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Navigating the Digital Transformation of Education: Insights from Collaborative Learning in an Erasmus+ Project

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Abstract: Collaborative Opportunities for Professional Inquiry Leading to Organisational Transformation (COPILOT) represents an Erasmus+ initiative involving four transnational partners from three EU countries including IES Cristobal de Monroy secondary school [Spain], Laois Offaly Education Training Board (LOETB) [Ireland], University College Dublin (UCD) School of Education [Ireland], and Akadimos, a teacher continuing professional development provider [Greece]. The project encompassed three primary objectives, aligned with the Erasmus+ programmes's emphasis on supporting teachers and school leaders to address digital transformation. These included the following: the identification of participatory approaches and digital methodologies employed by schools to facilitate digital transformation among educators; exploring and establishing dynamic professional environments in schools by identifying synergies with organisations operating in diverse fields or socio-economic contexts and enhancing the capacity and professionalism of partners to engage in EU/international collaboration. To investigate the outcomes of the project objectives, a small-scale qualitative study was conducted, which involved analysing participants' reports on the project's collaborative activities. Additionally, a focus group was held at the conclusion of the project to gain insights into the digital readiness, capacity, and resilience of teachers and school leaders within their respective organisations. Thematic analysis was employed to analyse the collected data. The findings of the study offer encouraging indications regarding the crucial symbiotic role played by school leaders and "early adopter" teachers in promoting digital transformation. Moreover, participating teachers displayed a general willingness to adapt their teaching methods to incorporate more technology, provided they receive both formal and informal support. Furthermore, there exists a willingness among transnational partners to digitise and share resources both at present and in the future.

Keywords: COPILOT; Erasmus+ project; digital transformation; education digital policy; digital competence; professional development

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1. Introduction

The global educational landscape is undergoing a profound shift as education systems strive to prepare students for life and learning in the digital age, a movement that is driving the digital transformation of education [1]. This transformation is not a straightforward process; rather, it is shaped by a complex interplay of factors. Research underscores the importance of school leadership, teacher characteristics, and ongoing professional development as key determinants of successful digital integration [2,3]. The COVID-19 pandemic has only accelerated this transformation, forcing educational institutions worldwide to rethink traditional practises. As a result, teachers and school leaders have emerged as pivotal actors in equipping students with critical skills like creativity, problem-solving, and adaptability in an increasingly digital environment [4].

The digital transformation of education, defined by McCarthy et al. as "a realignment of education models utilising digital technology to engage students, teachers, parents, and

leaders more effectively at every point in the students' schooling journey" [5], represents a critical shift in how education systems operate globally. This shift is driven by the rapid integration of digital tools and resources, enabling more personalised, flexible, and inclusive learning environments [6]. For teachers, the digital transformation requires developing new competencies, adapting curricula, and managing digital platforms to engage students effectively in both virtual and physical settings [7]. School leaders play a pivotal role in this transformation by creating a clear digital vision, fostering a digital culture within their institutions, and ensuring equitable access to technology for all students and staff [8]. Additionally, as digital technology evolves and becomes increasingly integrated into educational practises, teachers and school leaders must stay agile and forward-thinking to strive to equip students with the necessary skills for a digitally driven future. This transformation offers both challenges and opportunities, but embracing it is essential for enhancing student outcomes and preparing them for the demands of modern society.

Recognising this central role of teachers and school leaders in driving educational change, the COPILOT Erasmus+ Small Scale Project was initiated to empower teachers and school leaders to navigate the post-COVID-19 educational landscape and support the digital transformation of schools associated with project partners. A key initiative of the project was the active promotion of the SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies) tool across partner schools, helping teachers and school leaders to reflect on and improve their use of digital technologies for teaching and learning. Developed by the European Commission as part of the EU Digital Education Action Plan (DEAP) 2021-27 [9], SELFIE is a free instrument specifically designed to facilitate the integration of digital technologies into teaching, learning, and assessment processes [10]. By anonymously collecting the perspectives of students, teachers, and school leaders on technology usage within their schools, SELFIE generates comprehensive reports or "SELFIES" that provide a snapshot of a school's strengths and weaknesses in leveraging technology.

The COPILOT project encompassed three primary objectives, which aligned with the Erasmus+ programmes's emphasis on supporting teachers and school leaders to address digital transformation:

1. To identify participatory approaches and digital methodologies used by schools to support teachers and school leaders with digital transformation.
2. To explore the creation of dynamic professional environments in schools by identifying synergies with organisations active in different fields or in other socio-economic sectors.
3. To increase the capacity and professionalism of partners to work at the EU/international level.

