AN INNOVATIVE E-TIVITY FRAMEWORK FOR AN ACTIVE LEARNING ENVIRONMENT IN HIGHER EDUCATION: ACONHE PRIN PROJECT EXPERIMENT

UN FRAMEWORK INNOVATIVO DI E-TIVITY PER L'APPRENDIMENTO ATTIVO NELL'ISTRUZIONE SUPERIORE: LA SPERIMENTAZIONE DEL PROGETTO PRIN ACONHE

Anna Dipace
Università Telematica Pegaso
anna.dipace@unipegaso.it

Teresa Savoia
Università Telematica Pegaso
teresa.savoia@unipegaso.it

Ilaria Fiore
Università Telematica Pegaso
ilaria.fiore@unipegaso.it

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ABSTRACT
The PRIN AcOnHE project developed an online formative assessment framework for blended courses. A PRISMA-based review on the e-tivity model (Salmon, 2002) provided the theoretical basis. E-tivities were designed at Pegaso University following a five-stage structure with e-moderators. Preliminary results show enhanced engagement, effective formative assessment, and adaptability across disciplines.

Il progetto PRIN AcOnHE ha sviluppato un framework di valutazione formativa online per corsi blended. Una revisione basata su PRISMA del modello di e-tivity (Salmon, 2003) ha fornito la base teorica. Le e-tivity sono state progettate presso l'Università Pegaso seguendo una struttura in cinque fasi con il supporto della figura dell'e- moderator. I risultati preliminari mostrano un maggiore coinvolgimento, un'efficace valutazione formativa e un'adattabilità a diverse discipline.

KEYWORDS
Formative assessment, e-tivity, higher education, active learning environment, e-moderator
Valutazione formativa, e-tivity, istruzione superiore, ambiente di apprendimento attivo, e-moderator

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Introduction

In recent years, innovative tools and methodologies have proven fundamental in promoting students' active engagement and self-reflective assessment. Nowadays, educators can rely upon several teaching strategies which can be unfold with the support of these tools and methodologies and can apply to different and specific contexts, responding to learners' educational needs. Within higher education, in particular, especially following the Covid-19 emergency, teaching and learning practices have been influenced by the growing adoption of innovative technologies, and this tendency has spread to the extent that it has been recognised as a profound "online movement" (Edisherashvili et al., 2022). In the current context, it appears outdated, if not impossible, to imagine educational systems that entirely exclude digital tools (Raviolo et al., 2024). However, it has become more and more crucial to identify and validate protocols and instruments for assuring high quality to any educational activity or adhere to existing and successful ones.

Therefore, the study of the potentialities offered by digital tools to innovate educational processes, especially in higher education, becomes particularly relevant (Chick et al., 2020). In this regard, Hamilton et al. (2016) highlight the importance of supporting both teachers and students with clear guidelines concerning the skills, knowledge, and approaches they need to succeed in the digital age (Brusilovsky & Henze, 2007). Technologies possess a multifaceted and often unpredictable nature; thus, their inclusion in teaching-learning processes could make such processes more complex (Dlab & Hoić-Božić, 2016). Over time, this has led to the development of various reference frameworks, models, and theories used in both research and practice (Dlab & Hoić-Božić, 2016). For example, Limone (2021) refers to a university model that considers teaching experiences and technological progress. This is a hybrid model in which digital and traditional practices coexist in a system of mutual influence (Limone, 2021). Technologies are the main communication channel with students and a tool to transmit knowledge. The task assigned to technologies is to offer formative moments to the media, thus allowing all stakeholders to enter the educational process. Digital mediation has now become essential in teaching-learning dynamics, therefore, the contents should be oriented to this new contextual need (Limone, 2021).

