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Instructional Design in Pre-Service Teacher Education: A Qualitative Study of Simulated Projects Based on the eTwinning Framework

Progettazione didattica e formazione iniziale: un'analisi qualitativa di esperienze simulate ispirate al modello eTwinning

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Abstract
In the context of Initial Teacher Education (ITE), the ability to design collaborative and digitally integrated learning activities is recognized as a key professional competence. This study examines instructional design simulations developed by 225 first-year students enrolled in a Primary Education degree program, within a teaching technologies laboratory conducted during the 2024/2025 academic year. As a final task, students were required to design a project inspired by the eTwinning model, using a structured planning template and evaluated through a rubric aligned with the five criteria of the National Quality Label. The study has a dual aim: first, to document the laboratory experience and its educational value in developing collaborative design competencies; and second, to assess the quality of the student-designed projects across five core dimensions—collaboration, technological integration, pedagogical approach, curricular alignment, and assessment design. Adopting a mixed-methods approach, the analysis highlights promising outcomes, including a strong command of digital tools and a clear preference for student-centered, active learning methodologies. Nonetheless, some challenges persist, particularly in the areas of structuring meaningful collaboration between partner schools and designing effective assessment strategies.

Keywords: Instructional design; Initial Teacher Education; Digital competence; eTwinning.

Riassunto
Nel contesto della formazione iniziale degli insegnanti, la capacità di progettare attività didattiche collaborative e digitalmente integrate rappresenta una competenza fondamentale. Il presente studio analizza le progettazioni didattiche simulate elaborate da 225 studenti del primo anno del Corso di Laurea in Scienze della Formazione Primaria, realizzate nell'ambito del laboratorio dell'Insegnamento di Tecnologie didattiche per la Scuola dell'infanzia e primaria durante l'a.a. 2024/2025. L'attività finale ha previsto la creazione di una progettazione ispirata al modello eTwinning, supportata da una scheda strutturata e valutata tramite una rubrica basata sui cinque criteri del National Quality Label (NQL).
L'obiettivo dello studio è duplice: da un lato, documentare l'esperienza laboratoriale e il potenziale formativo della progettazione collaborativa; dall'altro, valutare la qualità dei progetti rispetto a cinque dimensioni chiave: collaborazione, uso delle tecnologie, approccio pedagogico, integrazione curricolare e valutazione. L'analisi, condotta attraverso un approccio misto, evidenzia risultati promettenti, con una diffusa padronanza degli strumenti digitali e una propensione verso metodologie attive e centrate sullo studente. Persistono tuttavia alcune criticità, in particolare nella strutturazione della collaborazione tra scuole partner e nella definizione delle strategie valutative.

Parole chiave: Progettazione didattica; Formazione iniziale degli insegnanti; Competenza digitale; eTwinning.

Credit author statement
This article is the result of a joint effort. Specifically, sections 1 and 2 were written by De Franches; sections 3, 4, 5, 6, and 7 by Pitrella; and section 8 was authored by Gulbay.

1. Introduction

In today's educational landscape, initial teacher education is required to address increasingly complex and evolving challenges: from the growing digitalization of teaching practices, to the creation of inclusive and intercultural learning environments, to the development of transversal competencies and soft skills. To meet these demands, it is essential to provide future teachers with innovative tools and meaningful learning experiences that enable them to design effective, creative, and collaborative learning pathways.

Within this context, digital technologies play a crucial role in shaping dynamic, interactive, and cooperative educational settings (Cinganotto, 2017; Blazic & Verswijvel, 2017). Designing with intention means not only mastering tools and methodologies, but integrating them into a coherent, reflective instructional plan that responds to students' needs (Prieto & Cirugeda, 2017). Instructional design, therefore, is a fundamental competence for teachers, as it allows them to build meaningful and inclusive learning experiences.

eTwinning[1], the European platform for online school collaboration, fits squarely within this framework, offering a secure digital environment for the development of shared projects between schools. It promotes intercultural dialogue, critical use of technology, and the growth of professional learning communities (Ancillotti et al., 2023; Crisan, 2013; La Marca & Gulbay, 2021). The eTwinning experience goes beyond the technical dimension: it provides an authentic pedagogical space that fosters key transversal skills such as collaboration, intercultural communication, problem solving, and critical thinking (Vuorikari et al., 2011; Özen & Özkara, 2023; Nucci et al., 2021).

This study is situated within a university laboratory focused on educational technologies, carried out with first-year students in the Primary Education degree program. The learning experience involved the simulation of instructional designs inspired by the eTwinning model and assessed through a rubric based on the five criteria of the National Quality Label (European School Education Platform, 2024).

The aim of this article is twofold: first, to document the laboratory process and the formative potential of collaborative design; second, to analyse the quality of the students' instructional projects, with particular attention to the development of design, digital, and reflective competences. The analysis seeks to explore the educational potential of integrating eTwinning into initial teacher education, emphasizing the intersection of digital tools, innovative pedagogical approaches, and European citizenship.

