tools or AI-supported assessment approaches. Similarly, teachers appeared more confident in promoting safe and responsible technology use than in facilitating digital content creation, collaboration, and learner self-regulation through technology. These findings align with international DigCompEdu research, which commonly identifies stronger competence in professional and administrative uses of technology than in more transformative pedagogical applications.

Analysis of the mean scores provides additional insight into competence development across the four frameworks. The strongest subdomains were Values and Responsibility within ESD ($M = 4.22$) and Digital Resources within DigCompEdu ($M = 4.14$), while the weakest areas were AI Assessment ($M = 2.93$) and DigCompEdu Assessment ($M = 3.47$). This pattern suggests that teachers are more confident in established professional practices and values-based competences than in emerging pedagogical and assessment-related applications of digital technologies and AI.

Table 3: Strongest to weakest sub-domain

Themes	Strongest sub-domain	Mean	Weakest sub-domain	Mean
Digital Teaching Comp.	Digital Resources	4.14	Assessment	3.47
AI Comp.	AI Knowledge	3.44	AI Assessment	2.93
ESD Comp.	Values and responsibilities	4.22	Pedagogical practice	3.83
OER	Overall OER competencies	3.50	Intellectual property knowledge	3.44

The pattern observed for AI competence reveals a comparatively less mature area of professional practice. Across the TAICS dimensions (Figures 12–17), respondents demonstrated the highest confidence in AI Knowledge, particularly in relation to understanding AI concepts and generating content using AI tools. However, confidence declined substantially in AI Pedagogy, AI Assessment, and aspects of AI Professional Engagement. Figure 14 was particularly noteworthy, as most respondents reported low confidence in assessing learning within AI-supported environments or using AI tools for grading and assessment purposes. AI competence displayed the greatest internal variation of any framework. AI Knowledge produced the

highest subdomain mean ($M = 3.44$), whereas AI Assessment produced the lowest mean ($M = 2.93$). The lowest scoring individual item was A11, assessing learning in AI-supported environments ($M = 2.84$, $SD = 1.24$). The findings imply that teachers are currently at an early stage of AI adoption, possessing foundational awareness but lacking confidence in more advanced pedagogical applications.

Results relating to Education for Sustainable Development (ESD) indicate a somewhat different pattern. The strongest findings emerged within the Values and Responsibility dimension (Figure 19), where substantial majorities reported promoting responsibility, equity, diversity, and ethical awareness through their teaching. Positive responses were also evident for reflective practice and learner responsibility (Figure 20). By comparison, lower levels of agreement were found in the Pedagogical Practice for ESD dimension (Figure 18), particularly regarding the use of digital technologies to support engagement with real-world sustainability challenges. Large proportions of neutral responses across several ESD items should be interpreted cautiously, however, as the methodology report identified an inconsistency between the confidence-based instruction and agreement-based response format used in this section. Nonetheless, the overall pattern suggests that respondents appear more confident with the ethical and values-oriented dimensions of sustainability than with the pedagogical implementation of ESD through innovative digital approaches. The findings regarding Open Educational Resources (OER) (Figure 21) point to a moderate level of familiarity but relatively limited expertise. Approximately half of respondents reported previous experience using OER, and confidence in ICT skills related to OER adoption was generally positive. However, weaker results emerged regarding knowledge of intellectual property rights and copyright issues. This suggests that while teachers may access and use open resources, many remain uncertain about the legal and licensing frameworks that underpin effective OER adoption and development.

5.1.2. Teachers' competence concerning the four DigiSET topics

The four DigiSET-specific topics provide a more detailed picture of emerging competence needs. Among these themes, Inclusive Practices (Figure 24) emerged as the strongest area. More than half of respondents reported frequent use of digital tools to support learners with learning difficulties and adapt resources for students with special educational needs. This finding suggests that many teachers have already incorporated inclusive digital practices into their professional activities. By contrast, Adaptive AI Use (Figure 22) received some of the weakest ratings across the entire survey. Most respondents reported low confidence in using AI tools to personalise learning or support differentiated instruction. This finding aligns closely with the relatively low confidence observed in AI pedagogy and AI assessment (Figures 13 and 14), indicating that AI has not yet become embedded within personalised teaching practice. The mean score analysis reinforces this conclusion. Digital Resources achieved the highest DigCompEdu subdomain mean ($M = 4.14$), followed closely by Professional Engagement ($M = 4.02$) and Teaching and Learning ($M = 4.02$). In contrast, Assessment produced the lowest subdomain mean ($M = 3.47$), indicating that assessment remains the least developed aspect of digital teaching competence. This suggests a significant gap between awareness of AI and the practical ability to integrate AI meaningfully into teaching and assessment. The findings relating to Gender Bias in AI (Figure 23) also highlight an important competence gap. Respondents demonstrated relatively low confidence both in recognising gender bias

in AI-generated content and in addressing potential stereotypes when using AI in teaching. While awareness appeared somewhat stronger than intervention skills, confidence levels overall remained modest. Given the growing use of generative AI tools in education, this represents a significant area for future development. It should also be noted that these items were measured using confidence scales despite being framed as behavioural and knowledge-based statements, which may have influenced responses.