In this regard, the Technology, Pedagogy, and Content Knowledge (TPACK)

framework is created to facilitate the integration of technologies into teaching and student engagement based on the continuous interaction of three knowledge domains: technological, pedagogical, and content knowledge. This approach aligns with the e-tivity model developed by Gilly Salmon (2002), which promotes active and interactive learning through motivating, engaging, and goal-oriented activities designed and facilitated by an e-moderator, serving as a key tool for educators to foster active learning. E-tivities offer structured frameworks for interactive and participatory online learning. Based on TPACK, they leverage technologies as key resources to promote the practical application of knowledge through authentic, individual, and collaborative tasks, thus enhancing student engagement in traditional, blended, and fully online educational settings. This synergy between theoretical frameworks and operational tools allows for the optimization of technology use in education, turning challenges into opportunities for meaningful learning.

In particular, Salmon states that «the five-stage model provides an example of how participants can benefit from increasing skill and comfort in working, networking and learning online, and what e-moderators need to do at each stage to help them to achieve this success. The model shows how to motivate online participants, to build learning through appropriate e-tivities and to pace e-learners through programmes of training and development» (Salmon, 2013, p.10). Digital tools enable active participation in learning both individually and in groups, by employing essential and comprehensive principles and procedures, where students collaborate with one another (Garcia, 2020). The idea is not to rely entirely on dialogue with the teacher to acquire knowledge, but rather to construct it directly starting from the students (Salmon, 2002). However, «this requires the definition of methodologies and the identification of practices rooted in experimental research rather than in improvised intuitions» (Dipace et al, in press, p.1).

1. Integrating a multi-modal Framework design in Higher Education

Teaching modules, especially those conducted online, require solid planning. A systematic approach to their design reduces the likelihood that students will encounter difficulties related to expectations and also avoids frustrations stemming from the online experience, while lowering dropout rates among

course participants (Kelly, 2011). Instructional design models thus play a crucial role in academic systematic planning. In this context, e-tivities model is useful for guiding the course structure and each student's path toward a specific topic, for eliminating distractions, and for providing feedback. In teaching practices, this model proves advantageous in promoting meaningful and active learning (Mayes et al., 2009).

Besides, this approach uncovers the importance of the online learning community, where each member contributes to the collective construction of knowledge through interactions and sharing of unique experiences and points of view (Pelizzari & Carenzio, 2024, p.113). «It is a model that challenges the traditional idea of passive transfer of contents, leaning towards a shared construction of knowledge among students» (Dipace et al., in press, p.2).

A careful structuring of the e-tivity design is crucial to achieving these goals. It must be based on the flexibility of the approaches to be used and an appropriate intertwining and balance of synchronous and asynchronous work phases (Pellizzari & Carenzio, 2024). Both aspects are fundamental: the asynchronous context, which is characterized by the absence of simultaneous timing among students, is essential for enabling effective participation at different times and with personalized rhythms (Pellizzari & Carenzio, 2024). On the other hand, synchronous moments also play a key role, as they serve to simultaneously engage students through videoconferencing platforms or real-time chats in a dialogue between students and teachers (Oztok et al., 2013; Dipace et al., in press).

Indeed, alternating synchronous and asynchronous communication offers different benefits in terms of interaction and socialization, resulting in greater opportunities for sharing ideas and opinions over extended periods and in less stressful settings in which students can collaborate with peers. Moreover, designing learning environments and tools focused on students' specific and differentied needs increases their motivation to complete tasks with greater enthusiasm, care, and depth (Gleason & Suvorov, 2011; Lee, 2011).

When designing teaching paths according to the e-tivity model, some focal points must be taken into account. First, all projects must be designed by respecting three recurring elements (Salmon, 2013):

- *Purpose*: specific learning objectives to be achieved through the completion of the activity;

- *Task*: a task with concrete and detailed instructions regarding the actions to be taken;

- *Respond*: feedback and possible revision of the work based on the task's completion.

Furthermore, the instructional design should unfold by following five phases, starting from the welcoming and initial involvement of participants by the teacher – or the e-moderator - to the final reflection on the students' learning journey (Salmon, 2002). These elements help make e-tivities clear, balanced and at the same time encouraging for participants (Salmon, 2013).