This article aims to present the findings and insights derived from the COPILOT project, shedding light on collaborative practises that enhance digital competences among teachers and school leaders. Furthermore, it explores the role of the SELFIE tool as a valuable resource for school leaders in identifying and strengthening digital skills and competences in response to the digital transformation in education. Through this small-scale qualitative study, we aspire to contribute to the ongoing discourse on educational transformation in the post-COVID-19 era and provide practical recommendations for educators, policymakers, and stakeholders seeking to effectively navigate the digital landscape in contemporary education in Europe.

2. Background and Context

2.1. COPILOT Project Consortium

The COPILOT project consortium brought together four partners from three European countries, each contributing distinct expertise to advance digital transformation in education.

Laois and Offaly Education and Training Board (LOETB) was the lead project partner. LOETB facilitated the exchange of best practises among partner schools. By leveraging their experience as the largest education provider in Ireland's Midlands region, LOETB played

a central role in coordinating collaboration between partners and ensuring the effective implementation of the project.

University College Dublin (UCD) assembled the evidence base for the final project report, drawing on its expertise in research and higher education. The university contributed significantly to the project by integrating research on digital pedagogy and educational innovation, helping to guide partners toward evidence-informed practises.

I.E.S. Cristóbal de Monroy, based in Alcalá, Spain, hosted exchanges of practises in their school. With over 2000 students and a focus on digital competencies, the institution provided a platform for sharing innovative strategies for integrating digital technologies into education.

Akadimos, a lifelong learning centre in Greece, led initiatives focused on upskilling and reskilling educators, particularly in digital teaching capabilities. Akadimos hosted exchanges of practises and provided specialised training, helping educators effectively incorporate digital tools into their classrooms.

2.2. High-Level Overview of Education Digital Policy in Europe

Education digital policy in Europe encompasses a range of initiatives, strategies, and regulations aimed at integrating digital technologies and practises into educational systems [11]. These policies recognise the transformative potential of digital tools and their impact on teaching, learning, and educational outcomes. Key among these initiatives is the Digital Education Action Plan (2021–2027) [9], which outlines a vision for enhancing digital education through two strategic priorities: fostering the development of a high-performing digital education ecosystem and enhancing digital skills and competences for the digital age. This plan emphasises the need for improved infrastructure, teacher training, and digital pedagogies, as well as the integration of digital tools into everyday teaching.

In line with DEAP, individual European countries have developed their own national policies and strategies to address digital transformation in education. These policies focus on various aspects, such as infrastructure development, teacher professional development, curriculum and assessment integration of digital technologies, and the provision of digital resources [6,9,12–15].

Advancing education digital policy and supporting collaborative exchanges of best practises between European countries, platforms such as the European Schoolnet [16], the eTwinning network [14], and the European Digital Education Hub [17] play a crucial role. These platforms enable educators and school leaders to share innovative digital teaching strategies, resources, and experiences across borders. Through European Schoolnet, teachers access professional development opportunities and participate in collaborative projects aimed at integrating digital technologies into the classroom. eTwinning fosters partnerships between schools in different countries, encouraging collaborative projects that enhance digital literacy and pedagogical approaches. Similarly, the European Digital Education Hub supports the exchange of best practises and fosters innovation in digital education by connecting educators, policymakers, and experts across Europe. These platforms, in line with the aims of the COPILOT project, contribute to building a cohesive and digitally advanced educational ecosystem across Europe.

2.3. A Snapshot of Frameworks Supporting the Development of Teachers' Digital Competence

In Europe, the European Framework for the Digital Competence of Educators (DigCompEdu) provides a framework for educators to assess and develop their digital competence across six key areas, including digital resources, teaching, assessment, and the empowerment of learners [6]. This initiative directly addresses the professional development needs of teachers and school leaders, empowering them to integrate digital tools effectively.

In Spain, the Common Digital Competence Framework for Teachers [15], published by INTEF in Spain, emphasises the integration of digital tools in teaching, aimed to enhance teachers' digital literacy and educational outcomes. An updated version of this framework, Competencia Digital Docente (CDD 2.0) [18], is based on the European framework for

digital competence for citizens (DigComp 2.0 [19]) and identifies key elements of digital competence in five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. CDD 2.0 proposes competence descriptors at three levels (A—basic, B—intermediate, C—advanced), further subdivided into six levels (A1–C2). It includes an online tool for teachers to create a digital competence passport through continuous self-assessment.

UNESCO's ICT Competency Framework for Teachers [20] highlights the global need for educators to foster digital skills among students, emphasising equity, accessibility, and the use of digital tools to support inclusive education. In a similar vein, the ISTE Standards for Educators [8], aligned with the Sustainable Development Goals, provides a comprehensive guide for teachers to use technology effectively, promoting innovative teaching practises, professional growth, and student empowerment. ISTE also offers self-assessment tools to help educators evaluate their proficiency and identify areas for growth.

