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DOCTORAL THESIS

SUMMARY

DEVELOPMENT OF DIGITAL COMPETENCES AND LIFE SKILLS OF HIGH SCHOOL STUDENTS. APPLICATIONS WITHIN ETWINNING / ERASMUS+ PROJECTS

SCIENTIFIC ADVISOR,

Professor PhD Mușata-Dacia BOCOȘ

Author: PhD CANDIDATE,

Marika-Emese KISS (Cîmpean)

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ARGUMENT

This paper synthesises the doctoral research undertaken between 2022 and 2026, aiming to empirically investigate the impact of eTwinning and Erasmus+ projects on the development of digital competences and life skills among high school students.

The thesis starts from the premise that high school students are a segment of the school population particularly receptive to the formative influences of collaborative digital environments. In this context, the present thesis investigates the extent to which the systematic and complementary use of digital technologies and collaborative activities within eTwinning and Erasmus+ projects can constitute an effective framework for developing students' digital competences and life skills.

The relevance of the topic is supported by both developments in European education policy and the realities of the Romanian education system. The European reference framework DigComp 2.2 (Vuorikari et al., 2022), the European Skills Agenda 2020-2025 (European Commission, 2020a), and the Digital Education Action Plan 2021-2027 (European Commission, 2020b) place digital competence at the heart of policies for training the European citizen. The European eTwinning and Erasmus+ programmes offer a complementary alternative to the compulsory curriculum, creating authentic, collaborative, and interculturally connected learning spaces in which students can practise and consolidate both digital competences and skills essential to personal and professional life.

The novelty of our research lies in the integrative and comparative approach to two dimensions, digital competences and life skills, which are predominantly treated separately in the specialised literature, and in their concurrent investigation within the specific context of eTwinning and Erasmus+ projects implemented at the high school level in Romania.

The investigative approach is structured across three methodological stages: the pre-experimental stage, the experimental stage, and the post-experimental stage, integrating multiple perspectives: that of teachers (N=1,586), that of students (N=537 in the pre-

experimental stage and N=449 in the experimental stage), and the institutional perspective, represented by school inspectors (n=10). The triangulation of these data sources gives the research methodological robustness and allows conclusions to be drawn with a high degree of validity and relevance for educational practice in Romania.

CHAPTER I

THEORETICAL AND PRACTICAL CONSIDERATIONS REGARDING DIGITAL COMPETENCES. PARTICULARITIES AT THE HIGH SCHOOL LEVEL

The first chapter of the thesis presents, from theoretical and practical perspectives, the main coordinates of digital competence in the current educational context, starting with the European reference framework and extending to the concrete curricular realities of the Romanian education system.

The Council of the European Union Recommendation on key competences for lifelong learning (2018) is analysed, which defines key competences as a combination of knowledge, skills, and attitudes, and places digital competence among the eight fundamental competences of the European citizen. The DigComp 2.2 reference framework (Vuorikari, Kluzer & Punie, 2022) is also presented, which describes 21 competences organised into five areas: information and data literacy, communication and collaboration, digital content creation, safety and problem solving, providing a common language for curricular design and the assessment of students' digital achievements.

The European institutional self-assessment tools *SELFIE* and *DigCompEdu* are reviewed, along with the DESI (*Digital Economy and Society Index*) indicators on the integration of digital technologies at the European level. The DESI data consistently confirm Romania's unfavourable position: 27.7% basic digital skills, compared with the EU average of 55.6%, and only 7.2% use of online learning materials, compared with the European average of 26.9% (Eurostat, 2025).

The chapter also examines contemporary educational paradigms relevant at the national and European levels: the national strategy for the digitalisation of education, online education as a new educational paradigm, the challenges and perspectives posed by artificial intelligence, and Web tools that support collaborative learning. The training profile of the compulsory education graduate is analysed, in accordance with National Education Law no. 198/2023, highlighting the central role of competences in the formative mission of the Romanian school.

The analysis of the high school curricula reveals that the digital dimension and that of life skills are included implicitly, without being explicitly and systematically thematised. The Romanian Language and Literature subject leaves room for digital integration, while the *optional courses Reading and life skills and Adolescence and self-knowledge* partially meet the need for the explicit development of life skills, though on an elective basis. This curricular reality justifies the complementary space that eTwinning and Erasmus+ projects can occupy,

not as an external addition, but as an authentic expression of the declared aims of the formal curriculum. The conclusion of the chapter substantiates the general hypothesis of the research: systematic participation in eTwinning and Erasmus+ projects can drive the development of digital competences and life skills of high school students, by capitalising on authentic intercultural, collaborative, and digitally connected learning contexts.

The *DigComp* framework divides digital competence into five essential areas: information and data literacy, communication and collaboration, digital content creation, safety and problem-solving, each area structured into specific competences and progressive levels of complexity (Vuorikari et al., 2022). The Communication and Collaboration area includes interacting through digital technologies, sharing content, digital civic engagement, online collaboration, observing netiquette, and managing one's digital identity, an area that will, in the experimental stage of the research, prove to be the most strongly influenced by participation in eTwinning and Erasmus+ projects.

The European institutional self-assessment tools SELFIE and DigCompEdu complement the DigComp framework, providing schools and teachers with concrete mechanisms for diagnosing their digital capacity. "Petru Rareș" National College, Beclean, applied the SELFIE tool in two successive rounds (2022-2023, N=473, and 2025-2026), with the data intended for use in a comparative longitudinal analysis of the evolution of institutional digital capacity.

The training profile of the compulsory education graduate, anchored in the Pre-University Education Law no. 198/2023 and in the SMART-Edu Strategy (Ministry of Education and Research, 2021), structures digital competence across three progressive levels (elementary, functional, and developed), corresponding to the completion of primary education, compulsory education, and upper secondary education, respectively. High school students, the object of the present research, are precisely at the transition stage from the functional to the developed level, which makes this period of schooling critical for the consolidation of digital competence, while eTwinning and Erasmus+ projects offer a favourable environment for practising the four dimensions of digital competence set out in the graduate profile: problem solving, content creation, responsible use, and active digital citizenship.

A case study conducted by us at "Petru Rareș" National College, Beclean, within the eTwinning project #DigitalEU – we'll do!, demonstrated that the systematic use of Web 2.0 tools within an eTwinning project contributes to the development of digital competence and media literacy among high school students, confirming the pedagogical value of learning

through international collaborative projects as an authentic environment for practising digital competences (Cîmpean & Bocoș, 2022).

The 2018 Council of the European Union Recommendation defines key competences as a combination of knowledge, skills, and attitudes, each component having a distinct but complementary role. According to the Dictionary of Pedagogy (Bocoș et al., 2021), knowledge represents the result of assimilating, through learning, a set of facts, principles, theories, and practices; skills represent the acquired capacity to carry out an activity requiring dexterity, precision, and efficiency; and attitudes represent the preferential and value-based positioning adopted by a person in relation to an element of the social world. This conceptual triad underlies all eight European key competences, including digital competence, and forms the basis for the development of the researcher's own assessment instruments to be used later in the research.

The *DESI* indicators on the digitalisation of education place Romania in a critical position at European level: in addition to the two main percentages mentioned earlier (basic digital skills and use of online learning materials), the report highlights significant gaps in school digital infrastructure and in teacher preparedness for technology-assisted teaching, which amplifies the urgency of identifying solutions complementary to the formal curriculum, such as eTwinning and Erasmus+ projects.

CHAPTER II
THEORETICAL AND PRACTICAL CONSIDERATIONS REGARDING LIFE SKILLS. PARTICULARITIES AT THE HIGH SCHOOL LEVEL

The second chapter outlines the theoretical foundations of life skills, a dimension situated at the intersection of the student's cognitive, emotional, social, moral, and vocational development. The theories of Jean Piaget and Lev Vygotsky regarding cognitive development are analysed, which highlight that learning is built through active interaction with the environment, along with Abraham Maslow's hierarchy of needs, which stresses that the development of competences is conditioned by the existence of a climate of safety, belonging, and being valued.

Erik Erikson's psychosocial model is examined, with its central role in building the adolescent's identity, along with Daniel Goleman's theory of emotional intelligence, Albert Bandura's social-cognitive learning theory (self-efficacy), as well as contributions on vocational guidance (Lent, Brown & Hackett) and moral development (Kohlberg). David Kolb's experiential learning theory provides the integrative framework through which authentic experience, reflection, and action transform learning into a deep and lasting process, elements that pedagogically underpin the use of collaborative projects as privileged environments for the formation of life skills.