2. Theoretical framework

Instructional design constitutes a central competence in the professional profile of teachers and represents a foundational element of educational practice. It involves the ability to create intentional and coherent learning paths that respond to students' needs through the integration of content, methodologies, and tools (Marzano et al., 2022). In this perspective, designing is not merely a technical act but a reflective and creative process, requiring teachers to make conscious pedagogical choices.

In Initial Teacher Education, instructional design plays a key role in the construction of professional identity. It allows students to experience the teaching profession in guided and safe environments, promoting the acquisition of transversal, metacognitive, and organizational skills. University-based laboratories, in this sense, represent privileged spaces for learning by doing, while reflecting on the relationship between theory and practice (Greggio & Lampugnani, 2024).

Within this framework, the digital competence of teachers emerges as an essential requirement for effective and inclusive teaching. The European DigCompEdu framework (Punie, 2017) provides a detailed

1 eTwinning is a European educational community that promotes collaboration among schools and educators through online project-based initiatives. It offers a digital platform where teachers, school leaders, and librarians from participating countries can connect, communicate, co-design projects, and engage in professional development activities. As an integral part of the Erasmus+ program, eTwinning supports cross-border cooperation, fosters innovation in teaching practices, and encourages the meaningful integration of technology in education. https://school-education.ec.europa.eu/en/etwinning - (https://etwinning.indire.it/).

vision of teachers' digital competencies, divided into six key areas, including the pedagogical use of technology, creation and selection of digital resources, digital classroom management, technology-enhanced assessment, and the development of students' digital skills.

The promotion of such competencies can be supported by environments and tools that combine instructional design, collaboration, and the use of ICT. Among these, eTwinning stands out as an innovative educational platform that enables teachers to co-design shared learning activities between European schools, fostering cooperation, European citizenship, and intercultural understanding (La Marca & Gulbay, 2021).

The five European criteria of the NQL, which focus on collaboration between schools, use of technology, pedagogical approach, curricular integration, and assessment, offer a valuable reference for guiding and evaluating instructional design experiences within teacher education (European School Education Platform, 2024). As a common standard for evaluating eTwinning projects across Europe, these criteria encourage a structured and reflective approach to instructional design, making its various dimensions more visible and analyzable.

A national mapping conducted across 21 Italian universities participating in the *eTwinning ITE* initiative (Ancillotti et al., 2023) identified three models of curricular integration: informative, applicative, and collaborative. A subsequent case study focusing on five universities showed that the collaborative model, in which student teachers co-design projects with school tutors during internships, strongly supports the development of design, digital, and reflective competences in authentic learning contexts. These results are echoed in the work of Izgı-Onba ılı et al. (2022), who found that participation in international eTwinning projects supported the professional, digital, and intercultural development of student teachers, particularly through peer interaction, co-design practices, and reflective engagement. In Italy, a recent study by Sammarro (2021) evaluated the impact of a university-based eTwinning initiative through a pre- and post-intervention design. The findings revealed a significant improvement in students' digital skills, particularly in communication, collaboration, and digital content creation. The experience also reinforced students' orientation toward project-based learning, conscious use of technology, and international cooperation.

While much of the literature has focused on the impact of eTwinning on in-service teacher development, several studies (Kearney & Gras-Velazquez, 2015; Fabbro et al., 2021; Napal-Fraile et al., 2024) highlight benefits for pre-service teacher education as well, especially in enhancing collaborative, reflective, and digital practices. However, in the Italian context, systematic research on the integration of eTwinning into university curricula remains relatively limited, despite increasing interest.

At the European level, significant initiatives are emerging. In Slovakia, Fabus et al. (2024) emphasize the importance of incorporating eTwinning into university curricula to promote a digitally cooperative teacher professionalism. In Croatia, Milkovi (2024) explores the use of eTwinning's virtual space in teacher education courses, highlighting its value in supporting reflective and design-oriented approaches.

At the supranational level, the *eTwinning for Future Teachers* initiative—launched in 2012 and strengthened in the following years—has promoted the structured integration of the platform into teacher education programs through formal agreements between universities and National eTwinning Units. The documented experiences (Vuorikari, 2011; Papadakis, 2016; Boffo et al., 2018) show a positive impact on students' motivation, digital competence, and instructional design awareness.

In many European universities, eTwinning is now embedded in curricula through subject-specific modules or internships. Students actively participate in projects, both with pupils and in peer-to-peer collaboration at the international level, developing collaborative, digital, and reflective competences (Tosi & Baptista, 2023). In this regard, Tosi (2023) provides a comprehensive theoretical overview of the potential of eTwinning in initial teacher education, highlighting how the platform supports authentic, intercultural, and collaborative learning and fosters competences for sustainability, inclusion, and digital citizenship.

eTwinning thus emerges as an authentic learning environment, enabling student teachers to engage in instructional design practices focused on collaboration, critical use of technology, and shared meaning-making. Through simulated or real projects—and thanks to the platform's structured environment, including digital workspaces and evaluation rubrics—students can develop an integrated pedagogical vision that combines methodological innovation, educational sustainability, and European citizenship (Izgı-Onbasılı et al., 2022).

Based on this theoretical framework, the present study aims to assess the quality of simulated instructional designs developed by first-year students enrolled in the Primary Education degree program, within the context of a laboratory on educational technologies for early childhood and primary school.