Systems Thinking (Figure 25) revealed moderate levels of confidence. Respondents generally agreed that they help learners understand the interconnected environmental, social, and economic dimensions of sustainability and encourage critical reflection on sustainability challenges. However, the high proportion of neutral responses suggests that systems thinking remains an emerging competence for many teachers rather than a fully established area of practice. Overall, Adaptive AI Use appears to represent the greatest need for intervention, followed closely by Gender Bias in AI. Both areas align with the wider pattern of lower confidence observed across the AI competence dimensions and therefore represent important priorities for DigiSET training provision.

5.1.3. Teachers' learning needs and interest

The qualitative findings provide valuable insight into how respondents interpret their own competence needs. Across Q1–Q3, the most frequently mentioned challenges were lack of time, limited access to training opportunities, insufficient digital infrastructure, and uncertainty regarding AI implementation. Teachers repeatedly emphasised workload pressures and the difficulty of engaging in professional learning alongside existing responsibilities. As one participant noted, *"The main challenges in every aspect of school life in Ireland are to do with time."* Another respondent highlighted the need for *"more training in AI for positive use, technology support for diversifying assessment and equitable access."*

The quantitative findings on professional development priorities strongly reinforce these observations. Figure 26 shows that using AI in teaching was the most frequently selected training need, followed by adaptive learning tools, inclusive digital teaching, OER, and ethical AI use. These priorities correspond closely with the competence gaps identified in Sections 5.1.1 and 5.1.2, particularly in relation to AI pedagogy, adaptive AI, and AI ethics. In contrast, systems thinking and gender bias in AI were selected less frequently despite relatively low confidence scores, perhaps suggesting that teachers are more immediately focused on practical classroom applications than on broader social and ethical dimensions of AI. Figure 27 further demonstrates that the principal barrier to professional development is lack of time, followed by lack of available training and limited institutional support. These findings suggest that successful DigiSET interventions must be designed not only around relevant content but also around flexible delivery mechanisms. Respondents demonstrated the highest confidence in established professional practices, digital resource management, and sustainability values. Lower confidence was observed in areas requiring the application of emerging technologies, particularly AI-supported assessment, adaptive learning, and learner-centred digital pedagogies. This suggests that competence development has progressed more rapidly in foundational digital practices than in newer pedagogical applications of AI and digital sustainability.

Taken together, the results reveal a notable cross-domain pattern. Teachers appear relatively confident in established digital teaching practices and values-based sustainability education, yet considerably less confident in AI-enhanced pedagogy, adaptive learning, digital assessment, and digitally mediated ESD practices. The findings therefore suggest that digital competence has developed more rapidly than AI competence, while ESD values are more established than digitally supported sustainability pedagogy.

Three implications emerge for training design. First, DigiSET should prioritise practical applications of AI, particularly adaptive learning, assessment, and differentiation. Second, training should be modular, flexible, and accessible to accommodate time constraints reported by participants. Third, AI-related ethical topics, including bias, inclusion, and responsible use, should be integrated throughout the curriculum rather than treated as standalone themes.

5.2. Contextualisation within the national framework

The findings of the DigiSET survey broadly reflect the current policy landscape in Ireland, where significant emphasis has been placed on digital transformation, artificial intelligence, and Education for Sustainable Development (ESD) in recent years. National initiatives such as the Digital Strategy for Schools to 2027, the National AI Strategy, and the Second National Strategy on Education for Sustainable Development have highlighted the importance of equipping teachers with digital, AI-related, and sustainability competences. The relatively strong levels of confidence observed in digital professional engagement and digital resource management (Figures 6 and 7) suggest that previous investment in digital infrastructure, professional learning, and technology integration has had a positive impact on teachers' everyday practice. However, the considerably lower confidence reported for AI pedagogy, AI assessment, adaptive AI use, and OER-related competences (Figures 13, 14, 21 and 22) indicates that policy ambitions regarding emerging technologies currently exceed the readiness of many teachers to implement them in practice.

The survey findings also align with broader international research on teacher digital competence. Similar studies using the DigCompEdu framework have typically found that teachers report higher confidence in communication, collaboration, and resource management than in digitally enhanced assessment and learner-centred pedagogies. The Irish results mirror this pattern, with strong performance in Professional Engagement and Digital Resources but weaker outcomes in Assessment and aspects of Facilitating Learners' Digital Competence (Figures 6, 7, 9 and 11). This suggests that although digital technologies are well embedded within many aspects of teachers' professional work, their use for transformative pedagogical purposes remains less developed.

The strong performance of respondents in areas such as Professional Engagement, Digital Resources, and Teaching and Learning aligns with the objectives of Ireland's *Digital Strategy for Schools to 2027*, which emphasises teacher digital competence, technology-enhanced pedagogy, and professional learning as key enablers of educational transformation. The findings suggest that national investment in digital infrastructure and teacher professional development has contributed to the

development of strong foundational digital teaching competences among Irish educators.

The findings regarding AI competence are particularly noteworthy in the Irish context. Although AI has received substantial attention within educational policy, professional development provision and media discourse since the widespread adoption of generative AI tools in 2023–2026, respondents reported only moderate confidence in AI knowledge and considerably lower confidence in AI pedagogy and assessment (Figures 12–14). This pattern suggests that awareness of AI has increased more rapidly than practical expertise. Teachers appear familiar with AI as a concept and many have experimented with AI tools, yet they remain uncertain about how to integrate AI effectively into teaching, assessment, and personalised learning environments. These findings suggest that teachers possess emerging awareness of AI but remain uncertain about its pedagogical and assessment-related applications. This interpretation is reinforced by the qualitative findings, where respondents repeatedly identified AI-related training as their highest professional development priority.