The chapter further analyses global and European perspectives on the concept of life skills: the European Commission's *LifeComp* Framework, the OECD's *Learning Compass 2030*, UNICEF's life skills curriculum, the World Health Organisation's benchmarks, and the UN *2030 Agenda*, all converging towards a shared vision of forming the individual as an autonomous, responsible person, capable of learning throughout life.

Operational models for developing life skills are presented, such as the *4-H Targeting Life Skills* model, *Knowing How to Become*, and PBLWorks (*Success Skills Rubrics*), which demonstrate that life skills can be behaviourally described, systematically formed, and assessed through specific instruments, providing benchmarks for designing pedagogical interventions and for building the assessment instruments used later in the research.

The analysis of the school curricula and of the school-based curriculum for high school confirms the interest of the Romanian education system in developing life skills, through optional courses such as *Reading and life skills*, *Development of life skills*, or *Adolescence and self-knowledge*, but integration remains, in many cases, fragmentary and dependent on the teacher's initiative. The chapter concludes that life skills constitute a strategic educational

dimension, theoretically grounded, institutionally validated, and pedagogically operationalisable, and that eTwinning and Erasmus+ projects represent pedagogical contexts with strong formative potential for the integrated development of high school students.

Jean Piaget's theory of cognitive development explains how the child actively builds their own cognitive structures through interaction with the environment, progressing through successive developmental stages, while Lev Vygotsky, through the concept of the zone of proximal development, emphasises the central role of social interaction and mediation by an adult or a more competent peer in developing the child's learning potential. These two complementary perspectives theoretically underpin the central idea of the research: high school students, in a period of intense cognitive transition, particularly benefit from socially and technologically mediated collaborative learning contexts, such as those offered by eTwinning and Erasmus+ projects.

Daniel Goleman's theory of emotional intelligence highlights the role of self-awareness, self-regulation, motivation, empathy, and social skills in personal and professional success, dimensions explicitly reflected in the structure of the life skills assessment instruments used in the research (LSAS, Success Skills Rubrics). Albert Bandura's theory of self-efficacy, in turn, emphasises that an individual's confidence in their own capacity to succeed at a task directly influences the level of effort invested and perseverance in the face of difficulties, a concept relevant to interpreting the results on the self-assessment of students participating in European projects, who proved consistently more confident than the control group.

The concept of the Zone of Proximal Development (ZPD), central to Vygotsky's theory, is defined as the distance between the student's current level of development, what they can achieve independently, and their potential level of development, determined by what they can achieve with the assistance of a competent adult or a more advanced peer (Vygotsky, 1978). The concept of scaffolding, introduced by Wood, Bruner and Ross (1976) as an extension of the ZPD idea, refers to the temporary, dynamically adjusted support provided by an expert, gradually withdrawn as the student gains autonomy. Within eTwinning and Erasmus+ projects, the project coordinator provides initial scaffolding, and students gradually become autonomous in carrying out international collaborative tasks, while digital platforms serve as cultural tools that mediate intercultural collaboration.

Erik Erikson's theory of psychosocial development (1950, 1968), structured across eight stages, each defined by a specific psychosocial conflict, is directly relevant to the present research through its fifth stage, identity versus role confusion, corresponding to adolescence (approximately 11-20 years), the period in which high school students fall. The positive

resolution of this conflict leads to the acquisition of fidelity, the capacity to commit to values, causes, and stable relationships, and participation in international collective activities, such as eTwinning and Erasmus+ projects, accelerates the process of building cultural identity and clarifying personal values (Fourie et al., 2018), a psychosocial stage central to the target group of the present research.

The World Health Organisation defines life skills as a set of psychosocial competences and interpersonal skills that help individuals make informed decisions, solve problems, think critically and creatively, communicate effectively, build healthy relationships, and manage their lives in a healthy and productive way (World Health Organisation, 1999). This definition situates life skills at the intersection of the cognitive, emotional, and social dimensions, compatible with the theoretical models analysed earlier in the chapter.

The *LifeComp* reference framework, developed by the European Commission (Sala et al., 2020) to operationalise the personal, social, and learning-to-learn key competence, describes nine competences grouped into three interdependent areas: the personal area (self-regulation, flexibility, wellbeing), the social area (empathy, communication, collaboration), and the learning-to-learn area (growth mindset, critical thinking, managing learning). Dimension D7 of the researcher's own assessment instrument used in the research was conceptualised in direct resonance with the social and personal areas of *LifeComp*, and the cyclical structure of eTwinning and Erasmus+ projects (planning, implementation, reflection, dissemination) organically reproduces the structure of the learning-to-learn area, confirming the compatibility between the design of the proposed pedagogical intervention and the European normative framework.

The OECD *Learning Compass 2030* and UNICEF's life skills curriculum complete this conceptual picture, placing critical thinking, collaboration, self-regulation, and active citizenship at the centre of the vision for 21st-century education, in full agreement with the UN *2030 Agenda for Sustainable Development*, whose goals in fact formed the theme of the practical applications carried out with students within Study 2 of the experimental stage.

CHAPTER III
ETWINNING / ERASMUS+ AND COMPETENCE DEVELOPMENT

The third chapter is dedicated to the European eTwinning and Erasmus+ programmes and their role in competence development. eTwinning, the international community of schools launched in 2005, grew from 10,000 teachers across 7,000 schools in its first year to 46 participating countries, 312,000 registered schools, over 1.2 million teachers, and 170,000 European projects after 20 years of operation (European Commission, 2025).

The new ESEP (European School Education Platform) is presented, along with the stages of running eTwinning projects (design, implementation, certification), the specific quality criteria, and how these projects influence competence formation. The Erasmus+ programme is also analysed, along with the priorities of the School Education sector and the concrete way in which mobility and strategic partnership projects are carried out.

The chapter examines the advantages and limitations of the two programmes: teacher workload overload, unequal access to digital infrastructure, insufficient funding, and the need for more consistent institutional support are identified as the main obstacles, alongside the clear benefits in terms of digital, linguistic, intercultural, social, and civic competences. As an illustrative case study of the synergy between the two programmes, the eTwinning/Erasmus+ project Eco-Herit@ge Matters 2.0 is presented, which exemplifies how virtual collaboration and physical mobility can mutually reinforce each other.

The conclusion of the chapter highlights the complementary and synergistic nature of the two European education policy instruments: eTwinning offers a free, flexible, and bureaucracy-free virtual space for pedagogical collaboration, while Erasmus+ provides the financial and institutional framework needed to organise physical mobilities and develop long-term strategic partnerships. Fully harnessing their potential depends on the presence of coherent school policies, distributed leadership, and curricular integration across the entire school organisation.

The European School Education Platform (ESEP) provides teachers and students with a safe collaborative space for running national and international virtual projects, organised around the Twinspace, each project's workspace, structured into sections such as Pages, Materials, Forum, Live Events, and Members, with different permission levels (administrator, member, student, student administrator, expert, observer).

The quality assessment of eTwinning projects, for the purpose of obtaining National Quality Labels (NQL) and, subsequently, the European Quality Label (EQL), is carried out on

the basis of five main criteria: collaboration between partner schools, use of technology, pedagogical approaches, curricular integration, and results achieved, together with documentation of activities in the Twinspace (ESEP, 2022). Only projects holding the European Quality Label can apply for the eTwinning Prizes, which are awarded annually by age category and in special categories.

Erasmus+ Accreditation is a programme instrument intended for organisations wishing to consistently carry out mobility and international cooperation activities, confirming the existence of an Erasmus Plan and of the institutional capacity to implement high-quality mobilities, as part of a long-term development strategy (European Commission, 2021). In Romania, the Erasmus+ programme is managed by the National Agency for Community Programmes in the Field of Education and Vocational Training (ANPCDEFP), and the objectives of the Accreditation action aim to strengthen the European dimension of teaching and learning, promote the recognition of learning outcomes achieved through mobility, improve language competences, and support the professional development of teachers.

"Petru Rareș" National College, Beclean holds Erasmus+ Accreditation for the 2022-2027 timeframe, spanning four consecutive years, an institutional context that enabled the conduct of Study 3 of the experimental stage of the research, dedicated to the eTwinning-Erasmus+ synergy through international mobilities.