Implementing the five-phase model in a university course design brings several challenges to course designers and teachers, but, once it has been established, it allows benefits for all the actors involved, teachers and learners. It is based on the premise that online learning goes beyond merely performing tasks on a computer and includes the interaction among neural, cognitive, motivational, affective, and social processes (Hoyos, 2016; Limone 2021). Moreover, learning must be understood as a process where transformation occurs by leaps and bounds and in parallel with learning a topic with and through others (Hoyos, 2016; Limone 2021). In this way, learning processes will succeed if there is an appropriate balance between learning through and with technology (Hoyos, 2016).

The design of e-tivities involves preparing a framework enriched by a significant number of activities focused on the construction of complex knowledge (Raviolo et al., 2024). But it ultimately offers course designers and e-moderators full visibility on the learners progresses and the opportunity to follow the system at each stage, while learners feel in control of their own learning, focusing on tasks and activities (Salmon, 2011).

Teaching is based on the principles of Learning Design (McKenney & Reeves, 2012) and supported by mediators who guide the teacher in formulating learning paths enhanced by digital tools, considering learning objectives, instructions, timing, tools, roles, learning resources, and assessment methods defined in advance (Sansone & Cesareni, 2020).

2. Active Online Assessment in Higher Education – AcOnHE PRIN project

Active Online Assessment in Higher Education – AcOnHE 2022 - PRIN project, was built with the goal of designing and validating a formative assessment framework

based on the e-tivities model that supports effective evaluation of learning outcomes in higher education, suitable for online, blended, and in-person learning. The principal investigator of the project is prof. Paolo Raviolo, from eCampus university. Based on careful planning, an e-tivities model was created, supported by detailed guidelines for its use. The experimentation is currently underway at Pegaso Digital University, where it has been implemented in two online training programs. The adopted methodological framework and the tools developed for the research have first been deployed in one course and, on the basis of the first results, are currently being replicated in other courses of the same institution.

From a broader point of view, the AcOnHE project develops through some steps, with the ultimate aim of developing operational guidelines for the implementation of an e-tivity model in higher education context, which includes the aspects mentioned above. These steps, which will separately be dealt with in the following paragraph, were organized as follows:

First, a review of the literature on the key constructs of the project was developed. Following the PRISMA Statement, the review focused on the constructs of e-tivity, portfolio and e-portfolio, and the role of the e-moderator. It was a preliminary step to fully understand the elements constituting these tools, and their potentialities and risks when used in real context.

Then, on the basis of the outcomes of the review, an e-tivity model was designed, validated and developed, accompanied by the e-portfolio tool for reflective assessment. It was mainly derived from Salmon's model, but reviewed with other similar studies validated in Italian university contexts and, also, adopted to the specific needs of a few selected courses at Pegaso Digital University;

After that, the experimentation of the model was started. It was developed within two courses. The experimental phase allows for testing the effectiveness of the proposed tools and refining both the model and the related methodological guidelines. A pre- and post-test questionnaire was also administered to participants for data collection, relevant to their background variables and personal preferences in technological assisted teaching.

Finally, operational guidelines for educational use and possible integration into the University's teaching practices will be created.

The following paragraphs highlight the project phases which have been just introduced.

3. Key constructs of the AcOnHE PRIN project

The AcOnHE project aims to develop an effective model for measuring learning outcomes in higher education, applicable in online, blended, and in- person teaching contexts. It began with a systematic review of the international scientific literature, based on the PRISMA statement, to clearly and operationally define the research's key constructs: e-tivity, e-portfolio, and e-moderator.

Indeed, e-portfolios and e-tivities prove to be essential tools for monitoring and promoting continuous learning (Raviolo et al., 2024). In particular, the study conducted on portfolios and e-portfolios served as the starting point for subsequent project development actions aimed at creating effective courses based on active and collaborative learning approaches with various forms of formative assessment that are also useful for summative evaluation (Raviolo et al., 2024). In this context, the cited study identifies the e-portfolio as a dynamic tool, usable in paper or digital format, to collect and organize learning evidence (such as journals, assignments, and tasks), with the aim of developing a digital version integrated with course data to support both final assessment and monitoring of student progress (Barrett, 2011).

