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Τμήμα Λογιστικής &  
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## **eTwinning: BUILDING A STRONG COMMUNITY OF INNOVATIVE TEACHERS**

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### **ABSTRACT**

eTwinning has been designated a flagship action by the European Commission with the objective of fostering educational innovation, promoting collaborative learning, developing digital skills and encouraging intercultural understanding. Since 2005, Greece has cultivated a dynamic community of teachers, schools and pedagogical students who have implemented thousands of collaborative projects, many of which have received high distinctions. The eTwinning National Support Organization cultivates competences related to ICT, AI and modern teaching methodologies through a variety of means, including its Open Online Courses, STEM activities, the Initial Teacher Education initiative and other actions. The network of ambassadors and institutional partners facilitate the dissemination of good practices and participation in international competitions, while publications and digital repositories support the dissemination of knowledge. The Greek experience corroborates the function of eTwinning as a catalyst for the transformation of educational culture and the establishment of robust learning communities at both the national and European levels.

**Keywords:** eTwinning, Teacher training, Professional development, MOOCs, STEM education, AI in education

## INTRODUCTION

The rapid development of Information and Communication Technologies (ICT) and the need to cultivate 21st-century skills have made educational innovation a key policy priority at both the national and international levels. eTwinning is a flagship initiative of the European Commission, launched in 2005 and integrated into the Erasmus+ programme. It has now developed into a wide-ranging transnational network for the creation of collaborative projects, the exchange of good practice, and the professional development of teachers. The utilization of digital tools has been instrumental in fostering open learning methodologies and facilitating cross-border collaboration between educators and students. This has led to its emergence as one of the most prominent networks on the global stage, undoubtedly marking a historic milestone in the evolution of education.

In Greece, the profound impact of eTwinning is exemplified by the over 40,000 active teachers from 14,000 school units, with a plethora of collaborative projects, many of which have been recognized with prestigious accolades. The action in Greece is supported by the National eTwinning Support Organization (NSO), which operates under the responsibility of CTI "Diophantus" in close cooperation with the Ministry of Education. The NSO provides training, professional development of teachers, networking, technical and pedagogical support, and promotes the integration of the programme into national education policies.

A well-organized series of actions, including open online courses, MOOCs, Initial Teacher Education, the ambassador network, quality labels, national and European competitions, actions for the integration of STEM and AI in collaborative projects, synergies with national education policy bodies and others, constitute a multidimensional framework. Within this framework, educational innovation and modern digital skills are fostered, collaborative culture is developed, professional development is enhanced, and European identity and intercultural understanding is promoted. The role of the Greek NSO is pivotal for the sustainable dissemination of results, contributing to a strategic mechanism for educational upgrading and fostering innovation in the national education system.

The following sections will present the actions of the Greek NSO of eTwinning, which contribute to the growth and development of the Greek eTwinners community of teachers. Firstly, the following discussion will present the main research findings on the impact of eTwinning on digital competence and teaching practices. This is followed by the section "Training Actions" with quantitative and qualitative data on participation and evaluation; then the "Networking and Professional Development Actions" are examined, followed by the presentation of the "Recognition and Reward" mechanisms. The section entitled "Partnerships with Education Policy Bodies" documents the link with universities, national bodies and other actions, while the section "Specific Actions" focuses on targeted programmes (STEM, AI). The paper concludes with an Executive Summary, which synthesizes the key findings and draws conclusions and policy recommendations, and a Bibliography to support the references.

## LITERATURE REVIEW

The eTwinning programme is a European educational initiative that facilitates collaboration between teachers and students from different countries through the use of Information and Communication Technologies (ICT). It is widely regarded as one of the most influential educational initiatives in Europe. A substantial body of research has demonstrated that there has been a considerable enhancement in teachers' digital competence, which has also been observed to be transferred to their students. Seklou (2023) has highlighted an increase in teachers' confidence in the utilization of digital tools, while Arabatzis (2020) has noted the adoption of novel teaching methods and the enhancement of technological skills in secondary schools. In a similar vein, Boukla (2018) and Voutyra (2008) have drawn parallels between the utilization of digital media in primary education and the provision of personalized lessons. Concurrently, eTwinning has been shown to enhance collaborative and communication skills (Kyriakidou, 2021). Furthermore, Kollitidou (2018) has emphasized its contribution to a culture of teamwork, and its role in improving communication and team coordination through e-learning has also been highlighted (Kollitidou, 2018). Gouvetzou (2018) emphasizes the pedagogical value of teleconferencing, while Ioannidou (2020) and Mastori (2017) document the importance of training activities in professional development and networking. Alexiou (2019) examines collaborative platforms for teaching mathematics, finding improvements in understanding and interdisciplinary thinking, while Tzilou (2018) highlights the contribution of digital art to creativity and autonomy. In the domain of preschool education, Spitsa (2017) posits that digital games have the potential to enhance group learning and social development. Finally, Drakontaidis (2015) highlights the contribution of eTwinning to intercultural exchange, tolerance, and European awareness. A comprehensive review of the extant literature confirms that eTwinning is a multidimensional tool for educational innovation, offering measurable benefits in terms of skills, collaboration, teaching practices, and intercultural awareness.