In the UK, the Digital Teaching Professional Framework (DTPF) [21] serves as a competency framework for teaching and training practitioners across all parts of the further education (VET) sectors. This framework is mapped to the European Framework for the Digital Competence of Educators (DigCompEdu) [6] and is overseen by the Education and Training Foundation, supporting continuous professional development. Meanwhile, Norway's Professional Digital Competence Framework for Teachers [22] underscores the need for teachers to develop their digital competence during initial teacher education and through ongoing professional development, aiming at both professional growth and practical application in teaching.

These competence frameworks play a pivotal role in equipping educators and school leaders with the skills and knowledge necessary for navigating the complexities of digital transformation in education. The COPILOT project, aligned with the DigCompEdu framework in particular, sought to enhance teachers' and school leaders' capacities to integrate digital tools effectively in schools associated with project partners.

2.4. The EU SELFIE Tool

The EU SELFIE (Self-reflection on Effective Learning by Fostering Innovation through Educational Technologies) for teachers tool [23] and the SELFIE [10] tool are both digital self-reflection tools developed by the European Commission to support the digital transformation of schools and the professional development of teachers. The EU SELFIE for teachers tool [23] is designed specifically for teachers to assess their digital competence and reflect on their teaching practises in the digital age. It enables teachers to evaluate their level of digital competence across various domains, such as digital skills, digital learning environments, digital resources, and digital assessment. The tool provides a self-assessment questionnaire that teachers can complete to identify their strengths and areas for improvement in relation to digital teaching and learning. It offers feedback and recommendations based on the self-assessment results, helping teachers to enhance their digital competencies and adapt their teaching approaches accordingly.

The SELFIE [10] tool is a broader self-reflection tool designed for schools as a whole. It enables schools to evaluate their level of digital maturity and effectiveness in integrating digital technologies into teaching and learning practises. The tool covers various dimensions, including leadership, teaching and learning, professional development, and infrastructure. By completing the SELFIE tool, schools can gain insights into their digital strengths and weaknesses and receive recommendations for improvement. The tool aims to support schools in their digital transformation journey and promote effective pedagogical approaches using technology.

Both the EU SELFIE for teacher tool [23] and the SELFIE [10] tool are integral to the European Commission's initiatives aimed at fostering digital skills, competence, and innovation in education. For the COPILOT project, these tools offered a structured approach to evaluating the digital readiness of schools and guiding professional development for project partners. By integrating SELFIE tools into the project's framework, COPILOT encouraged

a self-reflective and data-driven method for schools to identify gaps, improve digital integration strategies, and share best practises, ultimately contributing to the overarching goal of digital transformation in education.

2.5. Overview of School Leadership in Partner Countries

School leadership in Spain, Greece, and Ireland exhibits certain characteristics and responsibilities, although there may be variations based on specific contexts and educational systems. With regard to leading the digital transformation in schools, each jurisdiction has certain school leadership roles and characteristics.

In Spain, school leadership often involves a collaborative approach. School leaders, known as "directores", work closely with teachers, students, and parents to create a positive school climate and promote academic excellence. They provide vision and guidance, facilitate decision-making processes, and promote innovation and digital transformation. They play a crucial role in allocating resources for technology infrastructure, coordinating professional development opportunities, and fostering a culture of continuous improvement [24].

In Greece, school leadership, referred to as "scholarchia", encompasses similar roles and responsibilities. School leaders are responsible for strategic planning, curriculum development, and creating a supportive environment for teaching and learning. They collaborate with teachers to integrate digital tools and pedagogies, ensure equitable access to technology, and promote digital literacy among students and staff. They also engage with the wider community and stakeholders to foster partnerships and enhance the overall educational experience [25].

In Ireland, school leadership is characterised by a focus on educational goals and strategic planning. School principals provide visionary leadership, set clear expectations, and foster a culture of high standards and continuous improvement. They work closely with teachers and staff to implement effective teaching practises, including the integration of technology. School leaders in Ireland also highlight the importance of student well-being and engagement, ensuring a holistic approach to education [26].

The recent literature [27] highlights the role of school leadership in driving digital transformation in schools in Spain, Greece, and Ireland, revealing both commonalities and distinctions among these countries. In Spain, studies underscore the significance of visionary and proactive school leaders who recognise the potential of technology in enhancing teaching and learning. They promote a culture of innovation, provide support for teachers, and allocate resources for digital infrastructure and professional development. Similarly, in Greece, school leaders are acknowledged as key agents in facilitating the integration of digital tools and pedagogies. They engage in strategic planning, collaborate with stakeholders, and foster a positive digital climate. In Ireland, the literature highlights the importance of leadership in aligning digital strategies with educational goals and ensuring equitable access for all students. School leaders are encouraged to embrace change, engage in ongoing learning, and empower teachers to leverage technology effectively. Despite these commonalities, variations exist due to contextual factors and educational systems.

