Sonia Santoveña-Casal (Coord.)

Effectiveness of microlearning in the digital training of European university faculty

Horizontes Universidad

Octaedro

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Presentation

Sonia Santoveña-Casal
Coordinator of ENID-Teach
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This book is the result of research carried out within the framework of the European Network in D-flexible Teaching (ENID-Teach) project, funded by the Erasmus+ KA220-HED programme (*Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551*). This initiative responds to emerging needs in the field of higher education, accelerated by the COVID-19 crisis, which highlighted the limitations of traditional teaching models and the urgency of an effective digital transformation.

The project, which will be developed between 2022 and 2025, has been coordinated by the National University of Distance Education (UNED), from the Faculty of Education and with the support of the Vice-Rectorate for Internationalisation and Multilingualism. In addition, a consortium of collaboration has been formed with six European institutions, including universities and organisations specialising in digital education: Burgas Free University (BFU) – Bulgaria, Universidade Aberta de Portugal (UAb) – Portugal, Università degli Studi di Catania (UNICT) – Italy, MAG UNINETTUNO – Italy, Savoir*Devenir – France and ECO Digital Learning – Spain.

The project focuses on the digital training of university teachers through flexible and innovative pedagogies and on the creation of an international network for the exchange of good practices. In short, its main objective is to train teachers in digital pedagogies and to promote the construction of a collaborative community that facilitates digital transformation in higher education.

1. The book presentation is presented in all the languages of the project: English, Spanish, Portuguese, Italian, French.

This work compiles the results obtained from interviews and discussion groups with the teaching staff participating in the training courses given within the project. Throughout its chapters, specific educational experiences and the consolidation of the International Cooperation Network for the Transfer of Knowledge and Digital Learning (ReCoIn-Tad) around emerging digital methodologies are analysed.

The book is organised into three parts:

- Part one: presents the fundamentals of the project and the methodological design used in data collection and analysis. This section establishes the conceptual framework necessary to understand the dynamics of flexible digital learning, microlearning and active, hybrid, collaborative, connected and gamified methodologies.
- Part two: gathers the experiences of Spanish university teachers, focusing on the implementation of the training programme. Innovative pedagogical approaches are explored that seek to transform teaching through digital tools, promoting student learning and participation. It analyses how teachers have adapted their teaching practices to the challenges of a hyperconnected society, implementing hybrid models and flexibly designed programmes to respond to the needs of a more inclusive and accessible education.
- Part three: Examines the experience of European university teachers, offering a comparative view of the innovative practices developed in different countries. It highlights the use of hybrid and gamified methodologies, as well as the design of digital programmes that encourage collaborative and connected learning. This section underlines the importance of generating learning networks and transnational educational communities, promoting international cooperation and the development of shared digital competences.

The book concludes with a cross-cutting analysis, summarising the main conclusions and recommendations drawn from the project. It addresses the strengths and areas for improvement identified in the training courses (NOOCs), highlighting the need to improve the interactivity, cohesion and usability of digital platforms.

The final reflections highlight the key role of teachers in the digital transformation of higher education and the importance of continuing to develop open, flexible and adaptive learning models.

As a whole, this work constitutes a valuable resource for researchers, teachers and academic managers interested in educational innovation and in the design of training programmes that integrate digital technologies and active methodologies. In addition, it offers key lessons and practical examples for future projects that seek to consolidate digital learning and strengthen international cooperation in the university environment.

The titles, summaries and keywords of the chapters are presented in English and Spanish. And the more general parts, such as the presentation, description of each part of the book and the conclusions are in all the languages of the project (English, Spanish, Portuguese, Italian and French).

Finally, the ENID-Teach project coordination team would like to express its sincerest gratitude to the Vice-Rectorate for Internationalisation and Multilingualism, whose support has been fundamental to the realisation of this project. Likewise, it extends its gratitude to all the researchers, academics, members of the ReCoIn-TaD network and especially the project partners, who, with their work and collaboration throughout the three years of the project, have contributed significantly to its development and success.

Presentación

El presente libro es el resultado de la investigación llevada a cabo en el marco del proyecto European Network in D-flexible Teaching (ENID-Teach), financiado por el programa Erasmus+ KA220-HED (*Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551*). Esta iniciativa responde a las necesidades emergentes en el ámbito de la educación superior, aceleradas por la crisis del COVID-19, que puso en evidencia las limitaciones de los modelos tradicionales de enseñanza y la urgencia de una transformación digital efectiva.

Desarrollado entre 2022 y 2025, el proyecto ha sido coordinado por la Universidad Nacional de Educación a Distancia (UNED), desde la Facultad de Educación y con el apoyo del Vicerrectorado de Internacionalización y Multilingüismo. Además, se ha formado un consorcio de colaboración con seis instituciones europeas, incluyendo universidades y organizaciones especializadas en educación digital: Burgas Free University (BFU) – Bulgaria, Universidade Aberta de Portugal (UAb) – Portugal, Università degli Studi di Catania (UNICT) – Italia, MAG UNINETTUNO – Italia, Savoir*Devenir – Francia y ECO Digital Learning – España.

El proyecto se centra en la formación digital del profesorado universitario mediante pedagogías flexibles e innovadoras y en la creación de una red internacional de intercambio de buenas prácticas. En síntesis, su principal objetivo es capacitar al profesorado en pedagogías digitales y fomentar la construcción de una comunidad colaborativa que facilite la transformación digital en la educación superior.

Esta obra recopila los resultados obtenidos a partir de entrevistas y grupos de discusión con el profesorado participante en

los cursos de formación impartidos dentro del proyecto. A lo largo de sus capítulos, se analizan experiencias educativas concretas y la consolidación de la Red de Cooperación Internacional para la Transferencia de Conocimientos y el Aprendizaje Digital (ReCoIn-Tad) en torno a metodologías digitales emergentes.