## TRAINING ACTIONS

The Greek NSO of eTwinning provides a comprehensive framework of training, collaboration and support services for the educational community, promoting the integration of modern ICT in eTwinning projects and in educational practice, through activities such as Open Online Courses, MOOCs, and eTwinning Ambassadors' training workshops. Let's look at them in detail.

### Open Online Courses & MOOCs

Since 2017, the Greek NSO of eTwinning has been offering the Open Online Courses service<sup>2</sup>. These educational cycles are organized on an annual basis, with each cycle comprising 160-200 teaching hours. The thematic focus of these cycles encompasses the pedagogical utilization of ICT, Web 2.0 tools, Educational Robotics, STEM and Artificial Intelligence, with a view to facilitating collaborative activities and their integration within the context of classroom teaching. Since 2021 to date, the programme has trained over 70,000 teachers and students, and for the 2025-26 academic year, enrolment has reached 25,500. In the autumn of 2024, two new pilot courses were introduced: one focused on the use of interactive whiteboards, and the other on robotics kits. These additions brought the total number of courses offered related to educational robotics and STEM to eight. Approximately 1,500 trainers provide support to trainees, who are granted full access to the training material. Trainees are also tasked with developing assignments and practical exercises, and are subject to assessment before being awarded a certificate of successful completion. A central team of the NSO is responsible for the maintenance of the technical infrastructure, the creation of training material, and the supervision and coordination of the training process. To elaborate further, during the academic years 2021-22 to 2024-25, the courses delineated in the table were made available, with a total of 72,540 teacher registrations recorded.

**Table 1**  
**Enrolment of teachers in open online courses**

Online course \ School year	2021-22	2022-23	2023-24	2024-25
E-learning platforms - Tools for the production of educational material - Communication tools	2.192	1.807	2.188	2.716
Multimedia editing tools - Tools for the production of educational material	2.293	2.767	2.940	2.505
Website creation tools - Collaborative and support tools	1.470	2.119	2.392	2.269
Online learning communities and use of learning objects	779	987	1.249	1.506
Creative and safe Internet - Evaluation and development of critical thinking about digital content	876	919	1.009	1.240
Arduino Basic: Introduction to educational robotics using Arduino	614	813	632	416
Arduino Intermediate. Instructional Robotics using Arduino	-	291	253	111
Educational robotics with Edison	174	174	105	72
Educational robotics with Micro:bit	-	376	340	358
Educational robotics with Thymio	224	216	153	-
Educational robotics in kindergarten - Beebot	877	1.200	1.044	752
Scratch programming and educational robotics	1.412	1.383	1.211	595
Mobile devices 1 (Tablets and mobile phones) - Basic use	912	1.434	1.078	541
Mobile devices 2 (Tablets and mobile phones) - Use in teaching courses	1.491	2.071	2.461	1.214
Pedagogical use of AI in eTwinning projects and in course teaching	-	-	2.685	4.459
Use of interactive systems in teaching	-	-	-	3.245
Educational robotics with the new S1 robotics kit	-	-	-	715
TOTAL	13.529	16.557	19.740	22.714

<sup>2</sup> <https://seminars.etwinning.gr>

Two of the aforementioned courses are also offered in English for teachers from European Schools (Brussels) and for teachers from Tunisia, Lebanon, Jordan, Georgia and Armenia, which the Greek NSO has undertaken to support. In relation to the qualitative strand, the evaluation of the courses using the official methodology, Selfie4Teachers, of the European Commission demonstrated a 17% increase in digital skills among the trainees (54% post-course in comparison to 37% pre-course) and a 15% increase among the trainers (75% in comparison to 60% pre-course). This finding serves to confirm the effectiveness of the combined theoretical and experiential training methodology. As the new school year, 2025-26, approaches, it is reported that a total of 18 courses will be offered, with enrolment having reached 25,496 and 1,528 trainers scheduled to support the learning process. These figures represent the highest recorded since the inception of the initiative in 2017.