2.6. Overview of Socio-Economic Factors in Partner Countries

The digital divide in Spain, Greece, and Ireland demonstrates both similarities and differences in terms of access to digital technologies and its socio-economic impact. In all three countries, there are disparities in digital access between urban and rural areas, as well as between different socio-economic groups. However, the extent of the divide varies. Spain has made significant progress in recent years, with widespread internet availability and a higher rate of digital literacy compared to Greece and Ireland. Greece faces more significant challenges, particularly in rural regions, where internet infrastructure and accessibility are limited. Ireland, on the other hand, has generally better digital infrastructure, but still experiences disparities in access and usage among certain populations. The socio-economic impact of the digital divide is evident in all three countries, with disadvantaged individuals

and communities facing barriers in education, employment, and participation in the digital economy. Efforts to bridge the divide include government initiatives, community projects, and investment in digital infrastructure, but continued focus and resources are needed to ensure equal digital opportunities for all citizens in Spain, Greece, and Ireland [28].

3. Theoretical Framework

Expansive learning, as articulated by Engeström [29], forms a foundational pillar of the COPILOT project, which was launched to empower educators—teachers and school leaders alike—in navigating the complexities of digital transformation post-COVID-19. This theoretical framework underscores the collaborative nature of learning, advocating for the integration of diverse stakeholders such as schools, government bodies, and industry partners. By bringing together these varied perspectives, the project aimed to foster new insights and understanding about digital innovation in education. The collaborative approach adopted by COPILOT serves as a pioneering model for similar interventions, demonstrating how collective efforts can drive systemic change across schools of different types and contexts. These efforts are aligned with the objectives of the Erasmus+ programme, focusing on enhancing digital skills and competences among educators, fostering cooperation between educational institutions and businesses to create dynamic professional environments, and building the capacity of partners for effective EU/international collaboration. By embracing expansive learning principles, COPILOT empowered educators to adapt and innovate in the digital age, ultimately enhancing educational outcomes and preparing students for future challenges and opportunities.

A recent study by Carretero et al. [30] indicates that the period of remote learning necessitated by the COVID-19 pandemic has transformed the attitudes, experiences, and perceived requirements of school leaders, teachers, and students regarding the utilisation of technology in educational practises. Leveraging this newfound appetite for technology-enhanced learning in education, the COPILOT project adopted the use of the EU SELFIE tools. Kampylis and Sala [31] conducted a study on the use of the EU SELFIE tools and found that they are effective in promoting collaborative efforts among school leaders, teachers, and students to integrate digital technologies proficiently into educational settings. These findings contribute to the growing body of literature that supports the tools' utility in guiding educational policies and practises aimed at fostering digital innovation and improving learning outcomes for students.

The notion of adaptive expertise, as described by Timperley et al. [32], also played a pivotal role in the COPILOT project's efforts to support educators and school leaders amid the digital transformation that requires the agile integration of emerging technologies into teaching practises. The EU SELFIE tools that were central to the project facilitated self-assessment and reflection, enabling educators to identify strengths and areas for improvement in their digital pedagogies. This approach empowered participants to move beyond traditional methodologies, fostering a deep understanding of the intricate dynamics within digital learning environments. By cultivating adaptive expertise using SELFIE, the project equipped teachers and school leaders to navigate and effectively respond to the complexities of integrating digital tools in education. This encompassed not only mastering technical skills but also developing a nuanced awareness of how digital technologies could enhance learning experiences and outcomes for students across diverse educational settings. COPILOT underscored the importance of continuous professional development, empowering educators to innovate and tailor their approaches to meet evolving educational needs and technological advancements conducive to 21st century learning.

The COPILOT initiative engendered a learning ecosystem where educators and school leaders served as role models [33] in digital technology use. By empowering them to embrace and demonstrate innovative pedagogical practises, the project encourages educators to take calculated risks that respond effectively to the evolving needs of teaching, learning, and assessment in the post-COVID-19 digital age. This proactive stance not only enhanced digital competence among educators but also promoted a culture of continuous improve-

ment and adaptation in educational practises. By fostering these role model behaviours, COPILOT aims to create an environment where digital technologies are seamlessly integrated into educational processes, thereby enhancing learning outcomes and preparing students for future challenges in a digitally driven world.

The purpose of COPILOT was also to develop a robust repository of resources and insights that inform and shape educational practises and policies across various school types and contexts. Inspired by Papert's social constructionist approach [34], the COPILOT initiative harnessed the collective expertise and perspectives of educators, school leaders, and teacher educators. This approach not only promoted the co-creation of knowledge but also underscored the significance of social constructivism in fostering individual learning through active participation in collaborative endeavours. By facilitating these collaborative processes, COPILOT aligned with Farrell's [35] perspective on shared responsibility in education, emphasising the role of each participant in contributing specialised knowledge and expertise across the educational landscape.