The findings emerge at a time when Ireland has introduced national *Guidance on the Use of Artificial Intelligence in Schools*, which emphasises responsible, ethical, and critically informed use of AI within education. While awareness of AI appears to be increasing, the survey findings suggest that confidence in applying AI within assessment and pedagogical practice has not yet reached the level envisaged by emerging national policy frameworks.

The ESD findings also reflect developments within Irish education policy. Sustainability has become increasingly visible through curriculum reforms, Green Schools initiatives, climate action policies, and the National Strategy on Education for Sustainable Development. The particularly strong scores reported for values, responsibility, equity and ethical awareness (Figure 19) suggest that many teachers are already engaging with the normative and citizenship-oriented dimensions of sustainability. However, confidence was lower for pedagogical implementation and for the use of digital technologies to support real-world sustainability learning (Figures 18 and 25). Mean score analysis indicates that Values and Responsibility was the strongest ESD subdomain ($M = 4.22$), followed by Systems Thinking ($M = 4.01$). Pedagogical Practice produced the lowest ESD mean ($M = 3.83$), suggesting that teachers are more confident in sustainability-related values than in implementing sustainability-focused pedagogical approaches. This finding broadly reflects conclusions from previous Irish research, which has identified strong commitment to sustainability values among educators but more limited confidence in translating these ideas into classroom practice across all subject areas. The findings concerning Open Educational Resources are consistent with existing observations regarding OER adoption in Ireland and internationally. While respondents demonstrated moderate experience with OER and confidence in their ICT capabilities, uncertainty regarding intellectual property rights and licensing was evident (Figure 21). This suggests that OER use remains largely informal for many teachers and that further support is required to promote confident creation, adaptation, and sharing of openly licensed resources.

The strong commitment to sustainability values evident within the survey findings is consistent with the objectives of Ireland's *Education for Sustainable Development to*

2030 strategy, which identifies educator capacity-building as a central priority. However, the lower scores associated with sustainability-focused pedagogical practice suggest that translating sustainability values into classroom implementation remains an ongoing challenge.

The findings also broadly correspond with the DigiSET country desktop research previously conducted for Ireland. That review highlighted strong policy commitments in digital education and sustainability but identified comparatively limited guidance concerning AI implementation, AI ethics, adaptive learning, and OER competencies. The survey results appear to confirm these observations. Teachers reported relatively high competence in established digital practices and values-based ESD, but lower confidence in newer and more specialised domains such as adaptive AI use, gender bias in AI, AI assessment, and OER adoption (Figures 14, 21, 22 and 23).

Several findings were particularly striking given the current national context. The first was the very low confidence reported in adaptive AI use and AI assessment despite extensive attention given to generative AI in educational discussions over the past two years. A second notable finding was the comparatively strong confidence in inclusive digital practices (Figure 24), suggesting that inclusion has become a more established component of teachers' professional practice than AI-enhanced pedagogy. Finally, while sustainability is often discussed as an urgent national priority, the relatively low demand for training in systems thinking (Figure 26) may indicate that teachers perceive more immediate needs relating to digital technologies and AI than to sustainability-specific competences. These findings suggest that recent policy developments have increased awareness of emerging topics but have not yet translated into equivalent levels of practical competence among teachers.

The findings demonstrate a strong degree of alignment with current Irish education policy. National strategies relating to digital education, sustainability, and AI have established ambitious expectations for teacher competence development. However, the survey findings suggest that implementation remains uneven, particularly in relation to AI assessment, sustainability pedagogy, and open educational practices. This reflects a broader challenge of translating policy aspirations into classroom practice through sustained professional learning, practical supports, and appropriate resourcing.

Overall, the survey results fit well within the broader Irish educational context. They portray a teaching workforce that has developed strong foundational digital competences and positive attitudes towards sustainability and inclusion, but which continues to require substantial support in emerging areas such as AI pedagogy, AI assessment, adaptive learning, and OER literacy. The findings therefore reinforce the relevance of the DigiSET project and suggest that its focus on sustainable digital teaching, AI competence, and professional development remains highly aligned with current national priorities.

5.3. Limitations

The extent to which the findings can be generalised to the wider Irish teaching profession should be considered carefully. Although the survey achieved the DigiSET target of at least 100 completed responses and generated 165 usable responses, the sample does not fully reflect the composition of the national teacher population.

Consequently, the findings should be interpreted as indicative rather than representative of all teachers in Ireland.

The respondent profile demonstrates both similarities and differences when compared with available national teacher statistics. Women accounted for 71.8% of respondents compared with approximately two-thirds of teachers nationally, indicating a modest overrepresentation of female teachers within the sample. The average age of respondents was 47.8 years, with almost half (48.9%) reporting more than 20 years of teaching experience. This suggests that experienced teachers were disproportionately represented relative to the overall teaching workforce, which includes a larger proportion of early-career educators.

The sample was also dominated by educators working in publicly funded educational settings (82.4%), which reflects the structure of the Irish education system where most teachers work in state-funded schools or Education and Training Board (ETB) institutions. However, respondents from private and independent schools were only minimally represented. Upper-secondary and lower-secondary teachers formed the largest respondent groups, while primary-level teachers represented less than 7% of participants. Consequently, the findings may be more reflective of post-primary and vocational education contexts than the primary sector. Significant participation from Further Education and Training (FET) practitioners also differentiates the sample from the overall teacher workforce and reflects the dissemination channels used by the Irish consortium partners.