### Massive Open Online Courses - MOOCs

From 2022, the Greek NSO of eTwinning will offer training services in the form of Massive Open Online Courses (MOOCs<sup>3</sup>) on:

- The eTwinning community, the educational material provided by eTwinning, European School Education Platform (ESEP) and EU Academy for their professional development, networking and for the implementation of collaborative eTwinning projects.
- The use of the Community, actions and educational material provided by eTwinning for the implementation of Skills Workshops as collaborative projects.
- The introduction to the Community, the actions and the educational material provided by eTwinning and the European School Education Platform (ESEP) to students of Greek Universities, for their professional development and for the implementation of collaborative eTwinning projects.

More specifically, since 2022 to date, the MOOCs listed in Table 2 have been offered.

**Table 2**  
**Massive Open Online Courses (MOOCs)**

MOOC title	Offered	Participated
eTwinning & Skills Workshops: collaborative activities for the cultivation of knowledge, skills and competences	2022 and 2023	7,728 teachers
Introduction to eTwinning, the European action for education	2023, 2025	6,411 teachers
Designing a Quality, Collaborative eTwinning project	2024	1,908 teachers
European eTwinning in Higher Education	2024	195 students and university teachers
European eTwinning in Higher Education (self-paced)	2024, 2025	
Use of AI in Education and eTwinning projects	2025	• > 5,000 registrations

### Ambassador Training Workshops

The volunteer body of eTwinning Ambassadors performs a pivotal function, providing guidance to educators in their respective domains to facilitate the implementation of eTwinning projects. In addition to other activities, they facilitate training workshops, either as webinars or face-to-face training, on a range of topics, including "Awareness-raising for people not registered for eTwinning", "Presentation of the eTwinning platform", "Twinspace", "Enhancing the quality of eTwinning projects", "eTwinning Schools", "Digital Tools and eTwinning", "eTwinning and Skills Workshops" and "eTwinning and Initial Teacher Education". During the academic years 2022-23, 2023-24 and 2024-25, a total of 450 online workshops were delivered by ambassadors, reaching an estimated 30,000 teachers.

## NETWORKING & PROFESSIONAL DEVELOPMENT ACTIONS

The Contact Seminars / Multilateral Seminars (CS/MS) and the Professional Development Workshops (PDW) represent two pan-European eTwinning actions which have been designed with the objective of promoting the professional development of teachers and expanding cooperation between schools in Europe. It is evident that both forms of action have a substantial impact on the eTwinning community. CS/MS contribute to the expansion of the European

<sup>3</sup> <https://mooc.etwinning.gr/>

network of teachers, the establishment of communication channels and the promotion of intercultural understanding. The integration of PDWs into scientific and pedagogical training has been demonstrated to enhance both these fields. Furthermore, the integration of ICT in teaching has been shown to foster a culture of innovation. The outcomes of these initiatives are twofold: firstly, the development of collaborative projects with a demonstrable impact on students; secondly, the active involvement of students in international learning experiences. These experiences are critical for professional development and networking, and serve to strengthen the eTwinning community as a European community of learning and innovation.

### **Contact Seminars / Multilateral Seminars**

Contact Seminars / Multilateral Seminars (CS/MS)<sup>4</sup> are characterised by their strong cross-border nature, with the objective of establishing new partnerships between teachers from diverse international backgrounds. These events offer a distinctive networking opportunity, as they facilitate the convergence of teachers who share common interests and are seeking collaborators to execute European-based projects. The thematic focus of these initiatives aligns with European educational priorities, encompassing digital innovation, environmental education, social inclusion, STEM education, and even AI. In the course of the workshops, participants are required to present their ideas, work in small groups, design collaborative projects and lay the foundations for joint actions through eTwinning. The Greek eTwinning Network has been responsible for the organisation of specialised Communication Seminars, with a recent focus on STEM and Artificial Intelligence (AI). A paradigmatic example is the seminar entitled "Applications, Tools and Perspectives of AI in Education", which was held from 10-12 May 2024 at the CTI "Diophantus" in Patras. The seminar was designed for secondary school teachers with either basic or intermediate experience of eTwinning, with the aim of enhancing their skills in integrating AI in European collaborative projects. A recent example of this is the seminar entitled "Ancient Greece's STEM resources for eTwinning", which was held from 2-5 April 2025 in Pylos, Messinia. The aim of the seminar was to assist teachers in the organisation of European eTwinning projects with STEM themes, by examining the development of the skills that are considered to be fundamental to mathematics, technology, science and engineering in modern society, as they were in Ancient Greece. In both seminars, the programme comprised theoretical presentations, practical workshops, networking activities and the establishment of new collaborative eTwinning projects.