4. Methodology

4.1. Research Design

The research approach in the COPILOT Erasmus+ project comprised a small-scale qualitative study conducted throughout the project's duration in 2022/23. The primary sources of data consisted of partner meetings and transnational exchanges' reports and feedback on project training activities along with an end-of-project focus group. The focus group questions aimed to further elucidate themes emerging from the analysis project reports and feedback, including the following:

- How ready are you for the digital transformation in your own context?
- How are you building capacity for yourself for the digital transformation in your own context and what are the barriers and enablers for you in this regard?
- What were your key learning moments throughout the project?
- What were the barriers and opportunities in the project?
- From your use of the SELFIE tool, what teacher digital competencies do you think are the most important?
- What were the aspects of practise/organisation that you found most useful from other jurisdictions?
- What are the aspects of practise/organisation that you found most useful from your own jurisdiction?
- What are the barriers and obstacles for the digital transformation in your own context.

The study participants were recruited from the COPILOT project consortium which comprised two teacher educators from the CPD provider Akadimos in Greece, three teachers from IES Cristobal de Monroy in Spain, and five teachers/senior management representatives from the participating Laois Offaly Education Training Board (LOETB) schools. Ethical approval for the research was obtained from the UCD ethics board (HS-LR-23-47-Farrell). All consortium members provided their informed consent to participate in the research as part of the Erasmus+ project. Additionally, written consent was obtained from each individual participant prior to the initiation of any research activities.

4.2. Data Analysis

The collected data underwent a rigorous abductive coding analysis, which integrated both deductive and inductive approaches to identify key themes and patterns [36]. The deductive analysis was guided by the project's objectives: (1) identifying participatory approaches and digital methodologies used by schools to facilitate digital transformation among educators, (2) exploring and establishing dynamic professional environments by creating synergies with organisations from diverse fields or socio-economic contexts, and (3) enhancing the capacity and professionalism of partners to engage in EU/international collaboration.

Inductively, sub-themes emerged organically within these objectives, providing further depth to the findings. Thematic analysis followed Braun and Clarke's six-phase strategy:

becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining themes, and, finally, writing up [37]. This process was conducted independently by two co-authors, who then compared and aligned themes for consistency.

The next section explores the key themes that emerged, linking them to the project's objectives and the abductive reasoning framework, which emphasises blending inductive and deductive approaches for deeper theoretical insights [36].

5. Findings and Discussion

The key findings from the COPILOT project are structured around its three main objectives, providing a clear and organised overview of the themes that emerged from the data analysis. Each theme is directly aligned with one of the project's objectives, offering an integrated understanding of how the project facilitated digital transformation through collaborative partnerships and reflective practises.

5.1. Project Objective 1: To Identify Participatory Approaches and Digital Methodologies Used by Schools to Support Teachers and School Leaders with Digital Transformation

5.1.1. Adoption of the SELFIE Tool

As a result of an inter-institutional study on the digital capacity of Spanish schools using SELFIE, Spain has implemented the SELFIE tool to assess the digital capacity of schools and promote the digital transformation of the education system. Therefore, the partners from IES Cristobal de Monroy acted as mentors in this area and inspired the other partners in the project to embrace the use of the SELFIE tool for assessing digital competencies. In the case of LOETB, teachers were supported with targeted professional development on the SELFIE tool and a whole school approach was adapted to ensure that school leaders were also involved in the process. This was made possible by the ongoing support of the school support co-ordinator and ultimately the support of the LOETB Director of Schools in tandem with school leaders in each of the nine participating schools. However, participants in Akadimos pointed out that the adoption of the SELFIE tool in Greece would be more problematic as there are a lack of professional development supports for this currently and the gap would be filled by private providers such as themselves. A gap in the availability of a student teacher version of the SELFIE tool was identified by the partners. In Ireland, the project lead trialled a pilot project on the development of a SELFIE tool for student teachers and this is something that all partners would like to explore further in any further collaborative initiatives arising from this project.

5.1.2. Digitalisation and Sharing of Educational Materials

There was a consensus among partners that digital transformation is essential in a post-pandemic educational environment. The LOETB schools shared ideas on how they used a range of digital tools such as Padlet, Quizlet, and Canva to create and share content via their virtual learning environments. Inspired by the Irish schools in the project, other partners were encouraged to explore the digitalisation of educational materials to enhance accessibility, interactivity, and engagement in teaching and learning processes. One participant stated the following:

"We were influenced by the way Irish schools operate, and we intend to integrate many of the digital services and tools we witnessed into our internal operation and promote them to Greek school institutions. However, this process is a challenge since Greek educational institutions do not currently have the necessary infrastructure to effectively support the scale of digitisation we are envisioning".