The survey generated 221 responses, of which 165 were included in the final analysis following data cleaning procedures. The national target population consisted of registered teachers and student teachers in Ireland. As outlined in Section 2, approximately 79,221 teachers were employed in Irish primary and post-primary education during the data collection period, alongside approximately 1,490 students enrolled in initial teacher education programmes. Using the teaching workforce as a broad comparator, the analysed sample therefore represents less than 0.3% of the national teacher population.

A precise response rate cannot be calculated because the survey was distributed through multiple channels, including teacher unions, school networks, professional contacts, social media dissemination, and snowball sampling. The exact number of individuals who received an invitation to participate is therefore unknown. Nevertheless, achieving 165 usable responses exceeded the DigiSET project target of 100 completed surveys for Ireland and provided a sufficiently large dataset to identify broad patterns and trends.

Several potential sources of bias should be acknowledged. First, the sample appears to overrepresent experienced teachers and those already engaged with professional networks. This may have produced somewhat higher levels of self-reported competence than might be expected within the wider profession. Teachers with a pre-existing interest in digital technologies, sustainability, or professional learning may also have been more likely to participate, introducing a degree of self-selection bias. Second, the recruitment strategy resulted in stronger representation from post-primary, vocational, and FET settings than from the primary sector. As digital technologies, AI use, curriculum structures, and professional development

opportunities can differ substantially between educational sectors, the results should not be assumed to apply equally across all educational contexts. Third, regional information was not collected as part of the questionnaire, making it impossible to assess potential geographical biases within the sample. Similarly, the relatively limited participation of pre-service teachers, private-sector teachers, and teachers from minority educational settings restricts the extent to which conclusions can be extended to these groups.

Despite these limitations, several characteristics increase the value of the findings. The sample included participants from a broad range of school levels, subject areas, professional roles, and educational sectors. Furthermore, the findings demonstrate strong internal consistency across the quantitative and qualitative data, with the themes emerging from open-ended responses closely reinforcing the competence patterns observed in the survey scales.

Overall, while the results cannot be considered statistically representative of the entire Irish teaching population, they provide a credible and informative snapshot of teacher perceptions regarding digital competence, AI, sustainability, OER, and professional development needs. The findings are likely to be most applicable to experienced teachers working in publicly funded post-primary, vocational, and further education contexts, while caution should be exercised when generalising the results to underrepresented groups such as primary teachers, student teachers, and those working in private educational settings. Several limitations should be considered when interpreting the findings of this study. While the survey provides valuable insights into teachers' perceptions of digital sustainability competences in Ireland, the results should be viewed within the methodological and contextual constraints of the research design.

A primary limitation relates to the sampling approach. The survey employed a non-probability sampling strategy based on professional networks, teacher unions, educational organisations, and voluntary participation. As a result, respondents were self-selected rather than randomly sampled from the national teaching population. Teachers with an existing interest in digital technologies, sustainability, professional development, or educational innovation may have been more inclined to participate. Consequently, the sample may overrepresent educators who are already engaged with these topics and underrepresent those with lower levels of interest or confidence. Although the study exceeded the DigiSET target of 100 valid responses and achieved 165 usable survey responses, the sample size remains relatively small when compared with the overall teaching workforce in Ireland. Furthermore, some educational groups were represented only by small numbers of respondents. While the sample was sufficient for descriptive analysis, it is not large enough to support robust subgroup comparisons across educational sectors, teaching levels, gender groups, or age categories. Consequently, caution should be exercised when interpreting differences between groups or extending findings to specific subsets of teachers.

A further limitation concerns the reliance on self-reported competence measures. The survey assessed respondents' perceptions of their own abilities rather than objectively measuring competence through observation, testing, or performance-based assessment. Self-perceptions may not always correspond with actual competence

levels. Some respondents may overestimate their abilities because of social desirability effects or professional confidence, while others may underestimate their competence due to uncertainty or lack of confidence. The findings should therefore be interpreted as indicators of perceived competence rather than verified skill levels.

Several instrument-related limitations identified in the DigiSET methodology report may also have influenced the results. First, the Adaptive AI Use (AD1–AD2) and Gender Bias in AI (GD1–GD2) items employed confidence-based response scales despite being formulated as behavioural or knowledge-oriented statements. This mismatch may have affected how respondents interpreted and answered these questions. Second, the Education for Sustainable Development section combined confidence-oriented instructions with agreement-based response formats, potentially contributing to the relatively high proportion of neutral responses observed across the ESD dimensions. Third, inconsistencies in terminology, particularly the interchangeable use of “learners” and “students”, may have introduced minor interpretation differences among respondents from various educational sectors. These issues should be considered when interpreting the corresponding findings.

The recruitment strategy also introduced limitations regarding representativeness. The survey was primarily disseminated through teacher unions, professional networks, and educational contacts associated with the Irish consortium partners. This approach resulted in strong participation from post-primary, vocational, and Further Education and Training (FET) sectors, while primary teachers, student teachers, and teachers working in private educational settings were comparatively underrepresented. As a result, the findings may more accurately reflect the experiences of teachers in publicly funded post-primary and vocational contexts than those working in other sectors.