The eTwinning community, having become, after 20 years of existence, the largest virtual community of schools in Europe, with 46 participating countries, over 312,000 registered schools, over 1.2 million teachers, and 170,000 projects carried out, offers a free and bureaucracy-free digital collaboration framework, complementary to the institutional and financial rigours of the Erasmus+ programme (European Commission, 2025). This structural complementarity- one programme based on flexibility and being free of charge, the other on funding and institutional accreditation- theoretically explains the empirical synergistic effect identified in the experimental and post-experimental stages of the research, where simultaneous participation in both programmes systematically generated the highest scores across all instruments applied.

The *Eco-Herit@ge Matters 2.0* case study, presented as an illustration of the eTwinning-Erasmus+ synergy, exemplifies how virtual collaboration sustained on the Twinspace can be articulated with physical mobilities and the creation of authentic digital products in transnational teams, generating a genuine ecosystem of institutional innovation, transferable to subsequent projects carried out by "Petru Rareș" National College, Beclean, including O.S.H.T. 2.0 and Brussels Experience: Young Europeans in Dialogue.

Table 7.III: *Identification sheet of the Eco Herit@ge Matters (2.0) project*

Project title	*Eco Herit@ge Matters 2.0*
Project type	Erasmus+ KA229 strategic partnership project, with two complementary eTwinning projects
Erasmus project code	2019-1-PT01-KA229-060791_6
eTwinning platform	European School Education Platform (ESEP) / eTwinning TwinSpace: https://school-education.ec.europa.eu/en/etwinning/projects/eco-heritge-matters-20/twinspace
Project duration	2019–2022 (extended by one additional year due to the COVID-19 pandemic)
Coordinating country	**Portugal** - project coordinator: Marisa Rocha (AEMGA, Espinho)
Partner countries and schools	● **Portugal:** AEMGA Espinho & Agrupamento de Escolas de Ovar Sul, Ovar ● **Italy:** I.C. *F.P. Polizzano*, Gangi ● **Croatia:** Osnovna škola Retfala, Osijek ● **Greece:** 4th Gymnasium of Preveza ● **Romania:** "Petru Rareș" National College, Beclean
Associated eTwinning projects	- **Eco Herit@ge** Matters (founders: Emese Cîmpean and Nicoletta Forestiere) - **Eco Herit@ge Matters 2.0** (founders: Emese Cîmpean and Barbara Zadraveli):https://school-education.ec.europa.eu/en/etwinning/projects/eco-heritge-matters-20/twinspace
No. of participating students (CNPR)	150 students (project level); 20 students participating in international mobilities + 11 accompanying persons
Average student age	13-15 years
Theoretical frameworks	- UNESCO ESD Framework (Education for Sustainable Development); - Sustainable Development Goals (SDGs)
Certification obtained	*European Quality Label* (EQL) - awarded on 13.06.2023 (submitted 31.05.2022); National eTwinning Quality Label (NQL)
Awards received	- 1st Prize: collaborative film "Purgatory Airlines", national competition "Made for Europe" (2022), Bistrița-Năsăud county stage; - 3rd Prize: collaborative Eco-Guide, national competition "Made for Europe" (2022), Bistrița-Năsăud county stage;

	- 2nd Prize for projects run by eTwinning ambassadors (Marika Emese Cîmpean; Liana Valentina Pașca; Lavinia Mureșan; Ioana Doroș; Delia Năstase - "Petru Rareș" National College, Beclean)
Project website	https://ecoheritagematters.wixsite.com/ecoheritagematters

The specialised literature confirms the advantages identified empirically in the research, but also signals real limitations of the two programmes. For eTwinning, Alexandru (coord.) et al. (2022) identify three categories of constraints: technical aspects (platform functioning, limited access to technology), pedagogical aspects (extra working time, the need for teacher training), and administrative aspects (the absence of bureaucratic constraints being an advantage, but the lack of funding being a limitation). The report on the implementation of the eTwinning Action in Romania during 2012-2021 (Alexandru et al., 2023) confirms the significant role of eTwinning projects in developing students' digital, communication, and collaboration competences, as well as their compatibility with the competence-based approach, with transfer of learning outcomes to curricular areas such as language and communication, individual and society, or STEAM.

For the Erasmus+ programme, the advantages identified in the literature include the development of linguistic and intercultural competences, increased motivation for learning, the development of autonomy and teamwork, and institutional visibility, while the limitations include the high volume of administrative work, the difficulties of managing mobilities during the school year, and insufficient funding relative to the number of students interested in participating. A case study conducted in the context of the Erasmus+ Accreditation of "Petru Rareș" National College, Beclean demonstrated that the systematic integration of European collaborative projects contributes to the simultaneous development of students' digital and sustainability competences, validating the complementarity between the digital and green dimensions of eTwinning and Erasmus+ projects (Cîmpean et al., 2022).

Table No. 5.III. *Advantages and limitations of implementing eTwinning projects*

Advantages	**Limitations**
Development of linguistic competence for communication in a foreign language; development of digital competences; personal development; independence; development of life skills; understanding and appreciation of	In the absence of complementarity with Erasmus+, interaction remains limited to computer-mediated communication; the projects are time-consuming for the teacher, who must integrate them into the curriculum to work with the whole class.

diversity; the chance to discover other cultures; preparation for a future career.	

Table No. 6.III. *Advantages and limitations of implementing Erasmus+ projects*

Advantages	**Limitations**
• Development of linguistic and communication competences	• High volume of administrative work
• Increased motivation for learning and school engagement	• Difficulties in managing mobilities during the school programme
• Formation of digital and intercultural competences	• Additional pressure on coordinating teachers
• Development of international collaboration between schools	• Cultural and organisational differences that can create difficulties
• Promotion of inclusion, tolerance, and European citizenship	• Rigorous and time-consuming planning
• Access to innovative methods and European good practices	• Insufficient funding relative to the number of interested students

CHAPTER IV
RESEARCH DESIGN

The fourth chapter presents the design of the experimental research, which fits within the context of the profound transformations that contemporary education is undergoing under the impact of accelerated digitalisation. The research is applied and mixed in nature, systematically and complementarily combining quantitative and qualitative methods, with an explanatory sequential design and methodological triangulation. In terms of its intended purpose, the research is developmental and ameliorative, conducted longitudinally, and, in terms of the number of subjects involved, it is extensive.

The purpose of the research is to study the influence of eTwinning/Erasmus+ projects on the digital competences and life skills of high school students.

The research objectives (O1–O7) aim to determine the initial level of development of the targeted competences and skills, to design and pilot a system of applications based on digital technologies, to carry out formative and summative assessments by comparing the experimental and control groups, and to establish the extent to which the practical applications contribute to the development of digital competences and life skills, respectively.

The research question guiding the approach is:

> **Does the systematic and complementary use of digital technologies and collaborative activities within eTwinning/Erasmus+ projects among high school students lead to the development of digital competences and life skills?**

The general hypothesis of the research states that the systematic and complementary use of digital technologies and collaborative activities within eTwinning/Erasmus+ projects leads to the development of digital competences and life skills among high school students.

Two secondary hypotheses are formulated: SH1, concerning the development of linguistic competences, and SH2, concerning the development of collaboration and teamwork skills.

- **The systematic and complementary use of digital technologies in eTwinning/Erasmus+ projects among high school students will foster the development of linguistic competences.**

- **The systematic and complementary use of digital technologies in eTwinning/Erasmus+ projects among high school students will foster collaboration and teamwork skills in completing curriculum-integrated project tasks.**

The independent variable is represented by digital technologies and collaborative activities within eTwinning/Erasmus+ projects, while the dependent variables are the levels of development of digital competences and life skills, respectively, among high school students.

The methodological system used in the research combined quantitative methods (a questionnaire survey with Likert scales, the docimological test - pretest and posttest, self-assessment and external assessment scales such as the SCD, LSAS, Success Skills Rubrics, and SDiCoS) with qualitative methods (the complementary qualitative study conducted with school inspectors, a Photovoice-based survey - Wang and Burris, 1997, and reflexive thematic analysis - Braun and Clarke, 2006). Quantitative data processing was carried out using IBM SPSS Statistics 23 and JASP (version 0.19), with a significance threshold of $\alpha = .05$, and effect sizes calculated using the rank-biserial correlation coefficient r (Wilcoxon and Mann-Whitney U tests), eta squared (ANOVA), and Cramér's V (Chi-Square).