El libro se organiza en tres partes:

- Primera parte: Presenta los fundamentos del proyecto y el diseño metodológico empleado en la recogida y análisis de datos. Este apartado establece el marco conceptual necesario para comprender las dinámicas del aprendizaje digital flexible, el microaprendizaje y las metodologías activas, híbridas, colaborativas, conectadas y gamificadas.
- Segunda parte: Recoge las experiencias del profesorado universitario español, centrándose en la implementación del programa formativo. Se exploran enfoques pedagógicos innovadores que buscan transformar la enseñanza mediante herramientas digitales, promoviendo el aprendizaje y la participación del alumnado. Se analiza cómo el profesorado ha adaptado sus prácticas docentes a los desafíos de una sociedad hiperconectada, implementando modelos híbridos y programas de diseño flexible para responder a las necesidades de una educación más inclusiva y accesible.
- Tercera parte: Examina la experiencia del profesorado universitario europeo, ofreciendo una visión comparativade las prácticas innovadoras desarrolladas en distintos países. Se destacan el uso de metodologías híbridas y gamificadas, así como el diseño de programas digitales que fomentan el aprendizaje colaborativo y conectado. Este apartado subraya la importancia de generar redes de aprendizaje y comunidades educativas transnacionales, promoviendo la cooperación internacional y el desarrollo de competencias digitales compartidas.

El libro concluye con un análisis transversal, en el que se sintetizan las principales conclusiones y recomendaciones extraídas del proyecto. Se abordan las fortalezas y áreas de mejora identificadas en los cursos de formación (NOOCs), poniendo de relieve la necesidad de mejorar la interactividad, la cohesión y la usabilidad de las plataformas digitales.

Las reflexiones finales destacan el papel clave del profesorado en la transformación digital de la educación superior y la importancia de continuar desarrollando modelos de aprendizaje abiertos, flexibles y adaptativos.

En su conjunto, esta obra constituye un recurso valioso para investigadores, docentes y responsables académicos interesados en la innovación educativa y en el diseño de programas formativos que integren tecnologías digitales y metodologías activas. Además, ofrece lecciones clave y ejemplos prácticos para futuros proyectos que busquen consolidar el aprendizaje digital y fortalecer la cooperación internacional en el ámbito universitario.

Los títulos, resúmenes y palabras clave de los capítulos se presentan en inglés y español. Y, las partes más generales, como la presentación, descripción de cada parte del libro y las conclusiones en todos los idiomas del proyecto (inglés, español, portugués, italiano y francés).

Para finalizar, la Coordinación del proyecto ENID-Teach desea expresar su más sincero agradecimiento al Vicerrectorado de Internacionalización y Multilingüismo, cuyo apoyo ha sido fundamental para la realización de este proyecto. Asimismo, extiende su reconocimiento a todas y todos los investigadores, académicos, integrantes de la red ReCoIn-TaD y especialmente a los socios del proyecto, quienes, con su trabajo y colaboración a lo largo de los tres años de duración, han contribuido de manera significativa al desarrollo y éxito de este proyecto.

Apresentação

Este livro é o resultado da investigação realizada no âmbito do projeto European Network in D-flexible Teaching (ENI-D-Teach), financiado pelo programa Erasmus+ KA220-HED (*Cooperation Partnerships in Higher Education, 2021-1-ES01-KA-220-HED-000027551*). Esta iniciativa responde às necessidades emergentes no ensino superior, aceleradas pela crise da COVID-19, que evidenciou as limitações dos modelos de ensino tradicionais e a urgência de uma transformação digital eficaz.

Desenvolvido entre 2022 e 2025, o projeto foi coordenado pela Universidade Nacional de Educação à Distância (UNED), a partir da Faculdade de Educação e com o apoio da Vice-Reitoria para a Internacionalização e o Multilinguismo. Além disso, foi formado um consórcio de colaboração com seis instituições europeias, incluindo universidades e organizações especializadas em educação digital: Burgas Free University (BFU) - Bulgária, Universidade Aberta de Portugal (UAb) - Portugal, Università degli Studi di Catania (UNICT) - Itália, MAG UNINETTUNO - Itália, Savoir*Devenir - França e ECO Digital Learning - Espanha.

O projeto centra-se na formação digital de professores universitários através de pedagogias flexíveis e inovadoras e na criação de uma rede internacional para o intercâmbio de boas práticas. Em suma, o seu principal objetivo é formar professores em pedagogias digitais e fomentar a construção de uma comunidade colaborativa que facilite a transformação digital no ensino superior.

Este livro compila os resultados obtidos através de entrevistas e grupos de discussão com o pessoal docente que participou nos cursos de formação ministrados no âmbito do projeto. Ao longo

dos seus capítulos, analisa experiências educativas específicas e a consolidação da Rede de Cooperação Internacional para a Transferência de Conhecimento e Aprendizagem Digital (ReCoIn-Tad) em torno de metodologias digitais emergentes.