### **Professional Development Workshops**

The nature of PDW<sup>5</sup> events is such that they are intensive training exercises. It is asserted that the programme proffers eTwinners the opportunity to achieve a more profound comprehension of contemporary pedagogical issues and to acquire knowledge of innovative teaching methodologies that they can apply in the classroom. The subjects addressed are diverse, encompassing themes such as project-based learning, the cultivation of fundamental skills (language, mathematics, digital literacy), cultural heritage, ecology, and the utilisation of digital tools, among others. Teacher participation is by selection, based on a set of criteria. These include active presence in the eTwinning community, foreign language proficiency and the ability to use ICT in teaching. Participants will acquire practical experience, exchange good practice and develop skills that will enhance their effectiveness and innovation in their work through presentations, hands-on workshops and group activities.

## **RECOGNITION & REWARD ACTIONS**

eTwinning has established and is implementing a comprehensive recognition and reward framework with the aim of promoting educational innovation and the professional development of teachers. This framework encompasses national award competitions, wherein educational institutions that have demonstrated excellence in various competitions are recognized with technological equipment, thereby further enhancing their pedagogical practices. At the European level, the European eTwinning Awards represent the highest form of recognition for projects that embody educational value and innovation. It is evident that participation by Greek teachers has consistently yielded notable achievements in all European competitions. The annual national eTwinning conferences have been demonstrated to strengthen the Community by acting as a forum for knowledge dissemination, networking and training. It has been demonstrated that quality control procedures (i.e. the national and European quality labels) and international teacher missions, function in a complementary manner, thereby ensuring that recognition is translated into synergies, professional development and the implementation of educational innovations in the classroom.

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<sup>4</sup> <https://etwinning.gr/professionaldevelopment/cs>

<sup>5</sup> <https://etwinning.gr/professionaldevelopment/pdw>

### **National Competitions & Awards**

It is evident that the annual national competitions within the context of Greek eTwinning play a pivotal role in the recognition and rewarding of participants. The Greek NSO is responsible for the organization of these events, and by 2024, 19 national competitions had been held. Eligible participants are those collaborative projects that have been awarded a National Quality Label (NQL). The evaluation is conducted by a panel of expert evaluators who employ specific criteria that are applicable in all 46 countries where eTwinning is implemented. The national competitions have been conceived with the objective of recognizing projects that incorporate high pedagogical value, highlighting good practice and strengthening the implementation of projects in the classroom. The awards are presented in a public forum at special ceremonies, which are often held as part of the annual national eTwinning conference. The projects which are selected as winners are subject to public dissemination, and are included in publications such as the Pedagogical Guides. The winning schools are awarded prizes, which may take the form of tablets or 3D printers, among other items. For instance, in the 17th national competition (2022), 32 schools were awarded 3D printers and tablets; in the 18th national competition (2023), 20 schools were awarded 3D printers and tablets; and in the 19th national competition (2024), 17 schools and two university departments were awarded tablets.

### **European Competitions & Awards**

Alongside the national competitions, a pan-European competition is held every year, in which collaborative projects that have been awarded the European Quality Label (EQL) can participate. The European eTwinning Awards are the highest recognition at European level for collaborative projects in terms of innovation and pedagogical impact. Nominations are evaluated by international panels on the basis of clearly defined criteria (pedagogical evidence, collaboration, innovation, impact). The distinctions for collaborative projects at European level enhance the dissemination and replication of collaborative practices, provide a platform for networking and encourage the documentation of learning outcomes in an international context. The winners are awarded at the annual European eTwinning Conference. The eTwinning projects involving Greek teachers are always distinguished in the European competitions and ranked in the highest positions. Specifically, in 2022, 6 Greek schools and 8 Greek teachers participating in 5 winning projects<sup>6</sup> were awarded, in 2023, 5 Greek schools and 8 Greek teachers participating in 5 winning projects<sup>7</sup> were awarded, in 2024, 9 Greek schools and 15 Greek teachers participating in 4 award-winning projects<sup>8</sup> and in 2025, 8 Greek schools and 12 Greek teachers participating in 2 award-winning projects<sup>9</sup>. The systematic presence of Greek teachers in this highest distinction proves the high quality fulfilled by the collaborative projects founded or participated in by Greek schools and the awards document the quality and innovation of these projects.