Language and translation issues appear to have been relatively limited in the Irish context because the survey was administered in English, the primary professional language used by most respondents. However, some comments suggest that a small number of participants found aspects of the AI competence section difficult to interpret, particularly where confidence scales were applied to activities that may not currently form part of their professional responsibilities. Respondents working in specialised contexts such as adult education, prison education, or learner support roles may also have found certain questions less applicable to their teaching environments. The timing of data collection may have influenced participation patterns. The survey was conducted during a period when many Irish teachers were preparing students for examinations and managing end-of-year administrative responsibilities. This may have reduced participation among some groups and contributed to the dominance of respondents who were particularly motivated to engage with the topic despite existing workload pressures.

Taken together, these limitations suggest that the findings should be interpreted as an informative snapshot of teachers’ perceptions rather than a definitive representation of the entire Irish teaching profession. Nevertheless, the consistency between the quantitative and qualitative findings, together with the achievement of the national response target, provides confidence that the survey offers valuable evidence regarding teacher competence profiles, professional development needs, and emerging priorities relevant to the DigiSET project.

6. Implications

The findings of the survey have important implications for the development of the DigiSET Teacher Academy and the Framework of Learning Outcomes. By identifying areas of strength and need, the results provide evidence for targeted professional development interventions. This section outlines recommendations for DigiSET, policymakers, educational leaders, and teacher education providers. The survey findings provide important evidence for the future direction of the DigiSET Teacher Academy and the development of the Framework of Learning Outcomes (D2.2). While Irish teachers demonstrate strong competence in established digital teaching practices, professional engagement, digital resource management, inclusive practices, and values-based sustainability education (Figures 6, 7, 19 and 24), substantial competence gaps remain in relation to artificial intelligence, adaptive learning, digital assessment, OER literacy, and digitally supported sustainability pedagogy. The mean score hierarchy provides further evidence of this implementation gap. While Digital Resources ($M = 4.14$) and Values and Responsibility ($M = 4.22$) achieved strong scores, AI Assessment ($M = 2.93$) and AI Pedagogy ($M = 3.23$) remained substantially lower. This suggests that awareness of AI has developed more rapidly than practical confidence in its classroom application. These findings suggest that DigiSET should prioritise the development of competences that help teachers move from basic digital competence towards digitally sustainable, AI-enhanced and future-oriented educational practice.

Table 4: Priority areas and evidence

Analysis data and means scores	
Priority area	Evidence
AI Assessment	Lowest AI mean score (2.93)
AI Pedagogy	Low AI mean score (3.23)
Adaptive AI Use	Figure 22, 60% reported low confidence
Gender Bias in AI	Figure 23, 57% reported low confidence
Digital Assessment	Lowest means score DEC (3.47)
OER Licensing	Lowest means score OER (3.44)

Base on analysis of Means it is reasonable to suggest priority competence areas for the DigiSET Teacher Academy based on the survey findings. The ranking combines evidence from competence scores, reported confidence levels, and professional development needs, highlighting those areas where targeted support is likely to have the greatest impact.

6.1. Implication for DigiSET

Priority Competence Areas for the DigiSET Teacher Academy

The survey identifies several areas that should receive priority attention within the DigiSET Teacher Academy. First, AI-related competences emerged as the most significant area of need. While respondents reported moderate confidence in general AI knowledge (Figure 12), confidence was substantially lower in AI pedagogy, AI assessment, adaptive AI use, and addressing bias in AI systems (Figures 13, 14, 22 and 23). Furthermore, training on the use of AI in teaching was identified as the most frequently selected professional development priority (Figure 26). The DigiSET curriculum should therefore place particular emphasis on practical classroom applications of AI, including lesson design, assessment, feedback, differentiation, and responsible AI use. Second, the findings indicate a need to strengthen teachers'

competence in digital assessment and learner-centred digital pedagogies. Although respondents reported strong levels of confidence in professional engagement and digital resources, confidence was lower in the DigCompEdu areas of Assessment and Facilitating Learners' Digital Competence (Figures 9 and 11). Training should therefore support teachers in designing digitally enhanced assessment strategies, facilitating collaborative digital learning, and promoting learner agency through technology. Third, the survey suggests a need to strengthen digitally supported sustainability education. Respondents demonstrated strong commitment to sustainability values and responsibility (Figure 19), but lower confidence in pedagogical implementation and systems-thinking approaches (Figures 18 and 25). DigiSET training should therefore provide practical examples of how digital technologies, AI tools, and OER can be integrated into Education for Sustainable

The professional development barriers identified by respondents have important implications for programme delivery. Lack of time, lack of available training opportunities, and limited institutional support were consistently reported as major obstacles (Figure 27). Qualitative responses reinforced these findings, with many participants emphasising the need for flexible and accessible training opportunities that fit within existing workloads. Consequently, the DigiSET Teacher Academy should consider prioritising the items in Table 5 below:

Table 5: Priority areas for consideration

Priority areas
Modular and self-paced learning activities that can be completed in short segments.
Practical, classroom-oriented resources rather than purely theoretical content.
Blended delivery formats combining online learning, peer collaboration, and hands-on application.
Resources that can be adapted across educational sectors, including post-primary, vocational, further education and adult education settings.
Communities of practice that encourage peer learning and sharing of examples of effective practice.

The findings suggest that teachers are highly motivated to engage in professional learning but require training that is efficient, relevant, and immediately applicable to classroom practice.

Implications for the DigiSET Framework of Learning Outcomes (D2.2)

Based on the Irish findings, the DigiSET Framework should explicitly address learning outcomes that enable teachers to achieve the items listed in Table 6 below.