O livro está organizado em três partes:

- Primeira Parte: Apresenta a fundamentação do projeto e o desenho metodológico empregue na recolha e análise de dados. Esta secção estabelece o quadro concetual necessário para compreender as dinâmicas da aprendizagem digital flexível, da microaprendizagem e das metodologias activas, híbridas, colaborativas, conectadas e gamificadas.
- Segunda parte: Recolhe as experiências dos professores universitários espanhóis, centrando-se na implementação do programa de formação. Explora abordagens pedagógicas inovadoras que procuram transformar o ensino através de ferramentas digitais, promovendo a aprendizagem e a participação dos alunos. Analisa como os professores adaptaram as suas práticas de ensino aos desafios de uma sociedade hiperconectada, implementando modelos híbridos e programas concebidos de forma flexível para responder às necessidades de uma educação mais inclusiva e acessível.
- 3- Parte 3: Examina a experiência do pessoal docente universitário europeu, oferecendo uma visão comparativadas práticas inovadoras desenvolvidas em diferentes países. Destaca a utilização de metodologias híbridas e gamificadas, bem como a conceção de programas digitais que incentivam a aprendizagem colaborativa e interligada. Esta secção sublinha a importância de gerar redes de aprendizagem transnacionais e comunidades educativas, promovendo a cooperação internacional e o desenvolvimento de competências digitais partilhadas.

O livro termina com uma análise transversal, que sintetiza as principais conclusões e recomendaçõesretiradas do projeto. Aborda os pontos fortes e as áreas de melhoria identificadas nos cursos de formação (NOOCs), destacando a necessidade de melhorar a interatividade, a coesão e a usabilidade das plataformas digitais.

As reflexões finais destacam o papel fundamental do corpo docente na transformação digital do ensino superior e a importância de continuar a desenvolver modelos de aprendizagem abertos, flexíveis e adaptáveis.

Em termos gerais, este livro é um recurso valioso para investigadores, professores e dirigentes académicosinteressados na inovação educativa e na conceção de programas de aprendizagem que integrem tecnologias digitais e metodologias activas. Fornece também lições fundamentais e exemplos práticos para futuros projectos que procurem consolidar a aprendizagem digital e reforçar a cooperação internacional a nível universitário.

Os títulos dos capítulos, os resumos e as palavras-chave são apresentados em inglês e espanhol. E as partes mais gerais, como a introdução, a descrição de cada parte do livro e as conclusões, em todas as línguas do projeto (inglês, espanhol, português, italiano e francês).

Finalmente, a Coordenação do Projeto ENID-Teach gostaria de expressar os seus sinceros agradecimentos à Vice-Reitoria para a Internacionalização e o Multilinguismo, cujo apoio foi essencial para a realização deste projeto. Gostaríamos também de agradecer a todos os investigadores, académicos, membros da rede ReCoIn-TaD e, especialmente, aos parceiros do projeto, cujo trabalho e colaboração ao longo dos três anos do projeto contribuíram significativamente para o desenvolvimento e sucesso deste projeto.

Presentazione

Questo libro è il risultato di una ricerca condotta nell'ambito del progetto European Network in D-flexible Teaching (ENID-Teach), finanziato dal programma Erasmus+ KA220-HED (*Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551*). L'iniziativa risponde alle esigenze emergenti nell'istruzione universitaria, accelerate dalla crisi del COVID-19, che ha evidenziato i limiti dei modelli didattici tradizionali e l'urgenza di un'efficace trasformazione digitale.

Sviluppato tra il 2022 e il 2025, il progetto è stato coordinato dall'Università Nazionale dell'Educazione a Distanza (UNED), dalla Facoltà di Scienze della Formazione e con il supporto del Vice-Rettorato per l'Internazionalizzazione e il Multilinguismo. Inoltre, è stato costituito un consorzio di collaborazione con sei istituzioni europee, tra cui università e organizzazioni specializzate nell'educazione digitale: Burgas Free University (BFU) - Bulgaria, Universidade Aberta de Portugal (UAb) - Portogallo, Università degli Studi di Catania (UNICT) - Italia, MAG UNINETTUNO - Italia, Savoir*Devenir - Francia e ECO Digital Learning - Spagna.

Il progetto si concentra sulla formazione digitale dei docenti universitari attraverso pedagogie flessibili e innovative e la creazione di una rete internazionale per lo scambio di buone pratiche. In breve, il suo obiettivo principale è quello di formare gli insegnanti alle pedagogie digitali e di promuovere la costruzione di una comunità collaborativa che faciliti la trasformazione digitale nell'istruzione superiore.

Questo libro raccoglie i risultati ottenuti da interviste e gruppi di discussione con il personale docente che ha partecipato ai cor-

si di formazione tenuti nell'ambito del progetto. Nei suoi capitoli analizza le esperienze didattiche specifiche e il consolidamento della Rete di cooperazione internazionale per il trasferimento della conoscenza e l'apprendimento digitale (ReCoIn-Tad) intorno alle metodologie digitali emergenti.

Il libro è organizzato in tre parti:

- Prima parte: presenta le motivazioni del progetto e il disegno metodologico utilizzato per la raccolta e l'analisi dei dati. Questa sezione stabilisce il quadro concettuale necessario per comprendere le dinamiche dell'apprendimento digitale flessibile, del microapprendimento e delle metodologie attive, ibride, collaborative, connesse e gamificate.
- Seconda parte: raccoglie le esperienze dei docenti universitari spagnoli, concentrandosi sull'attuazione del programma di formazione. Esplora approcci pedagogici innovativi che cercano di trasformare l'insegnamento attraverso strumenti digitali, promuovendo l'apprendimento e la partecipazione degli studenti. Analizza come gli insegnanti abbiano adattato le loro pratiche didattiche alle sfide di una società iperconnessa, implementando modelli ibridi e programmi progettati in modo flessibile per rispondere alle esigenze di un'istruzione più inclusiva e accessibile.
- Parte 3: esamina l'esperienza del personale docente universitario europeo, offrendo una visione comparativa delle pratiche innovative sviluppate nei diversi Paesi. Evidenzia l'uso di metodologie ibride e gamificate, nonché la progettazione di programmi digitali che incoraggiano l'apprendimento collaborativo e connesso. Questa sezione sottolinea l'importanza di generare reti di apprendimento e comunità educative transnazionali, promuovendo la cooperazione internazionale e lo sviluppo di competenze digitali condivise.