The research's own central instrument is the pretest/posttest, designed and validated in accordance with the Romanian language and literature curriculum for grades IX–X, structured across seven dimensions: D1. Text comprehension (20 pts), D2. Expression and argumentation (20 pts), D3. Discourse organisation (10 pts), D4. Adaptation to the communication situation (5 pts), D5. Use of standard language (5 pts), D6. Digital competences (20 pts), and D7. Life skills (20 pts), with a maximum score of 100 points, converted into a grade on a 1–10 scale. The pretest was administered on paper (N=449, March–April 2024), and the posttest was administered online (N=252, March–April 2026), with the requirements, content, and assessment criteria kept identical.

Among the instruments translated and adapted by us, with the authors' consent, notable examples include the Life Skills Assessment Scale (LSAS), based on the instrument developed by Kennedy, Pearson, Brett-Taylor, and Talreja (2014), supplemented with the population norms of Pearson et al. (2020), the Success Skills Rubrics (PBLWorks, 2021), and the Digital Competence Assessment Scale (SCD), adapted from the DigComp 2.2 framework. All three instruments were applied from two perspectives: external assessment by the teacher and self-assessment by the student. Among the internationally standardised instruments, the SDiCoS Scale (Students' Digital Competence Scale, Tzafilkou, Perifanou, and Economides, 2022) was

applied online to a sample of 173 students, demonstrating excellent psychometric properties on the Romanian sample (α = .933).

The research was conducted between 2022 and 2026, across three methodological stages: pre-experimental, experimental, and post-experimental, with eleven instruments analysed in full in the thesis, in addition to three further instruments (the DLS Scale, focus groups with students, and focus groups with eTwinning/Erasmus+ ambassadors), whose data have been collected but remain to be examined in future research.

The research sampling included: the opinion questionnaire addressed to teachers (N=1,586, from all counties of the country), the opinion questionnaire addressed to high school students (N=537), the complementary qualitative study with school inspectors (n=10, from eight counties), as well as the sample for the experimental stage, made up of N=449 students in grades IX–X at "Petru Rareș" National College, Beclean, organised into four groups: Group 1 (G1 - exclusive participation in Erasmus+ mobilities), Group 2 (G2 - exclusive participation in eTwinning projects), Group 3 (G3 - simultaneous participation in eTwinning and Erasmus+), and Group 4 (G4 - control group, with no participation in European projects). The pretest was administered in March–April 2024 (N=449), and the posttest in March–April 2026 (N=252), the difference in numbers being due to significant experimental mortality in the control group (from 323 to 126 students, a retention rate of 39%), while the experimental groups recorded a retention rate of 100%.

The sample for Study 2 (the eTwinning project O.S.H.T. 2.0, run through the eTwinning/Erasmus+ Project Based Learning elective) consisted of N=141 students in grades IX–X, and the project received the Runner-up distinction at the 2025 European eTwinning Prizes, 16–19 age category, being selected from among 1,191 projects competing at European level.

The sample for Study 3 (Erasmus+ mobilities, under the 2022–2027 Erasmus+ Accreditation Plan of "Petru Rareș" National College, Beclean) included N=108 students participating in physical mobilities, of whom 72 (66.6%) contributed to the Photovoice corpus. A summary of the methods, instruments, and statistical analyses used across the three stages of the research is as follows: the pre-experimental stage drew on opinion questionnaires (teachers and students), processed through frequencies, the Chi-Square test, and the Mann-Whitney U test, the qualitative questionnaire addressed to school inspectors, analysed through content analysis, as well as the pretest, processed through descriptive statistics and the Kruskal-Wallis and Shapiro-Wilk tests. The experimental stage drew on the *SCD* Scale, the *LSAS* Scale, and the *Success Skills Rubrics*, and was analysed using ANOVA, the t-test, the Kruskal-Wallis

test, and the Mann-Whitney U test with Bonferroni correction. The post-experimental stage drew on the posttest, the SDiCoS Scale, and the Photovoice survey, which were processed using the Kruskal-Wallis and Wilcoxon tests, effect size r, Bonferroni post hoc analysis, and reflexive thematic analysis, respectively.

The research methodology complied with the principles of educational research ethics: participation in all instruments administered to students and teachers was voluntary, and for the Photovoice survey and the case studies conducted during Erasmus+ mobilities, informed consent forms were used, compliant with Regulation (EU) 2016/679 (GDPR) and Law No. 190/2018, including explicit options regarding anonymisation and the use of images, audio, and video materials for research and dissemination purposes.

The decimal separator used to present the results is the point, and the statistical significance threshold adopted in all analyses is $\alpha = .05$, with post hoc comparisons corrected using the Bonferroni method when multiple comparisons were made between groups.

Table No. 2.IV. Overall research design - stages, instruments, periods, and samples

Stage	**Instrument**	**Period**	**Sample**
Pre-experimental	**Teacher opinion questionnaire (own instrument)**	Aug.–Oct. 2023	N=1,586
	Student opinion questionnaire (own instrument)	Jan.–Apr. 2024	N=537
	Complementary qualitative study: questionnaire for school inspectors (own instrument)	Mar.–Apr. 2024	N=10
	Pretest (own instrument)	Mar.–Apr. 2024	N=449
Experimental	**Study 1. Teacher training in the use of the eTwinning/ESEP platform**	Apr. 2024; Mar.–Apr. 2025	N=128
	Study 2. Curricular integration through electives (CDEOȘ). The eTwinning project O.S.H.T. 2.0	2023–2026	N=141
	Study 3. eTwinning/Erasmus+ synergy through international mobilities. Erasmus+ Accreditation	2022–2026	N=108

Stage	Instrument	Period	Sample
	Digital Competence Assessment Scale (SCD) (DigComp 2.2 adaptation)	2022–2025	N=201
	Life Skills Assessment Scale (LSAS) (Kennedy et al., 2014)	2022–2025	N=187
	Success Skills Rubrics (PBLWorks, 2021)	2022–2025	N=150
Post-experimental	Posttest (own instrument)	Mar.–Apr. 2026	N=252
	Students' Digital Competence Scale (SDiCoS) - Tzafilkou et al., 2022	Feb. 2026	N=173
	Photovoice-based survey (Wang & Burris, 1997)	Jan.–Mar. 2026	N=72 dyads
	Digital Literacy Scale (DLS)	data collected, further analysis*	
	Focus group - students participating in Erasmus+ mobilities	data collected, further analysis*	
	Focus group - eTwinning and Erasmus+ ambassadors	data collected, further analysis*	

CHAPTER V
PRE-EXPERIMENTAL STAGE

The pre-experimental stage of the research aimed to determine the initial level of development of digital competences and life skills, and to map the perceptions of teachers, students, and school inspectors regarding the impact of eTwinning and Erasmus+ projects.

Chi-Square analyses conducted on the sample of 1,586 teachers showed that experience with eTwinning projects is significantly associated with level of education ($\chi^2(5)=17.639$, $p=.003$), teaching grade ($\chi^2(3)=47.165$, $p<.001$), and years of teaching experience ($\chi^2(5)=39.959$, $p<.001$), while the school's area of residence does not constitute a significant differentiating factor ($\chi^2(1)=0.512$, $p=.474$). For Erasmus+, the situation is reversed: area of residence becomes significant, with urban schools being advantaged, and the programme is more strongly associated with the high school cycle (41.6% of teachers with Erasmus+ experience work in high schools, compared to only 29.7% for eTwinning).

Teachers involved in eTwinning projects reported significantly higher levels of ICT competences across all investigated domains ($p <.001$ for all competences analysed), suggesting a generalised and consistent effect. Participation in Erasmus+ was associated with significant differences only for specific competences (use of online tests, administration of educational blogs and websites, use of collaborative documents), indicating a more selective, yet real, impact.

The students' perspective (N=537) outlines a paradoxical profile: the intensity of recreational digital consumption (social media, 91.1% for over an hour daily; internet browsing, 86.6%) contrasts with reduced engagement in digital educational activities (individual research in virtual classes, 65.4% under one hour/day; online collaboration, 71.9% under one hour/day). Self-assessed digital competences follow a clear hierarchy: content consumption and presentation are better mastered (online searching, 74.3%; creating presentations, 72.0%) than content production (video editing, 41.2%; creating posters/infographics, 42.4%). Limited participation in eTwinning projects (26.3%) is associated with significantly higher scores for perceived contribution to digital competences (M=3.78 versus 2.93; r=.349) and life skills (M=3.59 versus 2.77; r=.373), while Erasmus+ beneficiaries (35.9%) in turn perceive a higher impact than non-participants (r=.264-.279).