The use of the e-portfolio can be correlated with the e-tivities model. It can support students' reflective practices on the one hand and offer tutors and instructors a repository useful for developing formative assessment, while also contributing to increasing the reliability of the final evaluation. These functions align with the definition of e-tivity that emerged from the second study conducted by the research group (Dipace et al., in press). E-tivity is identified as an online task aimed at dynamic and interactive learning (Dipace et al., in press). These activities involve interaction and reflective dialogue between students and instructors, working in a technology-mediated environment.

In this regard, the role of the teacher within the e-tivities model and their progressive transition into the role of e-moderator has also been explored. The e-moderator manages and promotes sustainable and pedagogically sound e-learning practices by consciously and engagingly using technologies such as Virtual Learning Environments, forums, wikis, and blogs (Pellizzari & Carenzio, 2024). The literature analysis revealed several main roles: designer of online educational activities; facilitator and moderator of students' online interactions; guide for students in the development of structured online activities; supporter of collaborative learning; and figure who encourages participation and continuous feedback (Dipace et al., 2025).

Figure 1 thus visually explains the key constructs emerging from the systematic reviews conducted by the research group, composed of the Pegaso Digital University and the eCampus University members, which, together with the University of Florence, are carrying out the AcOnHE project. Also, the figure shows the cyclical and inter-dependent relationship connecting the three core components of the project: e-tivity, e-portfolio, and e-moderator.

E-Moderator: this figure initiates the cycle and is responsible for designing and facilitating asynchronous collaborative activities, encouraging participation, and providing targeted feedback. He/she starts synchronous activities, assesses students' readiness and encourages participation through engaging prompts. She/he fosters peer interaction via collaborative e-tivities, intervenes to clarify or expand ideas when needed, and helps structure emerging knowledge by synthesizing contributions and guiding reflection (Salmon, 2007). His/her role is essential in activating and sustaining the entire learning process.

E-Tivity: these are integrated online collaborative activities with clearly defined objectives. They engage learners, promote critical reflection, and generate content and experiences that feed into the e-portfolio.

E-Portfolio: this is a dynamic collection of evidence and learning progress, built upon the outcomes of the e-tivities. It enables learners to reflect on their experiences and supports autonomous, personalized learning pathways.

From the analysis of evidence within the portfolio, the e-moderator intervenes in a targeted way, closing the cycle and ensuring authentic, personalized, and reflective learning for each student.

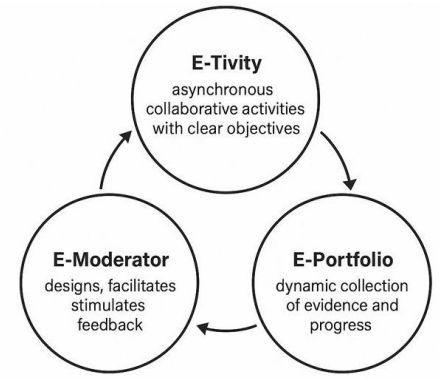

Figure 1. Interconnections of key constructs for AcOnHE project

4. Designing E-tivities for Pegaso Digital University courses

For the advancement of the AcOnHE project, a model of e-tivity was designed to be tested with the students enrolled at Pegaso Digital University.

A specific learning goal was chosen for the e-tivity implementation, based on the objectives reported in the syllabus of the target courses. Also, the learning goal was identified for its transversal nature and suitability to different activities, allowing both theoretical and practical components. The structure included both synchronous and asynchronous teaching moments, as indicated in the operational model developed by Gilly Salmon (2002). The goal thus identified was *to understand, learn and apply the Taxonomy of Learning Objectives* elaborated by Bloom (1956) and revised by Anderson and Krathwohl (2001).

The *Taxonomy of Learning Objectives* is a hierarchical classification system that organizes cognitive skills into levels of complexity and specificity, ranging from basic knowledge recall to higher-order thinking such as analysis, evaluation, and creation. It serves as a foundational framework for designing educational objectives, assessments, and learning activities aimed at promoting deeper and more structured learning. Understanding Bloom's Taxonomy helps students – and future teachers - become more aware of their learning processes, enabling them to set clearer goals, develop higher-order thinking skills, and engage more effectively in critical analysis, problem-solving, and creative tasks. It empowers them to take a more active and strategic role in their learning journey.