Il libro si conclude con un'analisi trasversale che sintetizza le principali conclusioni e raccomandazioni tratte dal progetto. Affronta i punti di forza e le aree di miglioramento identificate nei corsi di formazione (NOOC), evidenziando la necessità di migliorare l'interattività, la coesione e l'usabilità delle piattaforme digitali.

Le riflessioni finali evidenziano il ruolo chiave del corpo docente nella trasformazione digitale dell'istruzione superiore e l'importanza di continuare a sviluppare modelli di apprendimento aperti, flessibili e adattivi.

Nel complesso, questo libro è una risorsa preziosa per ricercatori, insegnanti e dirigenti accademici interessati all'innovazione didattica e alla progettazione di programmi di apprendimento che integrano tecnologie digitali e metodologie attive. Fornisce inoltre lezioni chiave ed esempi pratici per progetti futuri che mirano a consolidare l'apprendimento digitale e a rafforzare la cooperazione internazionale a livello universitario.

I titoli dei capitoli, gli abstract e le parole chiave sono presentati in inglese e spagnolo. Inoltre, le parti più generali, come l'introduzione, la descrizione di ogni parte del libro e le conclusioni, sono presentate in tutte le lingue del progetto (inglese, spagnolo, portoghese, italiano e francese).

Infine, il Coordinamento del progetto ENID-Teach desidera esprimere un sincero ringraziamento al Vice-Rettorato per l'Internazionalizzazione e il Multilinguismo, il cui supporto è stato essenziale per la realizzazione di questo progetto. Desideriamo inoltre ringraziare tutti i ricercatori, gli accademici, i membri della rete ReCoIn-TaD e soprattutto i partner del progetto, il cui lavoro e la cui collaborazione durante i tre anni del progetto hanno contribuito in modo significativo allo sviluppo e al successo di questo progetto.

Présentation

Ce livre est le résultat d'une recherche menée dans le cadre du projet European Network in D-flexible Teaching (ENID-Teach), financé par le programme Erasmus+ KA220-HED (*Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551*). Cette initiative répond à des besoins émergents dans l'enseignement supérieur, accélérés par la crise COVID-19, qui a mis en évidence les limites des modèles pédagogiques traditionnels et l'urgence d'une transformation numérique efficace.

Développé entre 2022 et 2025, le projet a été coordonné par l'Université nationale d'enseignement à distance (UNED), depuis la Faculté d'éducation et avec le soutien du Vice-rectorat pour l'internationalisation et le multilinguisme. En outre, un consortium de collaboration a été formé avec six institutions européennes, y compris des universités et des organisations spécialisées dans l'éducation numérique : Burgas Free University (BFU) - Bulgarie, Universidade Aberta de Portugal (UAb) - Portugal, Università degli Studi di Catania (UNICT) - Italie, MAG UNINETTUNO - Italie, Savoir*Devenir - France et ECO Digital Learning - Espagne.

Le projet se concentre sur la formation numérique des enseignants universitaires par le biais de pédagogies flexibles et innovantes et sur la création d'un réseau international pour l'échange de bonnes pratiques. En bref, son objectif principal est de former les enseignants aux pédagogies numériques et de favoriser la construction d'une communauté collaborative qui facilite la transformation numérique dans l'enseignement supérieur.

Ce livre compile les résultats obtenus lors d'entretiens et de groupes de discussion avec le personnel enseignant participant aux formations dispensées dans le cadre du projet. Au fil des

chapitres, il analyse des expériences pédagogiques spécifiques et la consolidation du Réseau de coopération internationale pour le transfert de connaissances et l'apprentissage numérique (Re-CoIn-Tad) autour des méthodologies numériques émergentes.

Le livre est organisé en trois parties :

- Première partie : elle présente la raison d'être du projet et la conception méthodologique employée pour la collecte et l'analyse des données. Cette partie établit le cadre conceptuel nécessaire pour comprendre la dynamique de l'apprentissage numérique flexible, du microapprentissage et des méthodologies actives, hybrides, collaboratives, connectées et gamifiées.
- Deuxième partie : elle recueille les expériences des enseignants universitaires espagnols, en se concentrant sur la mise en œuvre du programme de formation. Elle explore les approches pédagogiques innovantes qui cherchent à transformer l'enseignement grâce aux outils numériques, en favorisant l'apprentissage et la participation des étudiants. Elle analyse la manière dont les enseignants ont adapté leurs pratiques pédagogiques aux défis d'une société hyperconnectée, en mettant en œuvre des modèles hybrides et des programmes conçus de manière flexible pour répondre aux besoins d'une éducation plus inclusive et plus accessible.
- Trosième partie : examine l'expérience du personnel enseignant des universités européennes, offrant une vue comparativedes pratiques innovantes développées dans différents pays. Elle met en évidence l'utilisation de méthodologies hybrides et gamifiées, ainsi que la conception de programmes numériques qui encouragent l'apprentissage collaboratif et connecté. Cette section souligne l'importance de la création de réseaux d'apprentissage transnationaux et de communautés éducatives, promouvant la coopération internationale et le développement de compétences numériques partagées.

Le livre se termine par une analyse transversale qui synthétise les principales conclusions et recommandationstirées du projet. Il aborde les points forts et les domaines d'amélioration identifiés dans les cours de formation (NOOC), en soulignant la nécessité d'améliorer l'interactivité, la cohésion et la facilité d'utilisation des plates-formes numériques.

Les réflexions finales soulignent le rôle clé du corps enseignant dans la transformation numérique de l'enseignement supérieur et l'importance de continuer à développer des modèles d'apprentissage ouverts, flexibles et adaptatifs.