The pedagogical foundation of this study draws on socio-constructivist and experiential learning theories (Vygotsky, 1978; Kolb, 2014). Learning is conceived as a participatory and reflective process in which knowledge is co-constructed through collaboration and authentic tasks. Within this perspective, instructional design becomes both a cognitive and formative practice that enables future teachers to integrate theory and practice through reflection-in-action (Schön, 2017) and shared design activity. The adoption of the eTwinning framework aligns with this approach, as it promotes cooperative, intercultural, and technology-supported learning experiences

The evaluation was conducted using a rubric inspired by the five National Quality Label criteria of eTwinning, with the goal of exploring its formative and metacognitive potential in teacher education, and identifying the most developed and most critical dimensions of the students' design work. The research is guided by the following questions:

– RQ1. To what extent do the simulated instructional designs meet the quality criteria defined by the National Quality Label?
– RQ2. Which dimensions of instructional design appear to be most consolidated among student teachers, and which show recurring weaknesses?
– RQ3. How can the eTwinning-based rubric be used as a formative tool to support the development of reflective and design-oriented competences in future teachers?

3. Context and participants

The laboratory was held during the second semester of the 2024/2025 academic year, as part of the course *Educational Technologies for Early Childhood and Primary School*, offered in the first year of the Primary Education degree program at the University of Palermo. It represents an integral component of the official curriculum, aimed at developing the foundational design and digital competences that students will later consolidate and apply during internships and advanced didactics courses. This laboratory had a total duration of 16 hours, delivered across four sessions. The aim was to foster the development of instructional design skills, with a particular focus on the meaningful use of digital technologies, curricular integration, and peer collaboration.

Before the start of the laboratory activities, students received introductory training on the eTwinning platform, focusing on registration via the European School Education Platform (ESEP), exploration of the TwinSpace functionalities, and understanding of the platform's main educational features. This training, conducted with the support of eTwinning ambassadors, enabled students to acquire the basic competences needed to navigate and use the digital environment effectively.

During the laboratory, 225 students, organized into small groups of four or five participants, worked on simulated instructional design projects inspired by the eTwinning model. They were guided by a structured planning template and evaluated according to the European quality criteria. The activities included guided exercises, simulations, and group discussions, with active and collaborative use of the TwinSpace. All materials produced were uploaded to a dedicated group on the ESEP platform, serving as documentation of the developed projects.

4. Instructional tool: the etwinning design template

As part of the final activity of the laboratory, students were asked to use a planning template inspired by the official eTwinning project model. The tool was introduced with the aim of supporting the design of collaborative teaching projects in a European context, integrating elements of digital pedagogy, interdisciplinary approaches, and active citizenship.

The template consists of structured sections that guide students in defining key design components:

project identification and summary, learning objectives and subject areas, operational planning and management, proposed digital tools, communication methods, assessment strategies, and dissemination plans.

From an educational perspective, the template was presented not only as a technical aid for planning, but also as a potential metacognitive and reflective tool. It is hypothesized that its structure can support the creation of coherent and meaningful instructional paths, encouraging the integration of educational technologies, active methodologies, and transversal goals. Moreover, the focus on concise formalization of design content may contribute to the development of communication, organizational, and assessment-related skills, all of which are crucial in the teaching profession.

The introduction of the template in initial teacher education was therefore conceived as an opportunity to explore environments and tools that promote shared design practices and educational innovation. Among its aims, the present study seeks to examine to what extent this tool was perceived and used by students from a formative standpoint.

5. Methodology

This research adopts a qualitative-descriptive design with a specific focus on evaluation. The goal is to analyze the quality of simulated instructional designs developed by student teachers, using a rubric based on the five NQL criteria of eTwinning.

The dataset consists of 52 instructional design templates, developed by students as an authentic final task for the laboratory. Each template documents a simulated project structured around key dimensions of instructional design, including the definition of learning objectives, curricular integration, pedagogical approach, use of digital technologies, planned collaboration strategies, and assessment methods.

Data coding was carried out independently by each author, applying the evaluation rubric to all design templates. Each evaluator assigned a score to each criterion based on a close and systematic reading of relevant content in the student work. The scores were then discussed and compared within the research group, in order to resolve any interpretive discrepancies and reach a shared consensus. Before conducting the full analysis, the evaluators jointly examined two sample instructional design templates to align their interpretation of the rubric criteria and ensure scoring consistency. Each rater then independently assessed all remaining templates. A subsequent comparison of scores showed a satisfactory level of agreement among raters. This intersubjective comparison ensured greater consistency and reliability in the application of the rubric.

Once final scores were established, the data were analyzed on both a descriptive and qualitative level. Descriptive analysis included the calculation of frequencies, means, and score distributions for each criterion and each project, in order to identify general trends. In parallel, a qualitative analysis was conducted to explore the textual content in depth, highlighting recurring features, strengths, and areas for improvement in relation to the rubric descriptors. The study was conducted within a mandatory laboratory course that forms part of the official curriculum of the Primary Education degree program. No additional consent procedures were required, as the activity was part of regular coursework and did not involve the collection of personal or sensitive data. All student projects were anonymized prior to analysis, and the results were processed and presented in aggregated form.