The study also found that in Spain, teachers are free to use platforms of their choice and Microsoft 365 and Google Workspace were both popular choices. In LOETB, schools used Microsoft 365 as the whole school virtual learning environment and some teachers used Google Workspace as a personal preference for some of their work with students. The Greek system was found to be far more standardised as teachers are only permitted to use the State online platform that is mandated by their Ministry of Education. While, on the

one hand, participants agreed that "there are considerable benefits to standardised learning management systems", some participants also pointed out that "navigating different operating systems is beneficial for students". One participant commented that the Greek system curtailed the influence of multi-national corporations such as Google and Microsoft on education. However, the Greek partners suggested that teachers in Greece would like more freedom to choose platforms of their choice to digitise their resources and collaborate with other colleagues and students. Further information on the ongoing sharing of resources between the project partners may be found on the project website [38].

5.1.3. Incorporation of Innovative Educational Methods

While one participant suggested that "teacher motivation is more important than resources", the project explored the integration of effective teaching methods incorporating digital technologies into educational plans. While these methods may provide upskilling opportunities for educators and have the potential to improve student learning experiences, one participant highlighted that "some teachers/school leaders found it initially challenging to embed some of their learnings from the project in their own schools because of a lack of allocated digital planning time", echoing concerns of teachers in the partnership generally. Notwithstanding this challenge, meaningful progress in the S.T.E.M. area was found to be a priority across jurisdictions, as evidenced by the use of coding and robotic resources during exchange visits. Irish and Spanish partners were inspired by the Greek partner's involvement with the European School Radio [39,40], which involves teachers and students collaborating to create podcasts. Furthermore, the partners were ahead of the curve in their discussions about the use of Artificial Intelligence (AI) in education, with many useful AI tools and pedagogical approaches for their use discussed at length throughout the latter stages of the project. Further details on innovative methods used by partners in the project are available on the project website [38].

5.2. Project Objective 2: To Identify Synergies with Organisations Active in Different Fields or in Other Socio-Economic Contexts

5.2.1. Cross-Pollination of Ideas and Practices

Engeström's [29] theory of expansive learning emphasises the collaborative nature of learning across diverse stakeholders, a principle reflected in the COPILOT project. Participants highlighted the value of cross-sector collaboration, with schools benefiting from partnerships that introduced new perspectives and practises. For example, IES Cristóbal de Monroy noted that sharing methodologies with other schools significantly enhanced their digital transformation efforts, emphasising that improvement was "more effective when results and ideas are shared". This reciprocal exchange of knowledge between institutions not only deepened participants' reflections on their own digital practises but also expanded their approach to evaluation and innovation.

The partnerships forged through COPILOT connected schools with government, industry, and non-educational sectors, giving them access to innovative approaches and fostering insights that advanced their digital strategies [41]. In particular, the collaboration with UCD and the use of the SELFIE tool helped schools assess their digital readiness more comprehensively, an under-utilised practise in many regions prior to the project. By creating synergies across institutional boundaries, these collaborations aligned with Erasmus+ objectives, keeping schools at the forefront of educational innovation and enhancing digital competences across the board.

5.2.2. Access to Specialised Expertise and Adaptive Expertise

The COPILOT project also facilitated access to specialised expertise, enabling schools to overcome limitations in internal resources. Timperley et al.'s [32] concept of adaptive expertise [32] was central to this process, allowing educators to navigate the complex integration of digital technologies into their teaching. For instance, LOETB participants highlighted the importance of interpreting SELFIE results to devise actionable plans for

digital improvement. This reflective practise enabled educators to adapt their methods in response to evolving digital demands, further enhancing their competencies.

In addition to reflective tools, schools were exposed to innovative practises from other educational systems. Akadimos, for example, expressed interest in adopting the gamification techniques observed through the First Lego League and Zero Days initiatives in Irish schools, which had successfully enhanced student engagement. This cross-border exchange of expertise supported educators in refining their strategies and illustrated the importance of collaboration in building adaptive expertise. Participants acknowledged that these shared efforts equipped schools to meet the challenges of digital transformation, particularly in the post-pandemic landscape.

5.2.3. Resource Enhancement and Continuous Professional Development

External collaborations in COPILOT were pivotal in providing schools with vital resources, including technology, infrastructure, and professional development opportunities. The expansive learning framework enabled educators to continuously develop their skills, stay current with technological advancements, and cultivate adaptive expertise. For instance, the School of Education in UCD shared insights on their many outreach initiatives involving government and industry partners [42]. The project that was of particular interest to Greek and Spanish partners and a potential future collaboration was Cyberwise [43]. Funded by the Department of the Environment, Climate, and Communications (DECC), this initiative involved a team of teacher educators and researchers from the School of Education and the School of Computer Science at UCD. They collaborated with a steering group comprising members from the National Centre for Cyber Security (NCSC), the Computers in Education Society of Ireland (CESI), and Cyber Ireland to design and implement a Junior Cycle short course on cybersecurity that supported both students and teachers in advancing their digital literacy skills [44].