Dans l'ensemble, cet ouvrage constitue une ressource précieuse pour les chercheurs, les enseignants et les responsables universitairesqui s'intéressent à l'innovation pédagogique et à la conception de programmes d'apprentissage qui intègrent les technologies numériques et les méthodologies actives. Il fournit également des leçons clés et des exemples pratiques pour les projets futurs qui cherchent à consolider l'apprentissage numérique et à renforcer la coopération internationale au niveau universitaire.

Les parties plus générales, telles que l'introduction, la description de chaque partie du livre et les conclusions sont présentées dans toutes les langues du projet (anglais, espagnol, portugais, italien et français).

Enfin, la coordination du projet ENID-Teach tient à exprimer ses sincères remerciements au Vice-rectorat à l'internationalisation et au multilinguisme, dont le soutien a été essentiel à la réalisation de ce projet. Nous tenons également à remercier tous les chercheurs, universitaires, membres du réseau ReCoIn-TaD et surtout les partenaires du projet, dont le travail et la collaboration tout au long des trois années du projet ont contribué de manière significative au développement et à la réussite de ce projet.

Part One: Conceptual framework and research design

Sonia Santoveña-Casal
Coordinator of ENID-Teach
Universidad Nacional de Educación a Distancia

The first part of this book, entitled *Conceptual Framework and Overall Results*, sets out the conceptual framework and general results of the ENID-Teach project. This project, developed between 2022 and 2025 and funded by the Erasmus+ KA220-HED programme, responds to the need for digital transformation in higher education, a challenge that has become even more evident in the wake of the COVID-19 crisis. Throughout this section, we present the theoretical foundations of educational innovation in Europe, the key pillars on which the project is based and the central role of teachers in building networks of academic cooperation.

The first chapter introduces the European context of educational innovation, highlighting the strategic priorities for the digitalisation of higher education and teacher training in flexible methodologies. The principles that have guided the development of the project are explored, emphasising the need to provide the teaching community with tools that enable more adaptable and accessible teaching. In addition, the role of university teachers in the construction of knowledge networks is analysed, highlighting the importance of international collaboration and the exchange of good practices as drivers of educational transformation.

The objectives of the project and the activities carried out to achieve them are detailed below. This section presents the results obtained in the different actions carried out within the framework of ENID-Teach, including training programmes and the creation of an international academic network. It explains how these efforts have strengthened the connection between universities and facilitated access to innovative methodologies,

thus fostering a more flexible teaching approach adapted to the challenges of the digital environment.

One of the central themes of this part of the book is the description of the training programme in digital and flexible methodologies, designed specifically for university teachers. The pedagogical foundations of the programme are detailed, as well as its structure based on microlearning and NOOCs (Nano Open Online Courses) and the innovative elements that distinguish it from other teacher training models. In addition, the profile of the participating teaching staff is analysed, as well as the impact of the programme on the acquisition of digital competences. Furthermore, the impact obtained is extracted and analysed according to the European universities participating in the training programme.

Finally, the first part of the book introduces the creation and consolidation of the International Cooperation Network for Knowledge Transfer and Digital Learning (ReCoIn-TaD). This network has been fundamental for the sustainability of the project and for guaranteeing the continuity of the exchange of good practices between universities. The results obtained in its implementation are presented and its potential to continue promoting digital transformation in higher education is reflected upon.

Overall, this first part of the book lays the theoretical and methodological foundations of the ENID-Teach project, providing a detailed overview of its objectives, strategies and achievements. Throughout its chapters, the importance of educational innovation, flexibility in teaching and international collaboration as essential elements for the future of university education in Europe is made clear.

Primera parte: Marco conceptual y diseño de la investigación

La primera parte de este libro, titulada *Conceptual Framework and Overall Results*, establece el marco conceptual y los resultados generales del proyecto ENID-Teach. Este proyecto, desarrollado entre 2022 y 2025 y financiado por el programa Erasmus+ KA220-HED, responde a la necesidad de transformación digital en la educación superior, un reto que se ha hecho aún más evidente tras la crisis del COVID-19. A lo largo de esta sección, se presentan los fundamentos teóricos de la innovación educativa en Europa, los pilares clavesobre los que se articula el proyecto y el papel central del profesorado en la construcción de redes de cooperación académica.

El primer capítulo introduce el contexto europeo de la innovación educativa, destacando las prioridades estratégicas para la digitalización de la enseñanza superior y la formación del profesorado en metodologías flexibles. Se exploran los principios que han guiado el desarrollo del proyecto, haciendo hincapié en la necesidad de dotar a la comunidad docente de herramientas que permitan una enseñanza más adaptable y accesible. Además, se analiza el rol del profesorado universitario en la construcción de redes de conocimiento, resaltando la importancia de la colaboración internacional y del intercambio de buenas prácticas como motores de la transformación educativa.

A continuación, se detallan los objetivos del proyecto y las actividades desarrolladas para alcanzarlos. En este apartado, se presentan los resultados obtenidos en las distintas acciones llevadas a cabo dentro del marco de ENID-Teach, incluyendo programas formativos y la creación de una red académica internacional. Se explica cómo estos esfuerzos han permitido fortalecer

la conexión entre universidades y facilitar el acceso a metodologías innovadoras, fomentando así una enseñanza más flexible y adaptada a los desafíos del entorno digital.