Descriptive statistics were calculated using Microsoft Excel. Qualitative analysis was conducted manually through close reading and thematic grouping of the textual data included in the design templates. Average scores across the five rubric criteria were computed as arithmetic means. All data were processed in anonymized and aggregated form.

6. Evaluation of instructional designs based on the five nql criteria

In this study, the quality of the simulated instructional designs was assessed through a rubric developed on the basis of the five official NQL criteria of eTwinning. These criteria, recognized at the European level for evaluating collaborative educational projects, were selected for their pedagogical relevance, as they promote project coherence, methodological innovation, curricular integration, and authentic collaboration.

As the projects under analysis were not actually implemented on the eTwinning platform but created as simulated exercises by pre-service teachers, the criteria were adapted accordingly:

– Collaboration between partner schools: evaluated in terms of the clarity and quality of the proposed collaborative strategies, even in the absence of real implementation with school partners.
– Use of digital technologies: assessed based on the coherence between the indicated ICT tools, the learning objectives, and the collaborative aims of the project.
– Pedagogical approach: analyzed with reference to the originality of the proposal, use of active methodologies, and the degree of student agency foreseen.
– Curricular integration: considered through alignment with the school curriculum, internal coherence of the project, and the emphasis on key competences.
– Expected outcomes and assessment: while the original criterion calls for documented evidence of implemented activities, for the purposes of this simulation, it was adapted to assess the clarity of expected outcomes, the presence of (even hypothetical) assessment strategies, and reflection on the project's potential impact.

The rubric was structured on a four-level evaluation scale (1 = basic; 4 = excellent), as shown in Table 1.

Criterion	1 – Basic	2 – Intermediate	3 – Advanced	4 – Excellent
1. Simulated collaboration	Not described or vague.	Limited or one-sided collaboration.	Clear collaborative goals with shared tasks.	Well-structured, meaningful collaboration with shared products.
2. Use of technology	Not present or only mentioned.	Tools listed but not pedagogically integrated.	Technology supports learning objectives.	Technology is strategically used to enhance collaboration and pedagogy.
3. Pedagogical approach	Traditional and teacher-centered.	Some active learning strategies.	Well-planned activities, active student role.	Innovative design with rich, student-led and interdisciplinary methods.
4. Curricular integration	No connection to curriculum.	Vague or partial connections.	Clear links to subjects and goals.	Strong alignment with curriculum and skill development.
5. Expected results and evaluation	General outcomes, no evaluation.	Outcomes present, vague evaluation.	Clear goals and evaluation strategies.	Specific, coherent outcomes with meaningful assessment plan.

Tab. 1: Rubric for the evaluation of instructional designs.

Below are the results of the analysis, organized according to each of the five criteria of the eTwinning National Quality Label, combining quantitative data with qualitative observations.

6.1 Collaboration

The graph related to the collaboration criterion (Fig.1) shows a concentration of scores in the intermediate levels of the scale (2 and 3), with most projects evenly distributed between limited collaboration and structured—but not yet excellent—collaboration. Only one project reached the maximum score (4), while three were evaluated at the minimum level (1).

Projects that received a score of 2 included basic or underdeveloped forms of collaboration, such as material exchange between classes, a few occasional video calls, or the mere mention of potential interaction, without operational details or actual shared construction. In several cases, collaborative activities were described in general terms, emphasizing intentions but lacking concrete articulation of tasks.

Projects scored at level 3, on the other hand, showed a higher degree of collaborative structure. Common features included mixed groups between partner schools, reciprocal tasks, asynchronous activities through

forums and virtual spaces, or regular synchronous meetings such as weekly video conferences. Some projects included co-created products such as eBooks, digital posters, collaborative quizzes, or forms of peer feedback.

The only project to receive a level 4 score presented a well-structured collaboration, with clearly defined roles, integrated interactions, and shared reflection throughout the process.