### **National eTwinning Conference**

The annual national conference is another well-established action of Greek eTwinning with a clear scientific character. It has been held continuously since 2014, in cities such as Patras, Athens, Ioannina, Syros and Thessaloniki. During the covid-19 pandemic it was conducted online, and from 2021 until today it is conducted in a hybrid format. The main purpose of the conference is to encourage creative dialogue between teachers around the implementation of innovative teaching methods using eTwinning. One of the characteristics of the conference is the very high participation of teachers and the presentation of a variety of scientific papers. For example, the 9th conference<sup>10</sup> (2023, Syros) featured 167 papers, 21 workshops, 7 keynote speeches and a round table on educational innovation, while the 10th conference<sup>11</sup> (Athens, 2024) featured 105 papers, 15 workshops, 16 keynote speeches and a round table on AI in Education and eTwinning collaborative projects. The impact of the national eTwinning conference on the educational community is manifold: it fosters the dissemination of innovative teaching practices, enhances teacher networking, promotes collaborative actions, and fosters modern digital skills.

### **International Missions of Greek Teachers**

Another action that acknowledges and rewards eTwinners is their involvement in international professional development workshops (PDW) and partner search seminars (CS/MS). These missions are intended for both distinguished teachers and novices, with the objective of establishing transnational partnerships and scaling up successful classroom

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<sup>6</sup> <https://www.etwinning.gr/awards/eawards/1114-etwinning-2022-4-6-8-etwprizes22>

<sup>7</sup> <https://www.etwinning.gr/awards/eawards/1260-etwinning-2023-5-5-8-etwprizes23>

<sup>8</sup> <https://www.etwinning.gr/awards/eawards/1571-etwinning-2024-5-9-15-etwprizes24>

<sup>9</sup> <https://www.etwinning.gr/awards/eawards/1583-etwinning-2025-5-9-13-etwprizes25>

<sup>10</sup> <https://etwinning.gr/conf2023>

<sup>11</sup> <https://www.etwinning.gr/conf2024>

practices. Participation in PDW/CS facilitates direct knowledge transfer and enhancement of the participants' professional identity. The Greek eTwinning organization is responsible for the coordination of international missions for Greek teachers, with a yearly average of more than 50 teachers being sent to various countries for this purpose.

### **COOPERATION WITH EDUCATION POLICY BODIES**

The establishment of collaborative relationships between the Greek NSO of eTwinning and national education policy bodies is a pivotal element in both the promotion of innovation in education and the consolidation of the eTwinners' community. These partnerships entail the establishment of connections between the school community and institutions of higher education, as well as national education policy bodies and European mobility programmes. The Initial Teacher Education action is intended to inform pedagogical students about eTwinning and its services, while the collaboration with the Institute for Education Policy creates a framework for the use of Skills Workshops through collaborative projects. The synergy with the State Scholarship Foundation serves to strengthen the link between eTwinning and the Erasmus+ programme, while the cooperation with the National Centre for Public Administration and Local Government ensures the provision of extensive (free) training of teachers on eTwinning.

#### **Cooperation with Universities - Action: Initial Teacher Education**

The eTwinning's Initial Teacher Education<sup>12</sup> (ITE) action has been designed to enhance the initial training of prospective teachers, with the objective of cultivating collaborative, pedagogical and digital competencies from their university years onwards. In Greece, the NSO is collaborating with academic institutions to propose two primary directions for integration: firstly, the incorporation of a designated module, entitled "Introduction to eTwinning", within existing curricula; and secondly, the advancement of small-scale collaborative eTwinning initiatives, encompassing both teacher-student and student-student interactions, with a particular emphasis on student placements. It is evident that the vast majority of Greek universities are engaged in this initiative, with twenty (20) pedagogical departments incorporating pertinent activities. During the 2024-2025 academic year, sixteen lecturers integrated eTwinning into the curriculum, training more than 400 students. Concurrently, 24 national and European projects were designed and implemented, as well as two collaborative projects with kindergarten students in the context of student internships. In order to provide support for this endeavor, the "eTwinning ITE MOOC 2024" course has been developed. This course is offered in a self-paced format. In the 2024-25 academic year, enrolment exceeded 600, indicating its considerable potential. The programme's continuation has already been scheduled for the 2025-26 academic year. It is evident that the accreditation of Greek university departments is being augmented by the conferral of the National ITE Label. In the 2024 academic year, three departments are scheduled to be recognized, with this figure increasing to six in the subsequent 2025 academic year. In 2024, Greece participated for the first time in the European competition for the ITE Award, and in 2025 it will again be represented by a university department, thereby confirming the country's substantial contribution to the European academic and educational community.