The adoption of platforms such as My-school and E-class by Greek schools further demonstrated how external resources could drive professional growth. These tools facilitated better school coordination and continuous teacher development, particularly during the pandemic. The UCD partnership, alongside other collaborations, exemplified how long-term relationships with industry and government bodies could sustain educational innovation across diverse socio-economic contexts. By co-creating resources and sharing knowledge that aligned with a constructionist [34] approach, the COPILOT project enabled schools to align their digital initiatives with global standards, preparing educators and students for the future of education.

The COPILOT project integrated expansive learning principles, adaptive expertise, and ongoing professional development to create a sustainable framework for digital transformation in education. Through these collaborations, schools were empowered to achieve systemic change, equipped with the resources and expertise needed to thrive in a digitally driven world.

5.3. Project Objective 3: To Increase the Capacity and Professionalism of Partners to Work at the EU/International Level

5.3.1. Measurement and Visualisation of Progress

The findings of this project underscore the significant value of the SELFIE tool in facilitating digital transformation in schools. Across the three countries involved in the project, the SELFIE tool emerged as an invaluable resource for assessing and improving digital practises, expanding the scope of digital evaluation measures employed in educational settings. A key finding from the project was the effectiveness of the SELFIE tool in providing feedback on digital practises, thus enabling schools to identify areas for improvement. By offering a comprehensive overview of strengths and weaknesses, the tool empowered school leaders to develop a more nuanced understanding of their digital practises, serving as a catalyst for growth and development. Furthermore, the project emphasised the importance of knowledge sharing and collaboration among schools. The SELFIE tool facilitated

this process by allowing schools to compare their results and exchange ideas with peers, fostering a culture of learning and enabling the exploration of different organisational and methodological approaches to digital transformation across diverse educational systems.

The project also identified the benefits of employing measurement and visualisation techniques to monitor educators' progress in developing digital skills. The use of yearly advancement tables and graphs provided school leaders with a visual representation of the growth and development of digital competences among educators. This approach not only promoted a sense of continuous improvement but also encouraged reflective practises, as educators and school leaders could clearly visualise their advancements and identify areas that required further attention. The SELFIE tool aligns seamlessly with these findings, as it provides a structured framework for self-reflection and evaluation, allowing school leaders to measure and visualise the progress made in digital transformation efforts. By leveraging the SELFIE tool, schools can effectively track their digital evolution and identify strategies for further enhancement.

5.3.2. Collaborative Digital Action Planning

The COPILOT project explored the benefits of fostering a collaborative approach among schools to leverage the tool and create comprehensive digital action plans. This collaborative model aimed not only to pursue recognition but also to advance the process of digital transformation in each participating school. The project findings highlight the significant advantages of the collaborative approach facilitated by the SELFIE tool. By working together, schools that successfully used the tool were able to pool their expertise, resources, and experiences, resulting in a more holistic and effective approach to digital action planning. Collaboration fostered knowledge sharing, facilitated the cross-pollination of ideas, and encouraged the exploration of innovative strategies, ultimately propelling the digital transformation process forward. Moreover, the collaborative approach supported the development of comprehensive digital action plans. By involving multiple schools, the planning process became inclusive, incorporating a broader range of perspectives and insights. This inclusivity ensured that the digital action plans addressed the unique needs, challenges, and aspirations of each participating school, enabling a tailored and context-specific approach to digital transformation.

5.3.3. Core Teacher Competencies for Digital Transformation

Participants shared a collective agreement on the essential core competencies required for post-primary/high school teachers to effectively utilise digital technology. The suggestions put forth by the participants emphasised the following key areas:

- Technological proficiency: Teachers should possess a strong understanding of digital tools, devices, and platforms commonly used in educational settings. They should be familiar with various operating systems, software applications, and online resources relevant to their subject area.
- Digital literacy: Teachers should have the skills to critically evaluate, interpret, and create digital content. This encompasses information literacy, media literacy, and digital communication skills, enabling teachers to navigate and utilise digital resources effectively.
- Pedagogical knowledge: Teachers need to possess a deep understanding of how to integrate digital technology into their teaching practise. This includes knowledge of instructional strategies, assessment methods, and curriculum alignment to leverage technology for enhanced student learning.
- Adaptability and continuous learning: Given the rapid pace of technological advancements, teachers should demonstrate adaptability and openness to learning new tools and approaches. They should actively seek professional development opportunities and stay updated on emerging digital trends.
- Digital citizenship and online safety: Teachers should promote responsible and ethical use of digital technology among students. This involves teaching digital citizenship

skills, addressing online safety concerns, and discussing issues such as cyberbullying, privacy, and copyright.
- Collaboration and communication: Teachers should possess the ability to collaborate with colleagues, students, and parents using digital platforms. This includes utilising communication tools, online learning management systems, and virtual collaboration spaces to foster engagement and facilitate effective communication.
- Problem-solving and critical thinking: Teachers should encourage students to think critically and solve problems using digital technology. This involves fostering digital creativity, promoting problem-solving skills, and encouraging students to leverage technology for research, analysis, and problem-solving activities.