Table 6: Training could include these learning outcomes

Learning outcomes to be considered
Critically evaluate, select and use AI tools for teaching, learning, and assessment.
Design learning experiences that use AI to support differentiation, personalisation, and inclusion.
Recognise and mitigate bias, ethical concerns, privacy risks, and data-protection issues associated with AI systems.
Apply digital assessment approaches that support formative assessment and learner feedback.

Create, adapt, share and evaluate Open Educational Resources while understanding intellectual property and licensing requirements.
Integrate sustainability principles, systems thinking, and real-world sustainability challenges into digital learning activities.
Promote responsible digital citizenship, ethical technology use, and critical engagement with digital and AI-generated content.
Support diverse learners through inclusive digital teaching approaches and accessible learning design.

These learning outcomes directly reflect the competence gaps identified across the digital, AI, ESD, OER and DigiSET-specific dimensions of the survey.

The subdomain mean analysis provides additional evidence for prioritising specific areas within the DigiSET Teacher Academy. Respondents reported the highest levels of confidence in Values and Responsibility within ESD ($M = 4.22$) and Digital Resources within DigCompEdu ($M = 4.14$), indicating that sustainability values, ethical awareness, and core digital teaching practices are already relatively well established among Irish teachers. In contrast, substantially lower mean scores were observed for AI Assessment ($M = 2.93$), AI Professional Engagement ($M = 3.18$), AI Ethics ($M = 3.22$), AI Pedagogy ($M = 3.23$), and DigCompEdu Assessment ($M = 3.47$). These findings suggest that future professional development should focus less on basic digital literacy and more on helping teachers apply AI effectively within teaching, assessment, feedback, differentiation, and collaborative professional practice. The mean score profile also highlights an important developmental pattern. Teachers appear confident in established professional practices and sustainability-related values, but less confident in competences requiring the pedagogical application of emerging technologies. This is particularly evident in AI-related domains, where confidence in understanding AI concepts exceeded confidence in using AI to support assessment and personalised learning. Similarly, while sustainability values were strongly embedded, pedagogical implementation of sustainability through digital technologies was comparatively weaker. These findings suggest that DigiSET learning resources should prioritise practical classroom applications, authentic case studies, assessment strategies, and subject-specific examples that support the transition from awareness to implementation.

The findings further support the development of modular learning pathways that address different stages of competence development. Advanced modules should focus on AI-enhanced assessment, adaptive learning, ethical AI use, and digitally supported sustainability pedagogy, while introductory modules can consolidate existing strengths in digital resource management, professional engagement, and sustainability education. Such an approach would align the DigiSET Framework of Learning Outcomes with the areas of greatest need identified through both the survey findings and the mean score analysis.

6.2. Additional insights

Recommendations for National Policymakers

The findings suggest that policy priorities should move beyond digital access towards sustained investment in teacher competence development. Table 7 summarises some of the main findings relevant to policy.

Table 7: Policy recommendations, national, school and training

Policy recommendations
National policymakers should:
• Provide structured and accredited professional learning opportunities focused on AI pedagogy, digital assessment, and sustainable digital teaching. • Allocate protected professional development time within teachers' working schedules, addressing the significant time barriers identified by respondents.
Recommendations for School Leadership
School leaders play a critical role in supporting digital transformation. Based on the findings, school leadership should:
• Establish collaborative professional learning cultures that encourage experimentation, peer mentoring, and sharing of practice. • Support teachers through access to appropriate infrastructure, digital resources, and dedicated time for training and innovation.
Recommendations for Teacher Education Institutions
Initial teacher education providers and CPD organisations should:
• Embed AI literacy, digital assessment, OER, and sustainability competences within all teacher education programmes. • Develop practice-focused training that emphasises authentic classroom applications rather than purely technical knowledge.

The findings highlight several priorities for future research. First, longitudinal studies would be valuable for examining how teacher competence and confidence evolve as AI technologies become more embedded within educational practice. Second, future research should complement self-reported measures with objective assessments of competence to better understand the relationship between perceived and actual capability. Additional studies focusing on underrepresented groups, particularly primary teachers, pre-service teachers, and teachers in private educational settings, would further strengthen the evidence base.

Many of the patterns identified in Ireland are likely to be relevant across other DigiSET partner countries. The coexistence of strong foundational digital competence with lower confidence in AI pedagogy, adaptive learning, OER, and digitally supported sustainability education reflects challenges commonly reported across European education systems. However, some findings—particularly the strong representation of vocational and further education contexts and the emphasis on inclusion—may be influenced by specific characteristics of the Irish educational landscape. Consequently, while the broad competence priorities are likely to be transferable across the consortium, implementation strategies should remain sensitive to national and sectoral differences.