Uno de los ejes centrales de esta parte del libro es la descripción del programa de formación en metodologías digitales y flexibles, diseñado específicamente para docentes universitarios. Se detallan los fundamentos pedagógicos del programa, su estructura basada en el microaprendizaje y los NOOCs (Nano Open Online Courses) y los elementos innovadores que lo distinguen de otros modelos de formación docente. Además, se analiza el perfil del profesorado participante, así como el impacto del programa en la adquisición de competencias digitales. Además, se extrae y analiza el impacto obtenido en función de las universidades europeas participantes en el programa formativo.

Por último, la primera parte del libro introduce la creación y consolidación de la Red de Cooperación Internacional para la Transferencia de Conocimientos y el Aprendizaje Digital (ReCoIn-TaD). Esta red ha sido fundamental para la sostenibilidad del proyecto y para garantizar la continuidad del intercambio de buenas prácticas entre universidades. Se presentan los resultados obtenidos en su implementación y se reflexiona sobre su potencial para seguir impulsando la transformación digital en la educación superior.

En conjunto, esta primera parte del libro sienta las bases teóricas y metodológicas del proyecto ENID-Teach, proporcionando una visión detallada de sus objetivos, estrategias y logros. A través de sus capítulos, se evidencia la importancia de la innovación educativa, la flexibilidad en la enseñanza y la colaboración internacional como elementos esenciales para el futuro de la educación universitaria en Europa.

Primeira parte: Quadro concetual e conceção da investigação

A primeira parte deste livro, intitulada *Conceptual Framework and Overall Results*, apresenta o quadro concetual e os resultados globais do projeto ENID-Teach. Este projeto, que decorre de 2022 a 2025 e é financiado pelo programa Erasmus+ KA220-HED, responde à necessidade de transformação digital no ensino superior, um desafio que se tornou ainda mais evidente na sequência da crise da COVID-19. Ao longo desta secção, são apresentados os fundamentos teóricos da inovação educativa na Europa, os pilares fundamentais em que o projeto se articula e o papel central dos professores na construção de redes de cooperação académica.

O primeiro capítulo introduz o contexto europeu da inovação educativa, destacando as prioridades estratégicas para a digitalização do ensino superior e a formação de professores em metodologias flexíveis. Explora os princípios que orientaram o desenvolvimento do projeto, salientando a necessidade de dotar a comunidade docente de ferramentas que permitam um ensino mais adaptável e acessível. Para além disso, é analisado o papel do pessoal docente universitário na construção de redes de conhecimento, destacando a importância da colaboração internacional e do intercâmbio de boas práticas como motores da transformação educativa.

Os objectivos do projeto e as actividades levadas a cabo para os alcançar são detalhados a seguir. Esta secção apresenta os resultados obtidos nas diferentes acções levadas a cabo no âmbito do ENID-Teach, incluindo programas de formação e a criação de uma rede académica internacional. Explica-se como estes esforços reforçaram a ligação entre as universidades e facilitaram

o acesso a metodologias inovadoras, promovendo assim um ensino mais flexível e adaptado aos desafios do ambiente digital.

Um dos temas centrais desta parte do livro é a descrição do programa de formação em metodologias digitais e flexíveis, especificamente concebido para professores universitários. São apresentados em pormenor os fundamentos pedagógicos do programa, a sua estrutura baseada na microaprendizagem e nos NOOC (Nano Open Online Courses) e os elementos inovadores que o distinguem de outros modelos de formação de professores. Para além disso, é analisado o perfil dos professores participantes, bem como o impacto do programa na aquisição de competências digitais. Além disso, o impacto obtido é extraído e analisado em termos das universidades europeias que participam no programa de formação.

Finalmente, a primeira parte do livro apresenta a criação e a consolidação da Rede de Cooperação Internacional para a Transferência de Conhecimento e Aprendizagem Digital (ReCoIn-TaD). Esta rede tem sido fundamental para a sustentabilidade do projeto e para garantir a continuidade do intercâmbio de boas práticas entre universidades. Apresenta os resultados obtidos na sua implementação e reflecte sobre o seu potencial para continuar a impulsionar a transformação digital no ensino superior.

De um modo geral, esta primeira parte do livro estabelece as bases teóricas e metodológicas do projeto ENID-Teach, fornecendo uma visão detalhada dos seus objectivos, estratégias e realizações. Ao longo dos capítulos, é salientada a importância da inovação educativa, da flexibilidade do ensino e da colaboração internacional como elementos essenciais para o futuro do ensino superior na Europa.

Prima parte: Quadro concettuale e disegno di ricerca

La prima parte di questo libro, intitolata *Conceptual Framework and Overall Results*, presenta il quadro concettuale e i risultati complessivi del progetto ENID-Teach. Questo progetto, in corso dal 2022 al 2025 e finanziato dal programma Erasmus+ KA220-HED, risponde all'esigenza di trasformazione digitale dell'istruzione superiore, una sfida che è diventata ancora più evidente dopo la crisi del COVID-19. In questa sezione vengono presentati i fondamenti teorici dell'innovazione didattica in Europa, i pilastri fondamentali su cui si articola il progetto e il ruolo centrale dei docenti nella costruzione di reti di cooperazione accademica.

Il primo capitolo introduce il contesto europeo dell'innovazione educativa, evidenziando le priorità strategiche per la digitalizzazione dell'istruzione superiore e la formazione degli insegnanti in metodologie flessibili. Esplora i principi che hanno guidato lo sviluppo del progetto, sottolineando la necessità di dotare la comunità docente di strumenti che consentano un insegnamento più adattabile e accessibile. Inoltre, viene analizzato il ruolo del personale docente universitario nella costruzione di reti di conoscenza, evidenziando l'importanza della collaborazione internazionale e dello scambio di buone pratiche come motori della trasformazione educativa.