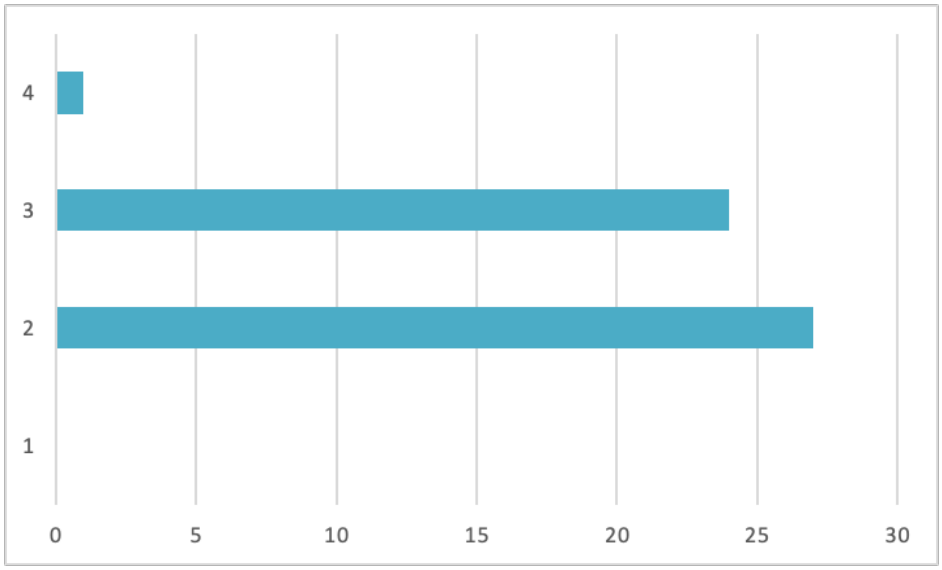

Fig. 1: Distribution of scores for the collaboration criterion

6.2 Use of Digital Technologies

The analysis of the scores related to the use of digital technologies (Fig. 2) reveals a medium-high level of competence. Most projects (n = 42) received the highest score (4), demonstrating not only familiarity with a wide range of ICT tools, but also their functional and coherent integration within the instructional design.

The European School Education Platform (ESEP), along with its TwinSpace environment, served as the main operational space for managing collaborative activities, providing students with a shared digital infrastructure to document and coordinate their projects. These tools were complemented by synchronous communication platforms (Zoom, Google Meet, Microsoft Teams); multimedia creation apps (Canva, Book Creator, Genially); collaborative environments (Google Drive, Padlet); and interactive assessment tools (Kahoot, LearningApps, Quizizz).

In many cases, the use of technologies enabled the simulation of authentic learning experiences, such as collaborative eBook or podcast production, virtual exhibitions, and digital storytelling activities. The integration of diverse tools also fostered the diversification of communication modes, personalized accessibility, and active student engagement.

However, seven projects showed a more descriptive or poorly justified use of technology, with generic tool lists and limited explanation of their pedagogical function. This highlights the need to further strengthen methodological reflection on the educational use of ICT in teacher training programs.

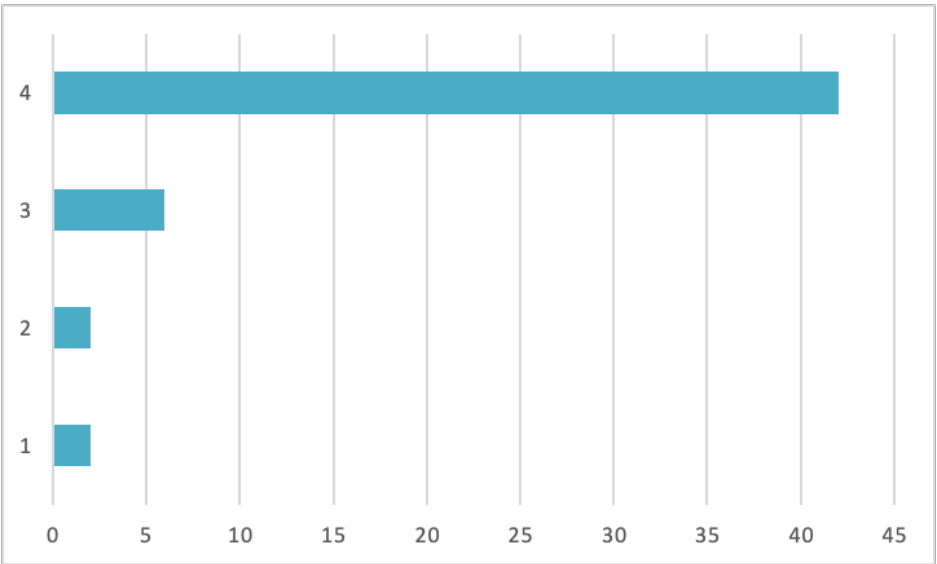

Fig. 2: Distribution of scores for the use of technology criterion

6.3 Pedagogical Approach

The analysis of the pedagogical approach (Fig. 3) adopted in the simulated instructional designs was based on an integrated reading of the sections concerning learning objectives, proposed activities, and overall project structure. Particular attention was given to the degree of methodological innovation, the centrality of the students, and the variety of instructional strategies used.

The results show a prevalence of designs evaluated as *Advanced* or *Excellent*. Specifically, twenty-three projects fell into the *Excellent* category, characterized by strong student agency and the use of active and cooperative methodologies such as cooperative learning, the Jigsaw method, collaborative writing, and the production of podcasts or eBooks.

Another sixteen projects were assessed as *Advanced*, displaying a coherent methodological structure and the use of participatory strategies, although not always fully original or integrated into a complex instructional design.

Ten projects received a score of 2, showing a more linear structure in which student participation was often limited to executive tasks. In these cases, activities appeared less articulated and less consistent with an active learning approach.

Finally, three projects were rated at level 1, characterized by a predominantly transmissive approach, limited variety of activities, and a teacher-centered instructional vision.

Overall, the data indicate a positive trend toward more reflective and participatory teaching approaches, although the variability in scores reflects the early stage of the students' teacher education journey.