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Appendices

1 Copy of main survey items and code

Section 1: Digital Teaching Competence	
D1_p	I use different digital channels to communicate with learners and colleagues whenever appropriate.
D2_p	I use digital technologies whenever appropriate to work together with colleagues inside and outside my educational organisation.
D3_p	I actively develop my digital competence for teaching.
D4_p	I am aware of and participate in online training opportunities.
D5_d	I use different internet sites and search strategies to find and select a range of different digital resources.
D6_d	I create my own digital resources and modify existing ones to adapt them to my needs.
D7_d	I effectively protect personal data, e.g. exams, learners' grades, learners' personal information.
D8_t	I carefully consider how, when and why to use digital technologies in classroom with my learners, so that they are used with added value.
D9_t	I follow learners' activities and interactions in the collaborative online environments we use.
D10_t	When learners work in groups, they use digital technologies to help them learn and effectively accomplish course tasks.
D11_t	I use digital technologies to allow learners to plan, document and monitor their learning themselves.
D12_a	I use digital assessment tools to monitor [student] progress.
D13_a	I analyse all data (information) available to me to identify learners who need additional support.
D14_a	I use digital technologies to provide effective feedback.
D15_e	When I create digital assignments for learners I take into account and address potential practical or technical difficulties.
D16_e	I use digital technologies to offer learners personalised learning opportunities.
D17_e	I use digital technologies for learners to actively participate in class or online learning.
D18_f	I teach learners how to assess the reliability of information.
D19_f	I set up course tasks which require learners to use digital means to communicate and collaborate with each other or with an outside audience.
D20_f	I set up assignments which require learners to create digital content.
D21_f	I teach learners how to use digital technology safely and responsibly.
D22_f	I encourage learners to use digital technologies creatively to solve concrete problems.
I1	I use digital tools to support students with learning difficulties.

I2	I adapt digital learning materials for students with special educational needs.
Section 2: AI Competence	
A1_aik	I can distinguish whether a tool is AI-based or not.
A2_aik	I can create content with AI.
A3_aik	I can explain what AI is.
A4_aik	I can explain what generative AI is.
A5_aip	I can choose an AI tool to use in my classroom that enhances what I teach, how I teach, and what students learn
A6_aip	I can choose an AI tool that enhances my teaching subject content for a lesson.
A7_aip	I can teach lessons that appropriately combine my teaching subject, AI tools, and teaching approaches.
A8_aip	I can help others design learning activities that combine subject content, AI tools, and teaching approaches.
A9_aia	I can use an AI tool to foster assessment for learning.
A10_aia	I can design an assessment approach to improve student learning in an AI-based environment (e.g., learning with ChatGPT).
A11_aia	I can assess student learning in an AI-based environment.
A12_aia	I can use an AI tool to grade an assignment.
A13_aie	I can teach students ethics.
A14_aie	I can protect sensitive content from AI tools (e.g., exams, students' grades and personal data).
A15_aie	I can ensure my health and well-being while using AI tools.
A16_aie	I teach students how to behave safely and responsibly when learning with AI tools.
A17_hce	I can assess the benefits of an AI tool.
A18_hce	I can assess the risks of an AI tool.
A19_hce	I recognise that humans are responsible for AI bias.
A20_hce	I can explain how AI impacts our society
A21_pen	I can use different websites and search strategies to find and select a range of different AI tools.
A22_pen	I actively look for continuous professional development activities outside my educational organization.
A23_pen	I actively share my AI teaching experience with other colleagues within and outside my educational organization.
A24_pen	I love to help my colleagues design learning activities with AI.
AD1	I use AI tools to personalise learning for individual students.

AD2	I know how to use AI for differentiated instruction based on student needs.
GD1	I am aware of gender bias in AI-generated content.
GD2	I know how to address gender stereotypes when using AI in teaching.
Section 3: Education for sustainable development	
S1_stc	I help learners understand the interconnections between environmental, social, and economic aspects of sustainability.
S2_stc	I encourage learners to critically reflect on sustainability-related issues.
S3_stc	I support learners in analysing complex sustainability problems from multiple perspectives.
S4_ped	I integrate sustainability topics into my teaching practice.
S5_ped	I use participatory and learner-centred teaching approaches when addressing sustainability.
S6_ped	I design learning activities that promote active engagement with sustainability challenge
S7_ped	I use digital technologies (e.g., simulations, collaborative platforms, data visualisation tools, or AI-based applications) to engage learners with real-world sustainability challenges.
S8_val	I promote values such as responsibility, equity, and respect for diversity in my teaching.
S9_val	I encourage learners to consider ethical implications of sustainability issues.
S10_val	I support learners in developing a sense of responsibility for sustainable development.
S11_ref	I reflect on my teaching practice in relation to sustainability and seek continuous improvement.
S12_ref	I feel confident facilitating discussions on complex or controversial sustainability issues.
S13_ref	I support learners in applying sustainability knowledge to real-life situations.
Section 4: Open educational resources	
O1	I have prior experience of using OER
O2	I have knowledge of Intellectual Property Rights to understand OER
O3	I am efficient in Information Communication Technology (ICT) skills to adopt and use OER
O4	I adopt OER for my teaching as they fulfil academic requirement of my students
O5	My own competencies and knowledge towards OER helps me to participate or adopt OER
Section 5: Professional development	
P1a	Using AI in teaching
P1b	Ethical and responsible AI use
P1c	Integrating sustainability into teaching

P1d	Inclusive digital teaching
P1e	Creating and sharing OER
P1f	Using adaptive learning tools
P1g	Addressing gender bias in AI
P1h	Systems thinking for sustainability
P1other	Other
P1other_text	Textanswer
P2a	Lack of time
P2b	Lack of available training
P2c	Lack of institutional support
P2d	Lack of suitable resources / materials
P2e	Lack of infrastructure (e.g. wi-fi, technical equipment)
P2other	Other
P2other_text	Textanswer
Section 6: Open questions	
Q1	What challenges do you currently face in integrating digital technologies and sustainability into your teaching?
Q2	What competences would help you address these challenges?
Q3	Is there anything else you would like to mention to issues presented in the survey?
Section 7: About you	
B1a	I am studying to be a teacher
B1b	I am working at a public / state-funded school
B1c	I am working at a private / independent school
B1d	I am working at a church / religious-affiliated school
B1e	Currently I am looking for a job
B1other	Other
B1other_text	Textanswer
B2a	Primary level (ISCED 1, approx. ages 6–11)

B2b	Lower secondary (ISCED 2, approx. ages 12–14)
B2c	Upper secondary (ISCED 3, approx. ages 15–18)
B2d	Vocational education (ISCED 3/4)
B2 other	Text answer
B3 other text	Text answer
B4	How many years of teaching experience do you have?
B5	In which country do you work or do you study?
B6	How do you identify your gender?
B7	What is your age in years?