Gli obiettivi del progetto e le attività svolte per raggiungerli sono descritti in dettaglio di seguito. Questa sezione presenta i risultati ottenuti nelle diverse azioni svolte nell'ambito di ENID-Teach, tra cui i programmi di formazione e la creazione di una rete accademica internazionale. Spiega come questi sforzi abbiano rafforzato la connessione tra le università e facilitato

l'accesso a metodologie innovative, promuovendo così un insegnamento più flessibile e adatto alle sfide dell'ambiente digitale.

Uno dei temi centrali di questa parte del libro è la descrizione del programma di formazione in metodologie digitali e flessibili, specificamente progettato per i docenti universitari. Vengono illustrati i fondamenti pedagogici del programma, la sua struttura basata sul microapprendimento e sui NOOC (Nano Open Online Courses) e gli elementi innovativi che lo distinguono da altri modelli di formazione degli insegnanti. Inoltre, viene analizzato il profilo degli insegnanti partecipanti e l'impatto del programma sull'acquisizione di competenze digitali. Inoltre, l'impatto ottenuto viene estratto e analizzato in termini di università europee partecipanti al programma di formazione.

Infine, la prima parte del libro introduce la creazione e il consolidamento della Rete di cooperazione internazionale per il trasferimento della conoscenza e l'apprendimento digitale (ReCoIn-TaD). Questa rete è stata fondamentale per la sostenibilità del progetto e per garantire la continuità dello scambio di buone pratiche tra le università. Il libro presenta i risultati ottenuti nella sua implementazione e riflette sul suo potenziale per guidare ulteriormente la trasformazione digitale nell'istruzione superiore.

Nel complesso, questa prima parte del libro riporta le basi teoriche e metodologiche del progetto ENID-Teach, fornendo una panoramica dettagliata dei suoi obiettivi, strategie e risultati. In tutti i capitoli viene sottolineata l'importanza dell'innovazione didattica, della flessibilità dell'insegnamento e della collaborazione internazionale come elementi essenziali per il futuro dell'istruzione superiore in Europa.

Première partie: Cadre conceptuel et conception de la recherche

La première partie de cet ouvrage, intitulée *Conceptual Framework and Overall Results*, présente le cadre conceptuel et les résultats globaux du projet ENID-Teach. Ce projet, qui s'étend de 2022 à 2025 et qui est financé par le programme Erasmus+ KA220-HED, répond au besoin de transformation numérique dans l'enseignement supérieur, un défi qui est devenu encore plus évident à la suite de la crise COVID-19. Tout au long de cette section, les fondements théoriques de l'innovation éducative en Europe, les piliers clés sur lesquels le projet s'articule et le rôle central des enseignants dans la construction des réseaux de coopération académique sont présentés.

Le premier chapitre présente le contexte européen de l'innovation éducative, en soulignant les priorités stratégiques pour la numérisation de l'enseignement supérieur et la formation des enseignants aux méthodologies flexibles. Il explore les principes qui ont guidé le développement du projet, soulignant la nécessité de doter la communauté enseignante d'outils permettant un enseignement plus adaptable et plus accessible. En outre, le rôle du personnel enseignant universitaire dans la construction de réseaux de connaissances est analysé, soulignant l'importance de la collaboration internationale et de l'échange de bonnes pratiques en tant que moteurs de la transformation de l'éducation.

Les objectifs du projet et les activités menées pour les atteindre sont détaillés ci-dessous. Cette section présente les résultats obtenus dans les différentes actions menées dans le cadre d'ENID-Teach, y compris les programmes de formation et la création d'un réseau académique international. Elle explique comment ces efforts ont renforcé la connexion entre les universités et facilité

l'accès à des méthodologies innovantes, promouvant ainsi un enseignement plus flexible et adapté aux défis de l'environnement numérique.

L'un des thèmes centraux de cette partie du livre est la description du programme de formation aux méthodologies numériques et flexibles, spécialement conçu pour les enseignants universitaires. Elle détaille les fondements pédagogiques du programme, sa structure basée sur le micro-apprentissage et les NOOC (Nano Open Online Courses) et les éléments innovants qui le distinguent des autres modèles de formation des enseignants. En outre, le profil des enseignants participants est analysé, ainsi que l'impact du programme sur l'acquisition de compétences numériques. En outre, l'impact obtenu est extrait et analysé en fonction des universités européennes participant au programme de formation.

Enfin, la première partie du livre présente la création et la consolidation du Réseau de coopération internationale pour le transfert de connaissances et l'apprentissage numérique (ReCoIn-TaD). Ce réseau a été fondamental pour la durabilité du projet et pour garantir la continuité de l'échange de bonnes pratiques entre les universités. Il présente les résultats obtenus lors de sa mise en œuvre et réfléchit à son potentiel pour stimuler davantage la transformation numérique dans l'enseignement supérieur.

Dans l'ensemble, cette première partie du livre pose les bases théoriques et méthodologiques du projet ENID-Teach, en fournissant une vue d'ensemble détaillée de ses objectifs, de ses stratégies et de ses réalisations. Tout au long des chapitres, l'importance de l'innovation éducative, de la flexibilité de l'enseignement et de la collaboration internationale en tant qu'éléments essentiels pour l'avenir de l'enseignement supérieur en Europe est soulignée.

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European Network in D-flexible Teaching (ENID-Teach): conceptual framework and overall results

European Network in D-flexible Teaching (ENID-Teach): marco conceptual y resultados generales

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Abstract
The first chapter of the book presents the conceptual framework and the general results of the European Network in D-Flexible Teaching (ENID-Teach) project. The key priorities and pillars are established, highlighting the role of teachers in the creation of academic networks and the transfer of knowledge. The objectives of the project, the activities implemented and the achievements in the field of digital education are analysed. The training programme developed is based on microlearning and NOOCs (Nano Open Online Courses), aimed at university teachers. Its structure, innovative elements and the impact obtained in European universities are detailed.