The formative profiles of the two programmes proved to be distinct and complementary: eTwinning is primarily associated with digital competence (58.1%) and online

collaboration, while Erasmus+ is associated with foreign language communication (65.0%), social and civic competences (54.6%), and interculturality. The main obstacle identified by students is inadequate infrastructure (47.3%), not a lack of interest (insufficient motivation being mentioned by only 8.4% of respondents), a result with direct diagnostic value for the design of the experimental stage.

The institutional perspective of school inspectors (n=10, from eight counties), obtained through the complementary qualitative study, confirms and validates the quantitative conclusions: the perception of the impact of eTwinning and Erasmus+ projects is unanimously positive, and the recommendations formulated, centred on the creation of digital content, mobilities, and authentic collaborative activities, anticipate the pedagogical intervention proposed for the experimental stage.

Administration of the pretest to the sample of 449 students from 18 classes, from seven school units, revealed moderate initial differences between groups at the level of the overall score and of certain specific dimensions, but equivalence at the level of dimension D7. Life skills ($p = .280$), a dimension central to the research objectives, confirms the appropriateness and rigour of the subsequent comparisons carried out in the post-experimental stage.

From a demographic perspective, the sample of 1,586 teachers who responded to the opinion questionnaire was dominated by female respondents (96.2%), reflecting the actual share of women in the teaching profession in Romania (93% at primary level, and 75% at lower- and upper-secondary level, respectively, according to the Report on the State of Pre-University Education in Romania, 2022-2023). The average age of respondents was 44.46 years (SD=8.89), with a concentration in the 41-50 age group (over 54% cumulatively), and 80.3% of respondents came from urban areas. Regarding years of teaching experience, 40.1% of respondents had over 25 years of teaching experience, and 97.3% of respondents were tenured teachers, which gives the sample a high degree of stability and professional experience, relevant to the validity of the perceptions expressed regarding the impact of eTwinning and Erasmus+ projects.

CHAPTER VI
STAGE OF THE FORMATIVE EXPERIMENT

The experimental stage of the research was structured into three complementary studies, supplemented by the application of three continuous monitoring instruments: the Digital Competence Assessment Scale (*SCD*), the Life Skills Assessment Scale (*LSAS*), and the Success Skills Rubrics.

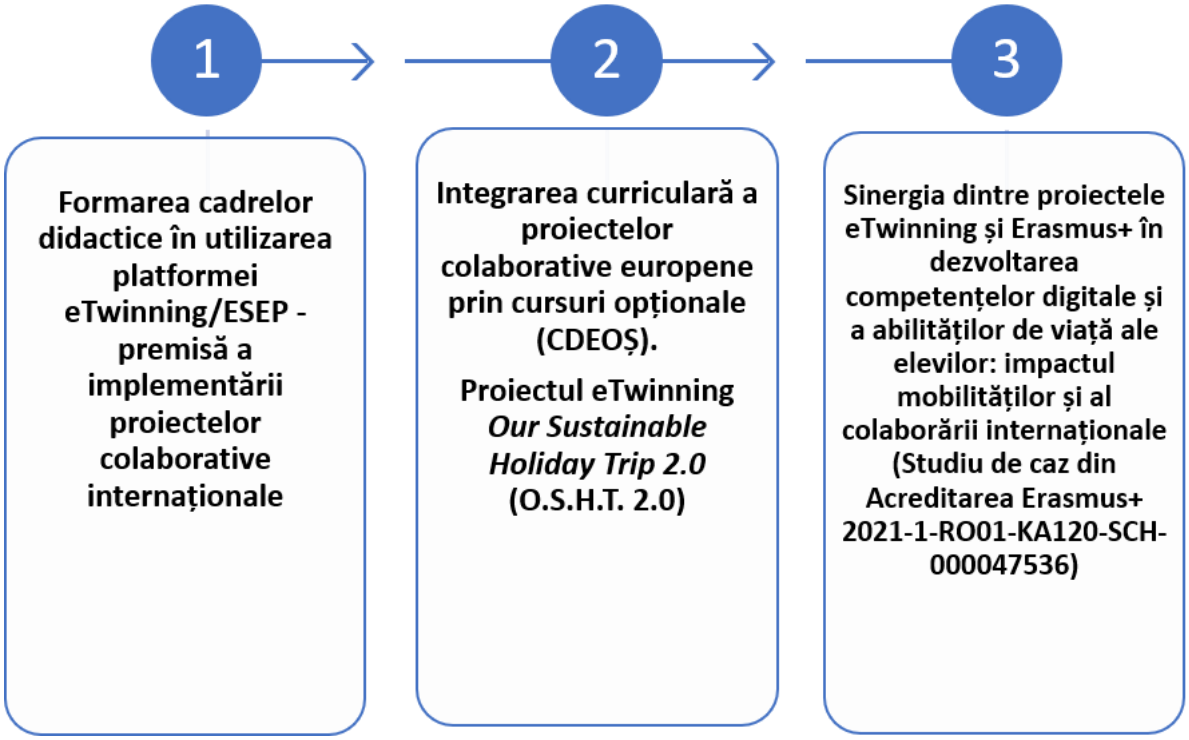


Figure No. 1.VI: Structure of the experimental stage of the research - the three complementary studies

Study 1, dedicated to training teachers to use the eTwinning/ESEP platform, confirmed that the development of students' digital competences is conditioned by the level of teacher preparation. The "Introduction to eTwinning/ESEP" course, run in two editions (2024 and 2025), with a total of 128 participants, achieved pass rates of 89.39% (2024) and 83.9% (2025).

Study 2, focused on the curricular integration of eTwinning projects through electives (CDEOȘ), documented the eTwinning project *Our Sustainable Holiday Trip 2.0 (O.S.H.T. 2.0)*, run over three consecutive school years (2023–2026), with 141 students, obtaining the Runner-up distinction at the 2025 European eTwinning Prizes Gala (16–19 age category).

Study 3, devoted to the eTwinning-Erasmus+ synergy through international mobilities, documented a longitudinal internationalisation programme, carried out over four years of

Erasmus+ accreditation (2022–2026), with 108 participating students across 10 mobility flows, in 8 European countries. Three in-depth case studies illustrated how each mobility addressed a distinct dimension of the Erasmus Plan's objectives: ecological and digital competences (Gangi, Sicily); digital European citizenship (Brussels); and practical life skills (Kartepe, Turkey). The four accreditation cycles are illustrated in Figure No. 2.VI.

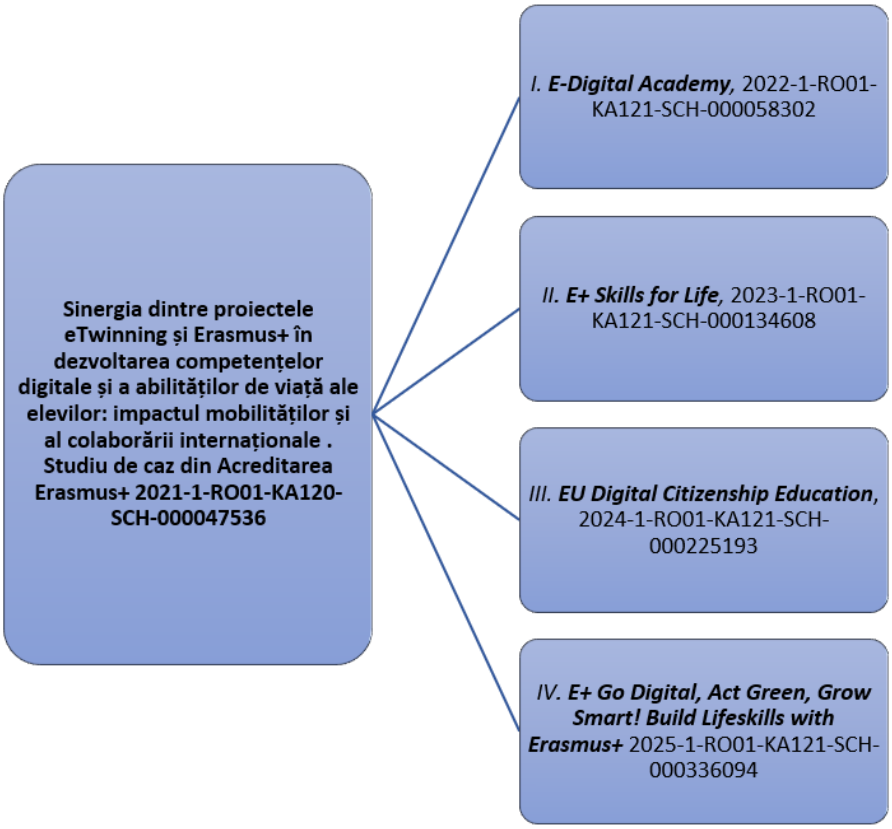


Figure No. 2.VI: Structure of the four Erasmus+ accreditation cycles (2022-2026) under Study 3

The results of the *Digital Competence Assessment Scale (SCD*) showed statistically significant differences between groups ($F(3.131)=9.746$, $p<.001$), with the combined group recording the highest scores, significantly higher than both the eTwinning group ($p=.001$) and the control group ($p<.001$). Teachers gave systematically higher scores than students ($t(84)=3.057$, $p=.003$).