#### **Cooperation with the Institute of Education Policy**

The present collaboration between the Greek NSO of eTwinning and the Institute for Educational Policy (IEP) has been initiated with the objective of implementing the Skills Labs in a collaborative manner through the eTwinning platform<sup>13</sup>. The programme is founded upon a programmatic agreement between the CTI "Diophantus" and IEP, and is administratively documented by circulars of the Ministry of Education and Science, which provide guidelines to schools. In order to facilitate the training of teachers, a MOOC has been developed under the title of "eTwinning & Skills Labs: Collaborative Actions for the Cultivation of Knowledge, Skills and Competencies". The primary objectives of the course are twofold: firstly, to emphasize the utilization of the eTwinning community, activities and educational material for the implementation of Skills Labs; and secondly, to present the steps for transforming activities from the eTwinning digital repository into collaborative eTwinning actions implemented by groups of students and teachers from two or more schools. The course was offered on two occasions, in 2022 and 2023, and a total of 7,728 teachers were trained, indicating the substantial reach of the initiative at national level. Simultaneously, the Community was presented with an "e-book of good practices for skills workshops in eTwinning"<sup>14</sup>, which was made available for their use. This development was instrumental in ensuring the sustainability of the action.

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<sup>12</sup> <https://www.etwinning.gr/ite>

<sup>13</sup> <https://etwinning.gr/actions/skillslabs>

<sup>14</sup> <https://www.etwinning.gr/etwinning/publications/1368-ergastiria-deksiotiton-synergariques-draseis-gia-tin-kalliergeia-gnoseon-deksiotiton-kai-ikanotiton>

### **Cooperation with the State Scholarship Foundation**

The collaboration between the NSO of eTwinning and the State Scholarships Foundation (IKY) serves as a paradigmatic illustration of the integration of two institutional frameworks that are pursuing complementary objectives. On the one hand, the development of a network of professional learning for teachers (through eTwinning) is promoted, and on the other hand, the internationalization of school education is strengthened through the Erasmus+ KA1 and KA2 actions. The training workshops, organized in conjunction with other institutions, fulfilled a dual function. Firstly, they provided a theoretical framework and interpretative tools for understanding Erasmus+. Secondly, they offered practical guidance on application, accreditation procedures and the use of electronic tools such as SELFIE. The involvement of IKY staff in the National eTwinning Conferences has been instrumental in establishing institutional recognition for the cooperation, thereby fostering the dissemination of a culture of transnational collaboration within the school environment.

### **Cooperation with the National Centre for Public Administration and Local Government**

The nationwide distribution of the eTwinning course for teachers by the Training Institute (IN.EP.) of the National Centre for Public Administration and Local Government (NCPA)<sup>15</sup> represents a significant intervention in the professional development of teaching staff, with an emphasis on the utilization of digital tools and collaborative practices promoted by the eTwinning network. The course is offered free of charge and aims to broaden the knowledge and skills of teachers across the country. This approach functions as a multiplier, as it equips teachers with the requisite tools to develop collaborative projects, thereby reinforcing pedagogical innovation and the utilization of teaching methods that incorporate new technologies.

### **ACTIONS for STEM & AI Integration in Education**

This section will analyze the NSO actions for integrating STEM and artificial intelligence in education as tools for strengthening the teaching community. The document will delineate the structure of these actions and the procedures for selecting and supporting schools. The presentation will comprise quantitative data pertaining to participation, alongside qualitative assessments, exemplars of teaching materials, and mechanisms for dissemination.

### **The STEM Action in Teacher Community Empowerment through eTwinning**

The STEM eTwinning action<sup>16</sup> has been identified as a prime exemplar within the domain of Greek education, demonstrating remarkable levels of organization and efficacy. Its core objective is to facilitate the integration of STEM (Science, Technology, Engineering and Mathematics) technologies across all levels of school education, operating within a structured and supported framework. In Greece, the number of schools participating in the initiative stands at approximately 1,000. The core of the initiative lies in the provision of robotics equipment that has been adapted to the educational level of each school, in conjunction with an integrated ecosystem of professional development and pedagogical innovation services. The selection of schools is based on eTwinning criteria, such as teachers' distinction in national or European eTwinning competitions or their active participation in the Community. Training is implemented through open online courses and MOOCs, which focus on both technical skills and pedagogical applications of STEM education. The efficacy of the initiative is substantiated by the generation of superior educational resources. An illustrative example is the guide "Educational robotics in kindergarten with Beebot" (Foti, Tzimopoulos & Bratitsis, 2023), which presents lesson plans developed by trained teachers. Furthermore, Greek teachers have been recognized with prestigious European awards for their contributions to STEM projects, thereby affirming the global acclaim of their endeavors. The dissemination of results is enhanced through the National eTwinning Competitions, where winning schools are rewarded with technological equipment (e.g. 3D printers, tablets), as well as through the annual National eTwinning Conferences, which act as hubs for the exchange of good practice and professional networking. Furthermore, articles and studies produced by the action are published in scientific and educational journals, such as eTwinning WELCOME and Learning with Technologies, thereby reinforcing the scientific character of the intervention.