There was a general consensus among the participants that developing these core competencies will enable teachers to effectively harness the potential of digital technology, thereby enhancing teaching and learning experiences for their students.

6. Conclusions

The COVID-19 pandemic has precipitated significant transformations in the educational landscape, underscoring the critical roles of teachers and school leaders in equipping students with essential digital competencies. In response to these challenges, the COPILOT project was initiated to support educators in navigating the evolving educational environment post-pandemic. The project aimed to identify collaborative practises that enhance digital competences and explore synergies with technology-focused organisations to address digital transformation within the education sector.

A key aspect of the project was the promotion and utilisation of the SELFIE tool, developed by the European Commission, to facilitate the integration of digital technologies into teaching, learning, and assessment processes. The SELFIE tool provided comprehensive insights by collecting perspectives from students, teachers, and school leaders on technology usage within their schools, thereby identifying strengths and weaknesses in leveraging technology to support digitalisation efforts.

The findings from the COPILOT project contribute significantly to the discourse on educational transformation in the post-COVID-19 era. Several key recommendations emerged from the thematic analysis of the project findings:

1. Encourage the adoption of the SELFIE Tool: Implementing the SELFIE tool enables schools to assess their digital capacity and promote digital transformation. Supporting teachers and school leaders in effectively using the tool and exploring the development of a student teacher version can enhance its applicability.
2. Promote the digitalisation and sharing of educational materials: Embrace the digitalisation of educational materials to improve accessibility, interactivity, and engagement. Encourage the use of diverse digital tools and platforms, fostering innovation and collaboration among teachers and students.
3. Incorporate innovative educational methods: Support teachers in integrating effective teaching methods that incorporate digital technologies. Allocate dedicated planning time for embedding project learnings, prioritise progress in S.T.E.M. education, and explore AI tools and pedagogical approaches for enhanced learning experiences.
4. Measure and visualise progress: Utilise the SELFIE tool and measurement techniques like advancement tables and graphs to monitor educators' progress. Promote a culture of continuous improvement and encourage reflective practises.
5. Foster collaborative digital action planning: Adopt a collaborative approach to leverage the SELFIE tool and create comprehensive digital action plans. Facilitate knowledge sharing, the cross-pollination of ideas, and innovative strategies among schools. Promote collective ownership, accountability, and continuous evaluation.
6. Foster synergies with external organisations: Establish partnerships and collaborations with external organisations to enhance digital transformation efforts. Leverage their expertise, resources, and innovative practises to accelerate progress. Embrace diverse perspectives and cutting-edge technologies through collaborative efforts.

7. Develop core competencies for digital transformation: Recognise the essential competencies required for teachers to effectively utilise digital technology. Provide professional development opportunities to enhance technological proficiency, digital literacy, pedagogical knowledge, adaptability, digital citizenship, collaboration, communication, and problem-solving skills.

Limitations: While the project offered valuable insights, it is important to recognise its constraints. These include the small-scale nature of the qualitative study and the specific context of the participating organisations, which may limit the generalisability of the findings. However, following Bassey's notion of "fuzzy generalisability" [45], the findings could potentially extend to individuals and contexts beyond those directly examined. Consequently, the study's conclusions and assertions may catalyse broader discussions and considerations regarding the implementation of digital transformation in education. Furthermore, relying on self-reported data through the SELFIE tools introduces a potential for bias in the data.

Future Research: Future research could expand the scope of the study to include a larger and more diverse sample of schools and educators across different regions. In addition, further research is needed to explore the specific challenges and successes of school leadership in each country and to inform evidence-based practises that can drive the digital transformation of schools in Spain, Greece, and Ireland.

Participation in the COPILOT project offers significant long-term potential for the development of the involved organisations. The knowledge gained through exchanges of practise empowers partners to enhance support for teachers and school leaders in addressing digital transformation. The project's promotion of the SELFIE tool fosters a sustainable culture of improvement within associated schools. Furthermore, engagement in the project strengthens partners' capacity to participate in future transnational projects and deepen European relationships, creating a foundation for broader impact at the European level.

Overall, the COPILOT project provides valuable insights and recommendations for digital transformation in education. By implementing these recommendations, schools effectively navigate the digital landscape, foster collaboration, and prepare students for the demands of a digital future. The project's impact extends beyond the immediate participants, contributing to the ongoing development of European education and strengthening partnerships at the international level.

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