Students enrolled at Pegaso Digital University were invited to participate voluntarily in the experimentation. Also, they were informed that their participation would not influence the final assessment to the course. Voluntary participation and the absence of summative assessment was essential to foster authentic engagement, reduce performance anxiety, and encourage intrinsic motivation. As anticipated, the project was designed to be carried out both synchronously and asynchronously – with activities including video meetings, forum participation, and individual and group tasks. Group works played a significant role for the project. They were essential to promote cooperative learning, enabling peer interaction, shared responsibility, and collaborative problem-solving skills development.

The integration of these different activities responded to the need to allow different kinds of interactions. So, if the videomeetings were meant for interactions with the e-moderator, forum participation was left for the students to

interact more spontaneously. For the same reason, video meetings were scheduled in the initial phases of each new task. This allowed students to be reached by clear and straightforward information from the e-moderator, supplying both practical information about the tasks and knowledge content base for them to build upon. Forum participation followed each initial phase. Forums were created, and in each forum, there was a clear indication of the tasks and actions expected by the participants. However, they were free to respond and share information with each other for a given amount of time. In that amount of time, there was no direct interference from the e-moderator.

Macro-Planning Phase: Defining the Experimental Framework

For the design of the e-tivities, the three following actions were suggested by Salmon (2013):

a) Creation of a storyboard

The first action in designing an e-tivity is the creation of the storyboard and worksheets defining objectives, timing, and activity content. Based on the syllabi of the selected courses, the general and specific objectives were identified. The general objective of the e-tivity was identified as "understanding the taxonomy of learning objectives and applying it to real contexts". The objectives of the e-tivity were themselves were defined with reference and the support of the taxonomy (Anderson & Krathwohl, 2001). So, they moved from basic goal of "understanding", which involves simple cognitive processes, to the most complex goal of "applying" and "assessing", which involve complex cognitive processes.

A time schedule was built for the overall activity, and declined into specific time units for each established phase. The estimated duration for the activities was one month. Three online meetings were planned, interspersed with two periods of exchange and co-construction of knowledge through the online platform, specifically prepared and monitored by instructors.

b) Scaffolding

Next, a scheme was developed to guide the construction of activities. The structure included online meetings alternated with collaborative phases between students, outlined as follows:

- *Access and Motivation:* 1st online meeting to present the course, explain the objectives, describe the activities, and activate the forum.
- *Online Socialization*: 2 weeks of collaborative work among students to

complete the first task.

- I*nformation Exchange*: 2nd online meeting to discuss the first task with the instructor and possibly revise the work.
- *Knowledge Construction*: 2 more weeks of collaborative work among students for the final task.
- *Development*: 3rd online meeting to present the final work with feedback.

This framework was integrated into the model adopted by Pellizzari and Carenzio (2024) and a design was built that is shown in Figure 2.

- *Spark* (*Access and Motivation*): Initial online meeting to introduce the course content and the first task objective.
- *Online Activity* (*Online Socialization and Information Exchange*): Students socialize and familiarize with the tools (e.g., chat) and begin sharing information.
- *Collaboration and Participation* (*Knowledge Construction*): Students actively, creatively, and collaboratively co-construct their knowledge.
- *Plenary - Summary* (*Development*): Final online meeting to present the students' work to the instructor.

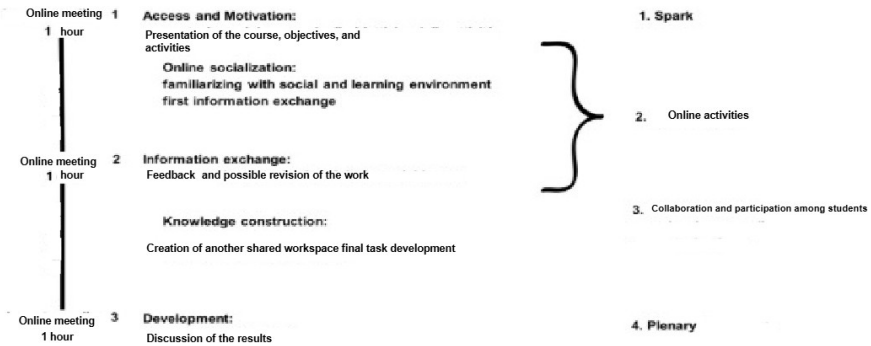

Figure 2. Macro-design scheme of the AcOnHE project

c) Activation of the input (spark)