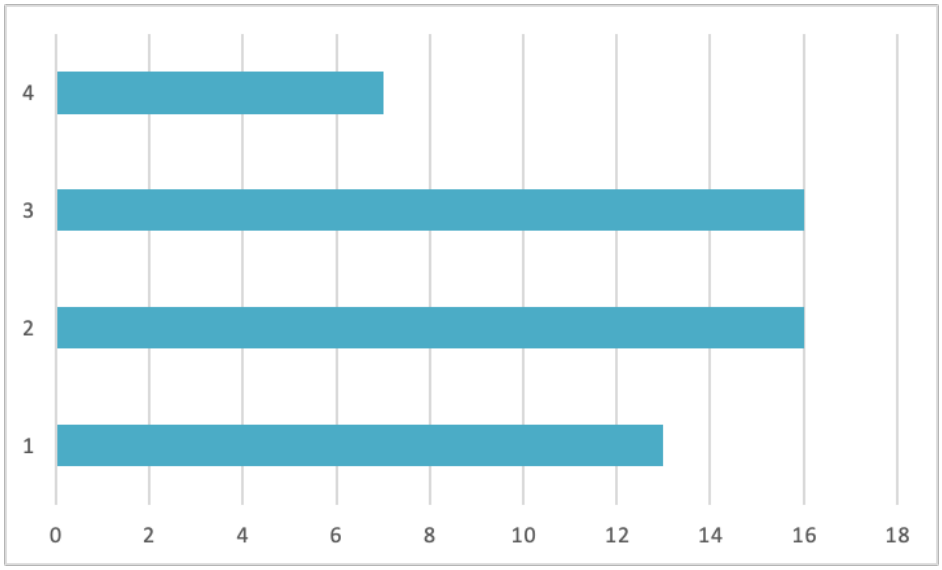

Fig. 3: Distribution of scores for the pedagogical approach criterion

6.4 Curricular Integration

With regard to curricular integration (Fig. 4), the assigned scores show a general tendency toward advanced levels, with the majority of projects (n = 36) classified at level 3 and a significant number (n = 16) reaching level 4. This distribution indicates that many students were able to design activities aligned with disciplinary goals and capable of enhancing relevant competencies.

In several cases, integration was achieved through connections to specific subject areas, such as foreign languages, science, civic education, and cultural geography—often combined in an interdisciplinary approach. At the same time, many instructional designs explicitly referred to the development of transversal competencies, such as collaboration, intercultural communication, critical thinking, and creativity, thereby fostering authentic learning and promoting active citizenship.

For example, foreign language activities were frequently aimed at facilitating communication with European partner schools, while initiatives related to cultural heritage encouraged reflection on belonging and diversity.

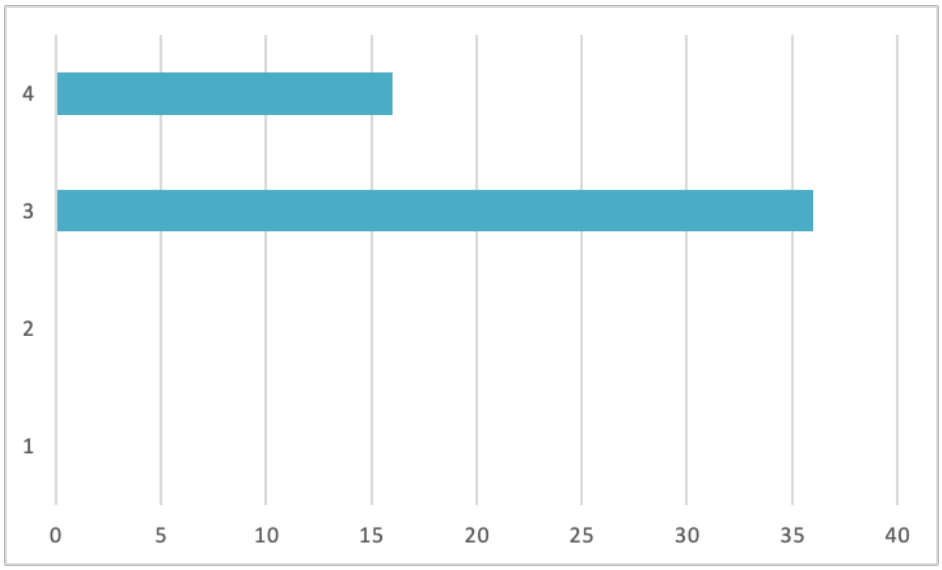

Fig. 4: Distribution of scores for the curricular integration criterion

6.5 Expected Results and Evaluation

The analysis of the fifth criterion (Fig. 5) revealed that the evaluation component remains, for many students, an area still under development. Although almost all projects include some reference to the expected learning outcomes, in more than half of the cases (n = 28) such references are generic or only loosely defined, lacking a clear connection with the proposed instructional strategies.

Only a limited number of projects (n = 7) presented a coherent and well-structured description of evaluation strategies, including criteria, tools, and intended purposes. In these cases, assessment was conceived as an integral part of the instructional design, aligned with both the educational objectives and the proposed activities.

By contrast, the remaining projects (n = 17) showed an intermediate formulation, where evaluation was mentioned but insufficiently developed—for example, by referring generically to observation or monitoring without further elaboration.