### **The integration of AI in educational practice through eTwinning**

The European Commission has identified the development of emerging technologies, including artificial intelligence (AI), as a strategic priority in the field of education. This domain of innovation is of paramount importance within the field of education, representing a substantial technological advancement. In this context, eTwinning provides online training programmes and specialized in-person events that cultivate digital competencies and advocate for the

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<sup>15</sup> <https://www.etwinning.gr/news/general/997-etwinning-2>

<sup>16</sup> <https://etwinning.gr/news/stem>

judicious and ethical utilization of AI in pedagogical practice. For instance, the open online course 'The pedagogical use of AI in eTwinning projects and teaching courses' is scheduled to be offered from October 2023 onwards. This 200-hour course, which is delivered over a period of 24 weeks, is designed for teachers of all levels and disciplines. It offers insights into the potential, limitations and ethical considerations of AI in education. The pedagogical approach integrates theoretical instruction with practical application, encompassing subjects such as the creation and management of educational materials, learning assessment, administrative support, and the organization of the teaching process. The course has seen a surge in popularity, with enrolment figures increasing from 2,685 in the 2023–24 academic year to 4,459 in the subsequent 2024–25 academic year. The programme evaluation, which received 1,521 responses, demonstrated a high level of satisfaction. It is noteworthy that 64.4% of teachers assigned the highest rating of "10", while 23.4% allocated a "9". The trainers were held in high esteem with regard to their expertise, guidance and communication skills, and the training material was evaluated as clear, complete and up to date. The activities were found to be appropriate for facilitating understanding of the subject matter, fostering a sense of belonging to a community of practice, and enhancing teaching preparation. Moreover, a significant proportion of the participants reported that their expectations were largely met (Angelopoulos, Paraskevas & Tzimopoulos, 2025).

In response to the mounting interest, eTwinning has made available from May 2025 a new, innovative Massive Open Online Course (MOOC) entitled "Harnessing AI in Education and eTwinning Programmes". The programme encompasses four training cycles, encompassing fundamental concepts, ethical considerations and data protection, the utilization of chatbots and prompt engineering, multimedia applications and content creation with AI, and evaluation, instructional design and ethical issues in practice. The programme places particular emphasis on experiential learning, hands-on activities and the functioning of an active learning community.

In addition to the online activities, the NSO also organizes thematic face-to-face events, such as the multidisciplinary seminar "Applications, Tools and Perspectives of AI in Education", which took place in Patras in May 2024. The seminar, which combined theoretical presentations, workshops and networking activities, provided secondary school teachers with practical skills for integrating AI in collaborative eTwinning projects.

The above-described framework examines the contribution of eTwinning in Greece to the development of a renewed framework for educational practice, grounded in transnational collaboration, experiential training, and the pedagogical integration of emerging technologies. Within this framework, the introduction of Artificial Intelligence (AI) is not conceived as an objective in itself, but rather as a catalyst for the reconfiguration of roles, practices, and learning relationships across the educational community. The eTwinning training activities have been meticulously designed to reflect a balanced integration of theoretical instruction, practical application, and the cultivation of professional identity. The activities under discussion are informed by a number of established theoretical perspectives, most notably those of Wenger (1998) on "communities of practice" and Mezirow (1997) on "transformative learning." The establishment of such a foundation is conducive to the development of a shared pedagogical discourse, thereby enabling educators to transition from the passive utilization of digital tools to an active and reflective engagement with educational innovation. In this respect, eTwinning functions as a dynamic learning ecosystem that interlinks educators, institutions, and technological infrastructures. This ecosystem fosters collective autonomy, professional agency, and adaptability, thereby enhancing the capacity of the teaching community to address the multifaceted challenges of the digital era.