Finally, the third essential element suggested by Salmon's model (2013) is called a *Spark*. A spark is an initial engaging activity, which is essential for a good start of the project. It is meant to introduce the activities by arising students' interests

towards them. That’s why it has to be captivating, quick and engaging.

4.1 Experiment Description

Besides the general outline that has just been reported, which was considered as a macro-framework for the implementation, the experimentation also involved a micro-design, which detailed goals, method, instruments, content and timing for each action to be undertaken. Structurally, the experimentation included three main phases.

The first consists of a synchronous meeting, useful to present the educational framework and activate participant motivation, followed by an asynchronous digital socialization activity on a forum to be completed within 14 days. The intervention, designed this way, combines preliminary data collection through a semi-structured questionnaire with the construction of group dynamics through moderated interactive tasks and familiarization with the proposed digital tools—especially the forum set up on the university platform.

The second phase aims to consolidate the acquired skills through an analytical review of the results from Phase 1 and a practical activity in collaborative instructional design based on the *Taxonomy of Learning Objectives*. The approach includes a one- hour synchronous webinar for information exchange, followed by a two-week asynchronous forum-based knowledge co-construction phase, with gradual tasks guiding the groups in developing their instructional design.

The phase concludes with a final synchronous meeting (close-up) for reflecting on the development of acquired competences and a hybrid self-assessment activity —partly synchronous and partly asynchronous— through a post-test semi-structured questionnaire (via Google Forms) and a reflective post produced with Wooclap during the synchronous session.

In February 2025, the experimentation began within the *Education Research* course at Pegaso Digital University. The first implementation was meant as a pilot study, useful to test the instruments and the design model. It involved 16 female students aged between 19 and 47, of whom 81.3% were enrolled in the first year of the degree program, 12.5% in the second year, and 6.3% in the third year.

The synchronous meetings were conducted via videoconferencing, using the university's platform. In this online space, students had the opportunity to interact with the instructor, who acted as an e-moderator, in an interactive and

spontaneous way, using the microphone, webcam, and chat features provided by the platform.

The first meeting began with the “spark,” an ice-breaking activity during which both the instructor and the students introduced themselves by identifying with a geographical place across the world. This activity was later resumed asynchronously within the forum activated on the platform, accessible to the students, where they posted the task in written form in the following weeks. This allowed them to become familiar with the tool and initiate interaction and collaboration processes with peers by commenting on each other's responses. It served as a preparatory exercise for the subsequent activity, which focused more directly on the learning goal of the e-tivity.

After the theoretical explanation provided by the instructor, the students deepened their understanding by reading the materials provided and selecting a learning objective from *Taxonomy of Learning Objectives* to describe in the forum, accompanied by a practical example. This task was later the subject of reflection and discussion during the second online meeting, in which the e-moderator reviewed the forum contributions to revisit the topic and launch the second part of the e-tivity, focused on applying taxonomic objectives to instructional design.

The use of concrete and practical examples to introduce the topic helped the students, who in the following two weeks worked in groups of four people each, focusing on one of the specific objectives from *Taxonomy of Learning Objectives* (remember, understand, apply, analyze, evaluate, create). The instructor prepared a shared Google Drive worksheet for each team, in which they were to indicate the chosen topic, the general and specific objectives of the designed activity, the type of assessment created, a description of the assessment and an example of the task (how it is structured, what it requires from students), and the pedagogical rationale (why this assessment helps achieve the objective).

From the analysis of the tasks created, it emerged that topics related to scientific-technological areas were predominantly chosen.

In May 2025, a second experimentation is taking place, on the basis of the results achieved by the pilot study.