The results of the *Life Skills Assessment Scale (LSAS)* showed statistically significant differences between groups across all subscales ($p <.001$ from the teacher's perspective), with the combined group obtaining the highest scores ($M=4.58$, compared to $M=3.66$ for the eTwinning group), both substantially exceeding the international population norm ($M=2.66$, Pearson et al., 2020). Unlike the SCD, on the LSAS students rated themselves significantly

higher than teachers rated them, suggesting a high level of self-confidence generated by participation in collaborative projects.

The results of the *Success Skills Rubrics* confirmed the same consistent hierarchy: the combined group outperformed the Erasmus+ group, which in turn outperformed the eTwinning group, both from the teacher's perspective and from students' self-assessments ($p < .05$ and $p < .001$, respectively). The largest difference between the two programmes was recorded on the creativity dimension (M(Erasmus+)=3.098 versus M(eTwinning)=2.587), suggesting that physical mobilities and direct intercultural contact create more favourable conditions for stimulating creative thinking. On this scale, an almost perfect metacognitive congruence was identified between the teacher's perspective and stud*ents' self-assessments (Z between -0.187 and -1.661; p > .09 for all dimensions).*

The integrated data analysis confirms the research hypothesis at the experimental stage: cumulative participation in eTwinning and Erasmus+ produces a synergistic effect superior to that of individual participation in either programme. Secondary hypothesis SH1 (linguistic competences) is confirmed through exclusive English communication within the mobilities and through the SCD results in the Communication, interaction, and collaboration area, while secondary hypothesis SH2 (collaboration and teamwork) is confirmed through the LSAS and Success Skills Rubrics results on the interaction and collaboration dimensions.

In addition to the pass rates mentioned above, Study 1 documented the thematic structure of the training course, organised into four modules: presentation of the European programmes and partner search, step-by-step use of the ESEP platform, writing and implementing eTwinning projects, and, respectively, quality criteria and eTwinning-Erasmus+ synergies, run online on the Google Classroom platform of the Bistrița-Năsăud Teachers' Training Centre, in two series, in 2024 and 2025.

Study 2 documented thematic practical applications structured around the UN's 17 Sustainable Development Goals, carried out weekly over the course of a school year, within the *eTwinning/Erasmus+ Project-Based Learning* elective class, with students working in turn on themes such as No Poverty, Quality Education, Gender Equality, Climate Action, and Partnerships for the Goals, within the Twinspace of the *O.S.H.T. 2.0* project.

Study 3 documented four Erasmus+ accreditation cycles, each with its own theme: *E-Digital Academy* (2022-2023), *E+ Skills for Life* (2023-2024), *EU Digital Citizenship Education* (2024-2025), and *E+ Go Digital, Act Green, Grow Smart! Build Lifeskills with Erasmus+* (2025-2026), with mobilities carried out in eight European countries, of which three

case studies were analysed in detail through the analysis of student work products (mobility journals, photographs, materials produced).

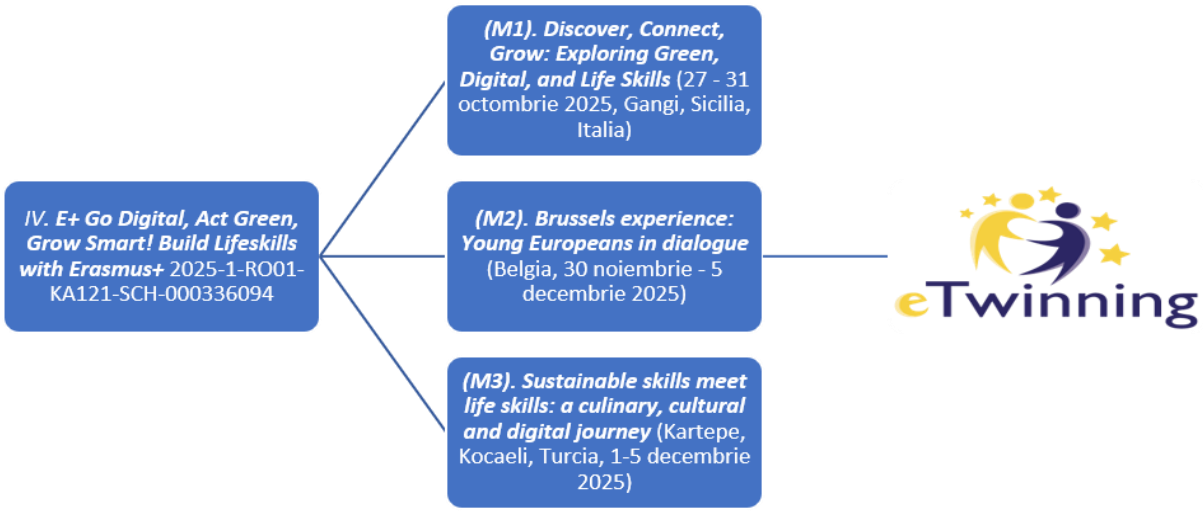


Figure No. 13.VI: *The three mobility flows of the E+ Go Digital, Act Green, Grow Smart! Build Lifeskills with Erasmus+ cycle (2025-1-RO01-KA121-SCH-000336094)*

The analysis by *DigComp* framework areas, carried out within the SCD Scale, confirmed that *Area 2 - Communication, interaction*, and collaboration represents the domain with the strongest impact from participation in European projects, while *Area 3 - Digital content creation* and *Area 5 - Problem solving and entrepreneurial spirit* constitute the domains with the greatest development potential for all participants, regardless of the type of European project in which they took part, a result with direct implications for the design of the educational recommendations formulated in Chapter VIII.

The *TI - Taking initiative* subscale of the *LSAS Scale* recorded the lowest scores in all groups and from both assessment perspectives, representing the dimension with the greatest development potential, a result convergent with the findings of Yaman et al. (2022), who identify initiative and creative thinking as the least developed domains in high school students. The gender analysis on the *LSAS Scale* revealed a differentiated pattern: from the teacher's perspective, female students obtained significantly higher scores than male students on all subscales, whereas from the self-assessment perspective, no significant gender differences

were recorded on any subscale, highlighting the value of the dual assessment perspective adopted in the research.

The impact of teacher training documented in Study 1 was directly reflected in the quality of eTwinning project implementation at school level, with graduates of the "*Introduction to eTwinning/ESEP*" programme subsequently becoming active coordinators of European eTwinning projects at "Petru Rareș" National College, Beclean, and at other schools in Bistrița-Năsăud County, confirming the multiplier effect of investment in continuing teacher training on the local educational ecosystem.

The eTwinning project *Brussels Experience: Young Europeans in Dialogue*, carried out as part of Study 2, made use of the project's Twinspace across all three phases of its associated Erasmus+ mobility (preparation, implementation, and post-mobility follow-up), constituting an example of good practice regarding the organic integration of the two European programmes, a synergy subsequently confirmed, at a quantitative level, by the systematic superiority of the combined group across all assessment instruments applied.

Table No. 70.VI. *Summary of the group hierarchy across the experimental stage's monitoring instruments*

Instrument / dimension	**1st place**	**2nd place**	**3rd place**	**Statistical significance**
SCD - total *self-assessment score*	Combined	Erasmus+	eTwinning	F(3.131)=9.746; p<.001
SCD - Area 2. Communication and collaboration	Combined	Erasmus+	eTwinning	Strongest impact
LSAS - total score (teacher's perspective)	Combined M=4.58	Erasmus+	eTwinning M=3.66	p<.001 all subscales
LSAS - TI subscale. *Taking initiative*	Combined	Erasmus+	eTwinning	Lowest overall score
Success Skills - creativity (teacher)	Combined	Erasmus+ M=3.098	eTwinning M=2.587	Largest difference
Success Skills - self-directed learning	Combined M=3.447	Erasmus+ M=3.197	eTwinning M=2.734	Graded progression
Success Skills - metacognitive congruence	All groups	–	–	Z between -0.187 and -1.661; p>0.09

CHAPTER VII
POST-EXPERIMENTAL STAGE. ANALYSIS AND INTERPRETATION OF THE EXPERIMENTAL DATA

The post-experimental stage aimed to assess the overall impact of the interventions through summative instruments: the standardised posttest, the SDiCoS Scale, and the Photovoice-based survey, carried out between February and April 2026.