## PUBLICATIONS

The enhancement of teachers' professional competencies through eTwinning is bolstered by a variety of dissemination and collaboration initiatives that facilitate the sharing of knowledge, the exchange of best practices, and the cultivation of a collaborative professional culture. Since July 2023, the eTwinning NSO has been publishing an online periodical, WELCOME (etWinning ELeCtronic MagazinE)<sup>17</sup>, which is issued biannually. This open-access publication functions as a repository of educational practices, empirical findings, and scholarly discourse, intended to reach a diverse readership that includes teachers, researchers, students, pupils, and education professionals. WELCOME functions as a living archive of innovative classroom experiences and research results, facilitating ongoing dialogue and cross-border professional learning.

Furthermore, the eTwinning NSO disseminates Pedagogical Guides and eBooks<sup>18</sup> that compile targeted methodologies and concrete examples drawn from real-world projects. The objective of these publications is to provide teachers with practical guidance and strategies that can be readily implemented in classroom settings. This support is intended to facilitate the translation of digital innovation into everyday instructional practice. Notable exemplars include

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<sup>17</sup> <https://welcome.etwinning.gr/>

<sup>18</sup> <https://www.etwinning.gr/etwinning/publications>

guides on "Educational robotics in kindergarten with the Bee-Bot," which outline age-appropriate robotics activities, assessment considerations, and classroom management guidelines; compendia such as "e-books of good practice for Skills Workshops," which synthesize effective approaches for developing essential 21st-century competences; and curated collections featuring exemplars from national eTwinning competitions, which showcase innovative pedagogical approaches and project-based learning models.

## CONCLUSIONS

The present article examines the transformative role of eTwinning within the Greek educational system, focusing on its impact on teacher professional development and the dissemination of innovative teaching practices. Anchored in a national framework that integrates policy, training, and institutional support, eTwinning has contributed substantially to strengthening teachers' digital and collaborative competencies while fostering a culture of pedagogical innovation.

At the systemic level, the network has expanded its reach to a significant number of active teachers and educational institutions, facilitating the implementation of a large body of collaborative projects. Training programmes constitute a central component of this transformation, combining theoretical concepts with practical application through Open Online Courses and Massive Open Online Courses (MOOCs). Evidence derived from systematic evaluation reveals both quantifiable improvement in digital skills and a consistently high level of participant satisfaction with the quality and effectiveness of the learning interventions. The integration of STEM education, supported by the provision of equipment, training manuals, and practical teaching scenarios, has led to the establishment of a coherent ecosystem that connects technological resources with innovative pedagogical approaches.

The incorporation of Artificial Intelligence (AI) into the educational agenda further illustrates the system's adaptability to emerging technological needs. Specialized courses, thematic MOOCs, and face-to-face seminars provide teachers with both theoretical insights and practical skills for the responsible application of AI in the classroom. However, this integration is not without challenges. Disparities between educational institutions - particularly in remote or under-resourced areas - highlight persistent inequalities in access to equipment and reliable digital infrastructure. The Panhellenic School Network has played a critical role in addressing these gaps, providing technical support and promoting infrastructure enhancement in order to mitigate the digital divide. Beyond technical constraints, the development of teacher competencies remains paramount. Many educators employ ICT tools in a limited or instrumental fashion, a tendency linked to gaps in initial and continuous professional training. In addition, concerns regarding data protection, ethical use, and the potential for technological substitution contribute to a degree of skepticism among practitioners. To counter these challenges, eTwinning and related initiatives of the Ministry of Education implement an integrated training model that combines open online courses, experiential workshops, and learning communities. This model not only equips educators with critical competencies but also fosters confidence, thereby reframing ICT and AI from perceived threats into catalysts for pedagogical enhancement.

A further dimension of the strategy is the systematic recognition of innovative practices through national and European competitions, quality labels, and dissemination platforms. These mechanisms incentivize excellence while fostering a culture of sharing and replication of good practices. Strategic partnerships with the Greek Universities, the Institute of Educational Policy (IEP), the State Scholarships Foundation (IKY), and other public training structures extend the impact of eTwinning by establishing strong linkages between national policy, higher education, and European programmes.

In conclusion, the Greek eTwinning framework represents a robust model of synergy between policy, institutional structures, and professional development initiatives. It demonstrates the capacity to promote innovation in educational practice while equipping educators with the competencies necessary for the 21st century. To ensure sustainability and further scalability, the following measures are proposed: (a) the consolidation and expansion of resources for training and digital infrastructure, (b) the systematic integration of eTwinning into both initial teacher education and in-service training standards, (c) the implementation of longitudinal evaluation studies to assess its impact on student learning outcomes, and (d) the reinforcement of thematic interventions in STEM and AI with particular emphasis on ethics, credibility, and classroom applicability. Collectively, these measures will consolidate eTwinning's transformative role in Greek education and strengthen its contribution to European educational policy and practice.

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