5 Data collection and analysis

Two semi-structured questionnaires were administered during the e-tivity phase.

They were meant to collect some necessary information and to compare initial and final data. These questionnaires help understand whether the e-tivity model, as designed and implemented, was effective and if, in turn, it could be adapted and replicated in other contexts.

More specifically, the initial questionnaire, in an anonymized fashion, was intended to provide an overview of the participants' demographic data and their level of experience and knowledge regarding the content of the e-tivity, as well as the method of activating the learning process. Moreover, it explored their willingness to interact with the instructor, collaborate with peers, familiarity with digital tools and web applications, and their preferences for receiving feedback.

Similarly, the semi-structured questionnaire administered at the end of the experimentation partly readdressed the aspects investigated in the initial one, in order to detect any changes over the course of the activities. In addition, a section was dedicated to exploring the relationship established between the students and the figure of the e-moderator, investigating participants' perceptions of this new teaching role.

In the initial data collection phase, participants were asked about the motivation that led them to take part in this type of activity. The survey revealed that for 6.3% of the participants, the motivations were respectively: engaging in dialogue and collaboration with others, enriching their own learning, curiosity and interest in the subject matter, and improving specific skills useful for their educational or professional paths. Meanwhile, 18.8% were motivated by the desire to acquire new knowledge related to a new learning experience; 25% participated to apply what they had learned in a professional and/or personal context; and 37.5% identified all of the above motivations as relevant to their participation.

Based on these findings, motivations can be grouped into three main clusters: social and personal interest motivations; theoretical and practical motivations; and multidimensional motivations. More than a third of the participants did not limit themselves to a single reason but acknowledged multiple simultaneous motivations — the desire to learn, improve, collaborate, etc. — highlighting that the expectations for the proposed training activity address a wide range of educational and professional needs.

Cluster	Motivation	Interpretation
1	Collaboration, Curiosity/Interest	*Social and Personal Interest Motivations*: individuals driven by a desire for interaction or by personal interest
2	Applying what has been learned, Acquiring new knowledge	*Applicative and Theoretical Motivations*: participants seeking to apply or deepen their knowledge
3	All the options	*Multidimensional Motivations*: individuals with multiple overlapping motivations, without a single predominant one

Figure 3. Motivational Cluster Division

Subsequently, participants were asked what they expected to learn from the proposed e-tivity.

12.5% of respondents stated that they expected to acquire new theoretical knowledge on the topic, while 43.8% expected to gain practical skills applicable to real-world contexts. Another 43.8% indicated that they expected to achieve all the proposed learning outcomes, namely: improved collaboration and teamwork skills, strategies for solving problems effectively, greater confidence in applying what they had learned, a new approach to tackling complex situations, acquisition of new theoretical knowledge on the topic, and practical skills applicable to real-world contexts.

No participant stated that any of the proposed options were inconsistent with their initial expectations.

Comparing these results with the final questionnaire showed that, upon completion of the e-tivity, 60% of participants confirmed that they had significantly achieved their expectation of learning new theoretical knowledge related to the topic, 50% reported having acquired practical skills applicable to real-world contexts, 50% indicated having improved their collaboration and teamwork abilities, 40% felt more confident in applying what they had learned, 40% recognized a new approach to facing complex situations, 30% stated they had learned new strategies for solving problems effectively, and 30% felt competent across all the mentioned areas. No participant reported having learned nothing regarding the areas identified in the questionnaire.

Thus, there is strong consistency between initial motivations and the expected/final learning outcomes: the training path successfully met the needs for comprehensiveness, practicality, and applicability that had emerged during the initial phase. The absence of negative responses in the final test further reinforces

the pedagogical validity of the proposed e-tivity.