2 Copy of survey invitation email sent to Irish sample

Dear,

You are invited to take part in a short online survey examining the current state of *digitally sustainable teaching* in Irish classrooms. The survey forms part of DigiSET – The Academy of the Digitally Sustainable European Teacher, an Erasmus+ Teacher Academies project involving partners from eight European countries. The purpose of the survey is to capture teachers' and pre-service teachers' experiences and perspectives on digitalisation, sustainability, inclusion, and the ethical use of artificial intelligence in teaching and learning. Your input will directly inform the development of a European competence framework and training programme for digitally sustainable teaching. In Ireland, DigiSET is supported by the Teachers' Union of Ireland and Bridgetown College, with TU Dublin participating as an Associate Partner.

Data protection and ethics

Participation is entirely voluntary. The surveys are anonymous, and no personally identifiable information (such as names, email addresses, or IP addresses) is collected. All responses are treated with strict confidentiality and processed in line with the EU General Data Protection Regulation (GDPR). Ethical approval has been granted by Bahçeşehir University. Data are processed on the basis of informed consent (GDPR Article 6(1)(a)) for scientific research purposes (Article 9(2)(j)). Anonymised data may be shared publicly in line with the EU Open Science Strategy. You may withdraw at any time before submitting the survey by closing your browser.

Take part

Click the link to access the survey (not included here)

The survey should take approximately 20 minutes to complete.

If you have any questions about the survey or the DigiSET project in Ireland, please contact:

Dr Aidan Kenny

Teachers' Union of Ireland / TU Dublin

akenny@tui.ie | aidan.kenny@tudublin.ie

For queries relating to data protection or privacy, please contact:

Dr Sandra Schön, Graz University of Technology (TU Graz)

sandra.schoen@tugraz.at

Thank you for considering contributing your experience to this important European initiative.

Kind regards,

The DigiSET Project Team in Ireland

For more information about the project visit <https://digisetproject.eu/>

3 Copy of survey means scores

Digital Teaching Competence Mean Scores and Standard Deviations

The mean scores and standard deviations for the Digital Teaching Competence items. Overall, respondents reported the highest levels of confidence in professional engagement, digital resource management, and aspects of teaching and learning. Lower scores were observed in assessment and some elements of facilitating learners' digital competence, indicating that learner-centred and assessment-related uses of technology remain less developed than professional uses.

Item	Mean	SD
D1	4.12	0.83
D2	4.05	0.87
D3	4.12	0.87
D4	3.78	0.98
D5	4.13	0.86
D6	3.73	1.06
D7	4.55	0.80
D8	4.33	0.80
D9	3.81	1.10
D10	3.58	1.03
D11	3.37	1.14
D12	3.29	1.13
D13	3.75	1.07
D14	3.56	1.06
D15	3.98	0.99
D16	3.59	1.01
D17	3.79	0.99
D18	3.97	0.98
D19	3.31	1.13
D20	3.29	1.11
D21	4.02	0.99
D22	3.73	1.01

AI Competence Mean Scores and Standard Deviations

Descriptive statistics for the AI Competence Scale. The highest scores were observed within AI Knowledge and Human-Centred Education, suggesting relatively strong awareness of AI concepts and their societal implications. The lowest scores occurred within AI Assessment, indicating that assessment-related applications of AI remain the least developed competence area.

Item	Mean	SD
A1	3.25	1.04
A2	3.57	1.12
A3	3.73	1.02
A4	3.23	1.22
A5	3.28	1.15
A6	3.33	1.14
A7	3.26	1.16
A8	3.07	1.22
A9	3.06	1.22
A10	2.93	1.25
A11	2.84	1.24
A12	2.88	1.29
A13	3.26	1.21
A14	3.04	1.32
A15	3.26	1.25
A16	3.32	1.19
A17	3.37	1.14
A18	3.34	1.15
A19	3.51	1.15
A20	3.39	1.11
A21	3.28	1.16

A22 3.38 1.20
A23 3.06 1.23
A24 3.01 1.30

Education for Sustainable Development Mean Scores and Standard Deviations

The mean scores and standard deviations for the Education for Sustainable Development (ESD) scale. Respondents reported particularly high scores in the Values and Responsibility dimension, indicating strong commitment to ethical, social, and environmental aspects of sustainability. Lower scores were observed within some pedagogical practice items, suggesting that teachers are more confident in sustainability values than in implementing sustainability-focused teaching approaches.

Item	Mean	SD
S1	3.99	0.85
S2	4.10	0.79
S3	3.96	0.83
S4	3.98	0.84
S5	3.92	0.86
S6	3.80	0.90
S7	3.63	0.99
S8	4.35	0.71
S9	4.13	0.79
S10	4.17	0.77
S11	4.05	0.85
S12	3.78	0.97
S13	4.01	0.83