Comparison of the overall posttest score revealed statistically significant differences between the four groups ($H(3)=25.134$, $p<.001$), with mean scores of $M=7.90$ for the Erasmus+ group, $M=7.88$ for the combined group, $M=6.99$ for the eTwinning group, and $M=6.51$ for the control group. Analysis of the progress between pretest and posttest (Kruskal-Wallis test, $H(3)=28.863$, $p<.001$) confirmed significant differences between groups, and post-hoc comparisons showed that the control group differs significantly from the eTwinning and Erasmus+ groups ($p<.0001$), while the differences between the three experimental groups did not reach the threshold of significance ($p=1.000$).

The result most relevant to the research hypotheses is the evolution of dimension D7. Life skills, which at pretest showed no significant differences between groups ($p=.280$), but at posttest became one of the most significant dimensions of the analysis ($H(3)=21.504$, $p<.001$). The Wilcoxon test for paired samples confirms significant progress on D7 for all three experimental groups (Erasmus+: $Z=-4.252$, $p<.001$; eTwinning: $Z=-3.294$, $p=.001$; combined: $Z=-3.737$, $p<.001$, with effect size $r=-0.815$, the strongest individual effect in the entire analysis and 0 regressions recorded, while the control group shows no significant progress ($Z=-0.279$, $p=.780$). A similar pattern is found for D6. Digital competences, where all experimental groups progress significantly ($r>0.50$ for all), unlike the control group ($Z=-0.210$, $p=.833$).

An important methodological aspect concerns the experimental mortality recorded in the control group, which decreased from N=323 at pretest to N=126 at posttest (a retention rate of 39%), while the experimental groups maintained a retention rate of 100%, suggesting that involvement in European projects generates sustained behavioural engagement among students.

The *SDiCoS Scale* (Tzafilkou et al., 2022), applied online to a sample of 173 students from the experimental groups, demonstrated excellent internal consistency ($\alpha=.933$, $\omega=.934$), with mean subscale scores ranging between $M=3.26$ (EV - Evaluation) and $M=4.01$ (SFA - *Search, Find, Access*), all above the scale's theoretical midpoint. Girls obtained significantly higher scores than boys on the SFA ($p=.020$) and PR-Protection ($p=.044$) subscales, with small

effect sizes. Positive and significant Spearman correlations across all pairs of subscales (rho values between .365 and .659) confirm the unitary nature of the measured digital competence construct.

The Photovoice-based survey (Wang and Burris, 1997), applied for the first time systematically to high school students in the context of physical Erasmus+ mobilities from Romania, generated a corpus of 72 photograph-text pairs (out of 108 invited students, a 66.6% response rate), analysed thematically according to the methodology of Braun and Clarke (2006). Twelve cross-cutting themes were identified, the most relevant being T-MAJOR (friendship as the primary value of the mobility experience, present in 38.9% of the corpus), T1 (identity transformation through mobility, 30.6%), and T3 (emerging European identity, 25%). These qualitative themes confirm and extend the quantitative posttest conclusions, indicating that the statistically measured effects correspond to authentic subjective experiences of identity and relational transformation.



Figure No. 4.VII. Example of a meta-photograph in the Photovoice material

The convergent analysis of the three instruments of the post-experimental stage (posttest, SDiCoS, Photovoice) leads to an affirmative answer to the central research question: the systematic and complementary use of digital technologies and collaborative activities within eTwinning/Erasmus+ projects determines the development of digital competences and life skills among high school students, an effect absent in the control group and documented convergently through external measurement, self-assessment, and personal narrative reflection.

Analysis by posttest dimension revealed a nuanced picture: the Erasmus+ group recorded significant progress on seven of the eight dimensions (with the exception of D3 - Discourse organisation), the eTwinning group on five of the eight dimensions, with particularly strong effects on D2 - Expression and argumentation ($Z=-5.454$, $p<.001$) and D6 - Digital competences ($Z=-5.214$, $p<.001$), and the combined group on four dimensions, including D7,

with the cleanest effect in the entire analysis (r=-0.815, 0 regressions). The control group progressed significantly only on the expressive-linguistic dimensions D3, D4, and D5, with no impact on the overall score or on dimensions D6 and D7.

At the item level of the SDiCoS Scale, mean scores ranged between M=3.01 (DAM4 - applying Creative Commons licences) and M=4.39 (SFA5 - viewing content on various devices), indicating a weaker self-perception of advanced digital competences (content creation, critical evaluation, intellectual property rights) and a high self-perception of basic digital operations (searching, accessing, file management). The confirmatory factor analysis (CFA) with six factors recorded moderate fit indices (CFI=.881, TLI=.866, RMSEA=.110), below conventional acceptability thresholds, but consistent with the theoretical structure of the DigComp framework, suggesting directions for psychometric refinement in future research.

Analysis of the photograph-text relationship typologies in the Photovoice corpus identified eight recurring patterns: productive divergence (33.3% of the corpus, photograph and text operating on different registers), maximum convergence (16.7%), narrative under-representation (13.9%), narrative over-representation (11.1%), the composite artefact (2.8%), the meta-photograph (1.4%), the resignified official photograph (6.9%), and the landscape without people (8.3%). The Photovoice method was popularised in Romania, in the context of eTwinning/Erasmus+ projects, through the guide by Velea and Alexandru (2017), developed by ANPCDEFP as part of the CONNECTOR 2017 guide series. The present research represents the first systematic empirical application of the method with high school students in the context of physical Erasmus+ mobilities carried out by schools in Romania.

Comparing the teacher's perspective with students' self-assessment, across the three instruments of the experimental stage, revealed three distinct patterns of agreement: on the SCD Scale, teachers gave systematically higher scores than students, suggesting self-criticism on the part of students regarding their digital competences; on the LSAS Scale, the pattern was reversed, with students rating themselves significantly higher than teachers did on most subscales, reflecting the self-confidence generated by participation in collaborative projects; and on the Success Skills Rubrics, an almost perfect metacognitive congruence was identified between the two perspectives, suggesting that European projects develop not only competences and skills, but also students' ability to assess them accurately, in agreement with Hattie's (2009) conclusions regarding the role of metacognition in school performance.

The 100% retention rate recorded by all three experimental groups between pretest and posttest, compared with the retention rate of only 39% for the control group, can be interpreted as a behavioural indicator of the engagement and motivation generated by participation in

European projects, offering an additional, behavioural argument in support of secondary hypothesis SH2 regarding the development of collaboration skills and the active involvement of students participating in eTwinning and Erasmus+ projects.

Beyond the three dominant themes already mentioned, the thematic analysis of the Photovoice corpus also identified: T5 - nature as an agent of memory, refuge, and metaphor (22.2%), T7 - informal and reciprocal peer-to-peer learning (22.2%), T2 - group cohesion versus individual experience (19.4%), T11 - topophilia, place as an anchor of affective memory (19.4%), T8 - secondary destinations as peaks of subjective significance, often unplanned (13.9%), T4 - institutional memory and the desire for permanence (11.1%), T9 - narrative laconicism (8.3%), T10 - the resignification of the official artefact (6.9%), T6 - education through memory, referring to visits to commemorative sites such as Auschwitz (4.2%), and T12 - gratitude as a mature affective dimension, the rarest theme in the sample, but the only one involving an explicit moral perspective on the Erasmus+ programme itself (4.2%).

The thematic synthesis reveals that the mobility experience is described by students predominantly as a relational rather than a geographical or strictly formal educational experience: regardless of destination, duration of mobility, or type of scheduled activity, participants describe the Erasmus+ experience in relational terms, the people met, the friendships formed, the moments shared, with the T-MAJOR theme (friendship) being almost twice as frequent as T5 (nature, place) and almost three times as frequent as T7 (formal learning). This thematic hierarchy empirically confirms, through qualitative methodology, the profoundly socio-relational nature of the impact of mobilities on the development of life skills among high school students.