These findings suggest that, despite a generally good level of planning in terms of activities and tools, the evaluation phase is sometimes perceived as secondary. This outcome is, however, understandable considering that the students involved are in their first year of teacher education and are gradually building awareness of assessment as a strategic element of the instructional process.

Overall, the "Expected Results and Evaluation" criterion highlights the need to strengthen the role of assessment in initial teacher training by promoting formative evaluation practices that are coherent, inclusive, and meaningful.

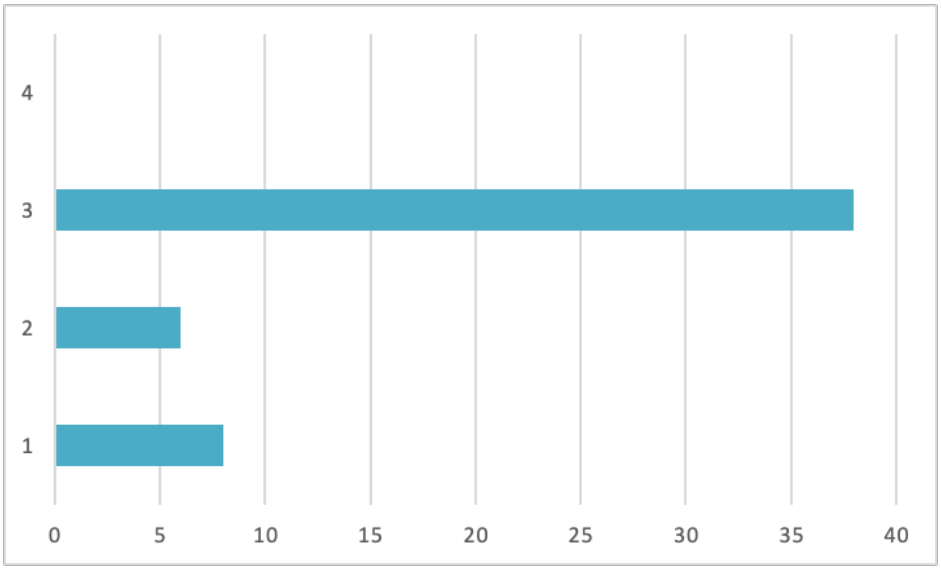

Fig. 5: Distribution of scores for the expected results and evaluation criterion

6.6 Distribution of Average Scores

To provide an overall summary of the quality level of the instructional designs, the average score for each project across the five rubric criteria was calculated. The frequency analysis of the averages (Fig. 6) reveals a distribution generally centered around intermediate and upper-intermediate values.

Specifically, the most frequent average score was 2.8 (n = 15), followed by 3.2 (n = 11) and 3.0 (n = 7). Only two projects recorded very high averages (3.6), while the lowest scores (1.6 and 2.0) appeared in only one project each, thus representing exceptions. Most of the instructional designs fall within the intermediate (2) to advanced (3) levels, indicating an overall positive trend.

This result is particularly significant considering that the projects were developed by first-year students within a university course focused on educational technologies. The findings reflect a solid understanding of the key elements of collaborative instructional design and an initial ability to translate theoretical principles into coherent project structures.

While some areas for improvement emerge—especially regarding the clarity of evaluation strategies and the structuring of collaborative processes—the overall data suggest a promising design capacity, aligned with the expected learning outcomes for this stage of the teacher education program.

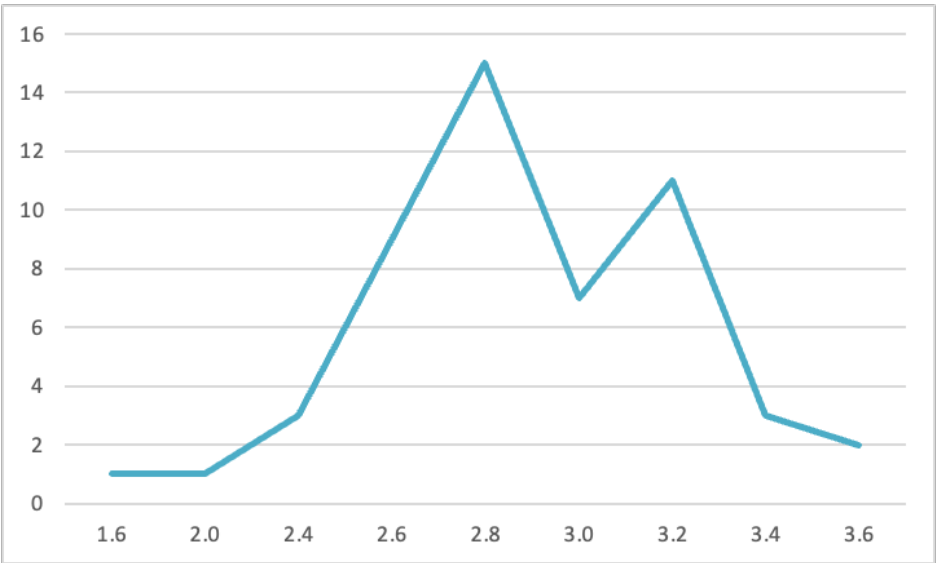

Fig. 6: Distribution of average scores across the five evaluation criteria

7. Discussion

The findings of the analysis highlight an overall satisfactory quality level of the simulated instructional designs, especially considering that these were developed by first-year students within a university laboratory on educational technologies. The distribution of scores, mostly concentrated around the intermediate levels of the evaluation scale, reveals both promising formative potential and areas for natural growth at this early stage of training.