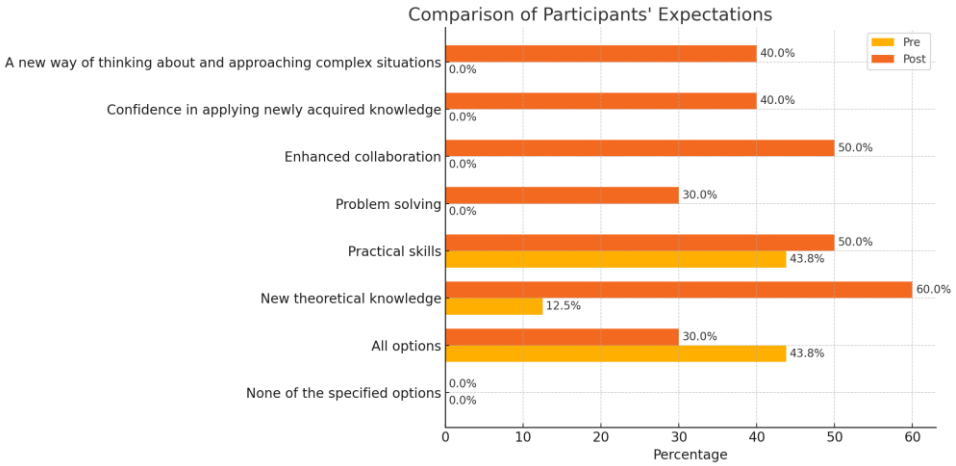

Figure 4. Participants' opinion on learning goals, in the initial and final phase.

At the end of the course, a questionnaire was administered, and the students were asked to describe their experience using a single word, which was then used to generate a shared word cloud via the Wooclap application (Figure 5).

Figure 5. Word Cloud that summarizes the definition of the Experience according to participants

Among the most frequently chosen terms, used to describe the experience the following adjectives emerged: "constructive," "interesting," "engaging," "resource," "interaction," "clarification," and "objectives" are closely interconnected and accurately describe the key features of the e-tivity. Moreover, these aspects highlight the fact that the experimentation was experienced positively by the students. At the end of the course, the students created, using

the same application, a brief reflective post on the online training activities they had carried out. These reflections reveal the high level of engagement generated by this type of activity. The alternation between synchronous and asynchronous moments is particularly appreciated, as well as the opportunity to receive constant feedback from the instructor and to collaborate with peers, fully exploiting the potential of online tools capable of fostering relationships and reducing geographical distances.

Conclusions

This study presented the methodological design of the PRIN ACONHE project, as implemented within the Education Research course at Pegaso Digital University and designed to be replicated in other courses. The research began with a systematic review of the international literature, which enabled the identification and operationalization of the key constructs underlying the educational intervention.

The article specifically focused on the planning phase, detailing:

(1) the structuring of teaching activities into progressive e-tivities, and (2) the data collection tools developed for the same phase.

Although the experimentation is still in progress, this article concentrates on describing the methodological design and the implemented tools, with particular attention to the pilot experience conducted in the Education Research course within a University program.

In particular, based on this experience, the emphasis will be placed on the creation of students' reflective portfolios, composed of all the exercises produced, which will make it possible to establish a model for reflective assessment that can be applied in other contexts. These portfolios, built through the structured collection of student work, can be used as a tool for evaluating the experience and also as a means to recognize the cognitive and meta-cognitive processes.

The preliminary analysis of these materials suggests the potential to develop an assessment model characterized by:

- A process dimension (documenting the evolution of competences);
- A self-evaluation component;
- A multidimensional approach (technical, methodological, and

pedagogical).

The longitudinal nature of the research, which is still in the experimental phase, currently represents both a temporal limitation in interpreting the data, on which future publications will focus once the project is completed, and an opportunity for future comparative analyses across different educational contexts.

Upcoming publications will explore this type of analysis further, comparing the results obtained in the pilot course with those from other courses and assessing the potential transferability of the model to diverse educational environments.

The methodological approach presented here offers a replicable framework for evidence-based educational interventions, with particular attention to the systematic documentation of the process and the authentic assessment of competences.

Author contributions

All authors collaborated on the final review, revisions, and approval of the manuscript. However,
Anna Dipace is the author of the following parts: Introduction; paragraph 2; paragraph 1.
Teresa Savoia is author of the following parts: paragraph 4; conclusion.
Ilaria Fiore is the author of the following parts: paragraph 3; paragraph 5; conclusion.

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