Table. Cross-cutting themes identified in the Photovoice corpus (N=72 photograph-text pairs)

Code	**Cross-cutting theme**	**N**	**Share (%)**
T-MAJOR	Friendship as the primary value of the mobility	28	38.9
T1	Identity transformation through mobility	22	30.6
T3	Emerging European identity	18	25.0
T5	Nature as an agent (memory, refuge, metaphor)	16	22.2
T7	Informal and reciprocal learning (peer-to-peer)	16	22.2
T2	Group cohesion vs. individual experience	14	19.4
T11	Topophilia - place as an anchor of affective memory	14	19.4
T8	Secondary destinations as peaks of significance	10	13.9

Code	Cross-cutting theme	N	Share (%)
T4	Institutional memory and the desire for permanence	8	11.1
T9	Narrative laconicism	6	8.3
T10	Resignification of the official artefact	5	6.9
T6	Education through memory (Auschwitz)	3	4.2
T12	Gratitude as a mature affective dimension	3	4.2



Figure No. 5.VII. Friendship as the central value of the Erasmus+ experience

CHAPTER VIII
CONCLUSIONS AND EDUCATIONAL RECOMMENDATIONS

This doctoral thesis started from a dual premise: on the one hand, the worrying statistical reality that places Romania last in the European Union in citizens' basic digital competences (27.7% compared to the European average of 55.6%), and, on the other hand, the pedagogical conviction, grounded in over fifteen years of implementing eTwinning and Erasmus+ projects at "Petru Rareș" National College, Beclean, that these European programmes can contribute systematically and measurably to remedying this gap.

The first personal contribution consists of the design and validation of an integrated assessment instrument for digital competences and life skills (a pretest/posttest with seven dimensions), applied to 449 students in the pre-experimental stage and 252 students in the post-experimental stage. The integrated character of the instrument, structured around the Romanian language and literature curriculum for grades IX–X, constitutes a novelty compared with current assessment practice, which generally separates linguistic dimensions from digital and socio-emotional ones.

The second contribution consists in the translation, adaptation, and application in the Romanian educational context of three internationally standardised instruments, with the authors' explicit consent: *LSAS – Life Skills Assessment Scale* (after Kennedy, Pearson, Brett-Taylor, and Talreja, 2014), *SDiCoS – Students' Digital Competence Scale* (after Tzafilkou, Perifanou, and Economides, 2022), and the *Success Skills Rubrics* (PBLWorks, 2021), alongside the adaptation of the *Digital Competence Assessment Scale* (SCD) based on the DigComp 2.2 framework. The dual assessment perspective, self-assessment and external assessment, adopted for all three instruments, generated comparable data, relevant to the agreement and divergence between the two sources.

The third contribution consists in the design and implementation of a longitudinal programme for training teachers in the use of the eTwinning/ESEP platform (Study 1), run over two consecutive editions (2024 and 2025), with a total of 128 trainees and pass rates of 89.39% and 83.9% respectively, demonstrating that teacher training constitutes an indispensable pedagogical prerequisite for the successful implementation of collaborative European projects.

The fourth contribution consists in the use of the Photovoice methodology in the post-experimental assessment of the impact of Erasmus+ mobilities on students, bringing, for the first time in the Romanian specialised literature, a systematic qualitative documentation of the

subjective experience of Erasmus+ mobilities through this methodology, on a corpus of 72 photograph-text pairs.

The fifth contribution consists in the proposal and empirical validation of an integrated eTwinning–Erasmus+ educational ecosystem model, in which the two programmes are treated not as separate entities, but as complementary subsystems: eTwinning ensures the continuity and depth of virtual collaboration, while Erasmus+ ensures the intensity and authenticity of the physical experience. The consistent hierarchy of groups across all instruments and all dimensions, the combined group superior to the Erasmus+ group, which is in turn superior to the eTwinning group, constitutes the empirical validation of this model. The eTwinning project O.S.H.T. 2.0, awarded Runner-up at the 2025 European eTwinning Prizes Gala, constitutes external recognition of the quality and practical relevance of the experimental approach designed.

The general hypothesis of the research is convergently confirmed by four complementary data sources: the three continuous monitoring instruments from the experimental stage (SCD, LSAS, Success Skills Rubrics) identified a synergistic effect of cumulative participation in eTwinning and Erasmus+, superior to individual participation in either programme, while the posttest from the post-experimental stage provided the most direct quantitative evidence: all three experimental groups recorded statistically significant progress on D6. Digital competences and D7. Life skills, while Group 4 - Control showed no significant improvement on either of these two dimensions (effect sizes $r>0.50$ for all experimental groups). The most relevant individual result of the entire research is the trajectory of dimension D7, from total equivalence between groups at pretest ($p=.280$) to a highly significant difference at posttest ($H(3)=21.504$, $p<.001$), ruling out the hypothesis of an initial advantage for the experimental groups. Regarding the central research question, the answer is affirmative, based on the convergence of the four data sources.

The first secondary hypothesis (SH1), concerning the development of linguistic competences, is partially confirmed: dimensions D1, D2, D3, and D5 show significant progress in at least one of the experimental groups, with distinct profiles per group (the Erasmus+ group shows the broadest profile of linguistic progress, while the eTwinning group excels in expression and argumentation). The absence of a standardised pre-post instrument dedicated to English language competences is acknowledged as a methodological limitation. The second secondary hypothesis (SH2), concerning the development of collaboration and teamwork skills, is confirmed by the convergence of the LSAS, Success Skills Rubrics, posttest (the strongest effect in the combined group, $r = -0.815$), and Photovoice data.

The research demonstrated that eTwinning and Erasmus+ are not interchangeable in terms of their pedagogical effects: Erasmus+ produces significant progress on seven of the eight posttest dimensions and superior effects in creativity, while eTwinning excels in argumentative competence and online collaboration. Metacognitive congruence was also identified as an indicator of the reflexive maturity generated by international collaborative projects, along with confirmation of Kolb's (1984) experiential learning cycle model in explaining the trajectory of progress on the life skills dimension. The selective progress of the control group on the expressive-linguistic dimensions, with no impact at the overall level or on digital competences and life skills, confirms that traditional instruction produces specific gains, without generating an integrative effect comparable to that of European projects.

Based on the data obtained, recommendations are formulated for several levels of the education system. Teachers are recommended to systematically and curricularly integrate eTwinning projects into their teaching activity, to use eTwinning and Erasmus+ synergically and complementarily, to design digital activities that explicitly target the less developed dimensions identified (critical evaluation of digital information, digital content creation), and to adopt the dual assessment perspective (external assessment and self-assessment). School management is recommended to create institutional ecosystems favourable to participation in European projects through coherent school policies and distributed leadership, and to invest in the continuing training of teachers. At the level of policymakers, it is recommended that eTwinning and Erasmus+ projects be explicitly integrated into the formal curriculum of the high school cycle, and that a national system be developed to recognise and valorise the digital competences and life skills acquired through European projects.

The research also presents a series of explicitly acknowledged methodological limitations: the quasi-experimental design, in which students were not assigned to groups randomly, but on the basis of pre-existing participation in projects; the experimental mortality recorded in the control group (39% retention, compared with 100% in the experimental groups); the difference in format between the paper-based pretest and the online posttest; the absence of a standardised pre-post instrument for English language competences; as well as the existence of a corpus of collected data (the DLS Scale, the follow-up survey with mobility participants, the focus groups with students and with eTwinning/Erasmus+ ambassadors) not fully exploited in the present thesis, for reasons of thematic focus and the scope of the work.

Future directions for investigation include a longitudinal analysis of the impact of mobilities and projects on the same cohorts of students after graduation, extending the research to other school subjects and other levels of education, developing a standardised instrument

dedicated to measuring intercultural collaboration skills, as well as the full exploitation of the data corpus already collected (the DLS Scale, focus groups, SELFIE data) through subsequent scientific articles and papers.

In conclusion, this doctoral thesis makes a significant contribution to understanding the impact of eTwinning and Erasmus+ projects on the digital competences and life skills of high school students, validating the claim that these European programmes, pedagogically integrated and systematically valorised, produce measurable, statistically significant, and practically relevant effects.

Dissemination of the research results took place, in part, prior to the thesis defence, through scientific publications, notably a book chapter dedicated to the transversal approach within the Erasmus+ Accreditation of "Petru Rareș" National College, Beclean, published in the collective volume *Transversal perspectives in education. Skills for the future* (Roman, Lucaci & Ursa, coord., Presa Universitară Clujeană, 2026), which empirically demonstrates that the transversal approach to European projects generates an integrated profile of digital, green, and personal balance competences for the high school graduate.

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