Regarding collaboration, it was present in nearly all designs, although not always in advanced forms. Many projects showed a clear collaborative intention, often accompanied by activities such as reciprocal tasks, videoconferences, and forums. However, only in a few cases did this dimension evolve into truly co-constructed processes. Designing collaboration—not as a simple exchange but as a joint construction of meaning and products—remains a key developmental area in teacher education.

As for the use of digital technologies, this was one of the highest-scoring areas, reflecting students' strong familiarity with digital tools and their functional integration in instructional design. The variety of tools used—from collaborative platforms to multimedia production tools—confirms the relevance of the lab experience. However, in some cases, a deeper methodological reflection to support technological choices was lacking.

The pedagogical approaches adopted show a positive trend toward active, cooperative, and student-centered methods. Many projects reflect the internalization of principles explored in the lab, through group work, hands-on activities, educational games, and digital creativity. Although some traditional models still persist, the overall outlook is encouraging.

Curricular integration also appears well-developed: the projects showed clear links to school subjects—particularly foreign languages, science, geography, and civic education—often interpreted through an interdisciplinary lens. This suggests a growing awareness of instructional design as a driver of transversal and authentic learning, moving beyond isolated activities.

The criterion concerning Expected Results and Evaluation emerged as the most challenging area. While learning objectives and evaluation tools were generally present, only some projects demonstrated full coherence between the proposed activities and their corresponding assessment strategies. This difficulty is understandable, given the students' early stage in teacher education, but it does highlight the need to further strengthen this area in future training.

Overall, the distribution of aggregate scores (mainly between 2.6 and 3.2) confirms the presence of a solid foundational competence in instructional design, which can be further consolidated. The laboratory proved to be an effective educational setting for introducing future teachers to collaborative design practices supported by technology and grounded in interdisciplinarity.

Most previous studies on eTwinning and Instructional Design have focused on in-service teachers and their professional development (Kampylis et all, 2012; Gilleran, 2019). This study offers a complementary perspective by examining how the eTwinning framework can be applied within Initial Teacher Education through simulated instructional design projects. By exploring pre-service teachers' design processes in a university laboratory context, the research highlights the formative potential of structured planning tools and European quality criteria for developing reflective and collaborative competences in future teachers.

8. Conclusions

Beyond the analytical findings, it is essential to highlight the effectiveness of the eTwinning project template as a planning support tool. Its structured, guided format encouraged reflective thinking and helped students organize their instructional design processes, providing a meaningful opportunity to translate methodological and pedagogical principles into practical, operational terms. Even in the absence of real classroom implementation, the activity contributed to the development of students' instructional, digital, and organizational competencies.

The evaluation rubric, aligned with the National Quality Label (NQL) criteria, served a dual function: it ensured coherence and transparency in project assessment, while also functioning as a metacognitive scaffold. By encouraging students to reflect critically on the quality of their design choices, the rubric promoted deeper engagement. The presence of graduated performance levels facilitated formative feedback and heightened students' awareness of areas for improvement.

Starting from the next academic year, the laboratory experience will evolve to include authentic collaborative design activities—initially through partnerships with national schools and progressively expanding to international collaborations via the eTwinning platform. This development will allow students to engage with the concrete, cooperative, and intercultural dimensions of teaching, thereby enhancing their digital, instructional, and interdisciplinary skills.

Notably, the eTwinning design environment fosters interdisciplinarity as a powerful lever for integrating knowledge, skills, and methodological approaches across subject areas (Nucci et al., 2021, p.83). Working on projects that require meaningful connections between disciplines—such as languages, science, civic education, and technology—supports the development of a more holistic and systemic understanding of teaching, aligned with the complex realities of contemporary school contexts.

Within this framework, the use of English as a vehicular language is expected to play an increasingly significant role—not only as a tool for cross-border communication but also as a key professional competence in a multilingual and European educational landscape.

Moreover, beginning in the second year of the degree program, students will have the opportunity to apply the competencies acquired in the laboratory through internships. This continuity will allow them to test the real-world applicability of their designs in classroom settings, reinforcing the connection between theory and practice.

From this perspective, the integration of structured planning tools and evaluation rubrics grounded in shared European frameworks can serve as a stable reference point for consolidating the core competencies expected of future teaching professionals.

Nevertheless, it must be acknowledged that this study is based on simulated instructional designs and does not include actual implementation of the projects. While this represents a methodological limitation, it also opens the door for future research incorporating classroom observations and feedback from both teachers and students to assess the perceived effectiveness of the instructional designs.

Ultimately, the laboratory experience should be understood not merely as a design exercise, but as an authentic learning opportunity—one that fosters in future teachers a more systemic, reflective, and collaborative professional mindset, well-aligned with the challenges and expectations of contemporary European education.

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