The digital skills training programme, aimed at university teachers, is based on microlearning and NOOCs (Nano Open Online Courses) and has been attended by 827 teachers, of whom 578 are university teachers from the EU, more than 100 belong to other educational levels within the EU and 60 are from countries outside the EU, among others. In total, the number of course participants amounts to 3,044. In addition, a Guide to Good Practice in Flexible Digital Pedagogies has been developed. More than 120 European universities

have participated in the project, with Spain (36 universities), Portugal (34) and Italy (25) leading the representation. One of the main achievements has been the creation of the International Cooperation Network for Knowledge Transfer and Digital Learning (ReCoIn-TaD). This network, with 506 members (including more than 300 university teachers) from the EU is a space open to teachers, students and professionals interested in educational innovation.

Keywords: digital learning, flexible methodologies, higher education, microlearning, NOOCs, international cooperation, teacher training, educational innovation, knowledge transfer, ReCoIn-TaD network.

Resumen

El primer capítulo del libro presenta el marco conceptual y los resultados generales del proyecto de la Red Europea de Enseñanza D-Flexible (ENID-Teach). Se establecen las prioridades y pilares clave, destacando el papel de los docentes en la creación de redes académicas y la transferencia de conocimientos. Se analizan los objetivos del proyecto, las actividades implementadas y los logros en el campo de la educación digital. El programa de formación desarrollado se basa en el microaprendizaje y los NOOC (Nano Open Online Courses), dirigido a profesores universitarios. Se detallan su estructura, elementos innovadores y el impacto obtenido en las universidades europeas. El programa de formación en competencias digitales, dirigido a profesores universitarios, se basa en el microaprendizaje y los NOOC (Nano Open Online Courses) y ha contado con la participación de 827 profesores, de los cuales 578 son profesores universitarios de la UE, más de 100 pertenecen a otros niveles educativos dentro de la UE y 60 son de países fuera de la UE, entre otros. En total, el número de participantes en el curso asciende a 3044. Además, se ha elaborado una Guía de buenas prácticas en pedagogías digitales flexibles. Más de 120 universidades europeas han participado en el proyecto, con España (36 universidades), Portugal (34) e Italia (25) a la cabeza. Uno de los principales logros ha sido la creación de la Red de Cooperación Internacional para la Transferencia de Conocimientos y el Aprendizaje Digital (ReCoIn-TaD). Esta red, con 565 miembros (incluidos 300 profesores universitarios de la UE y 53 de fuera de la UE), es un espacio abierto a profesores, estudiantes y profesionales interesados en la innovación educativa.

Palabras clave / Descriptores: aprendizaje digital, metodologías flexibles, educación superior, microaprendizaje, NOOC, cooperación internacional, formación de profesores, innovación educativa, transferencia de conocimientos, red ReCoIn-TaD.

Educational innovation in Europe: conceptual framework

The ENID-Teach project has emerged in response to the educational challenges generated by the global crisis caused by COVID-19, which prompted a rapid transition to digital and blended learning models in universities. Despite these efforts, structural and methodological deficiencies became evident in the adaptation of educational institutions, as well as insufficient preparation of teaching staff to face the challenges of the virtual environment. Although 60% of European universities claim to have adapted their systems to digital models, in many cases the measures were provisional and lacked a solid pedagogical design (Multirank, 2020).

The pandemic not only prompted the abrupt transfer of teaching to the digital environment, but also disrupted many of the inter-university networks that supported the exchange of knowledge and good practices. ENID-Teach is positioned as a comprehensive response to this challenge, with the aim of rebuilding and strengthening these networks, placing teaching staff at the centre as key agents for knowledge transfer. Through the creation of a cohesive academic community, the project seeks to promote training in flexible and innovative digital pedagogies that will enable universities to respond with agility and efficiency to future educational scenarios.

The **ENID-Teach** project is framed within the strategic priorities of Erasmus+ and responds to the current needs for digital transformation in higher education, aligning with the objectives of inclusion, innovation and inter-university cooperation.

Priorities

The project directly addresses the horizontal priority of 'digital transformation', centred on developing the resilience, capacity and digital readiness of educational institutions. One of the main objectives of ENID-Teach is to strengthen the capacity of university teachers to implement flexible digital pedagogies, thus facilitating an effective transition towards online and blended learning models. This transformation is articulated through a

training programme based on innovative pedagogies and the creation of digital resources that promote institutional change.

To achieve this objective, the project is based on two fundamental reference frameworks:

- **DIGCOMP**: A Framework for Developing and Understanding Digital Competence in Europe (2020), which establishes the essential digital competences for citizens and professionals.
- **ICT Competency Framework for Teachers (ICT-CFT) from UNESCO**, which provides guidelines for the integration of technology in teaching and learning.

Both frameworks guide the development of Open Educational Resources (OER) in line with the principles of the Sustainable Development Goals (SDGs), in particular with the slogan of 'leaving no one behind'.

Within the field of university education, the project responds to two key priorities:

1. 'Promoting inter-connected higher education systems': ENID-Teach promotes the creation and consolidation of inter-university networks that foster collaboration and the exchange of good practices in digital environments. The project facilitates the development of virtual and blended cooperation models, supported by digital tools and online platforms, thus contributing to the construction of a more connected and cohesive European education system.
2. 'Stimulating innovative learning and teaching practices': The project promotes innovative and transdisciplinary pedagogies that include:

- Flipped learning
- Collaborative online learning
- Teaching based on research and critical thinking
- Gamification and active learning methodologies.

These strategies make it possible to respond to the needs of a diverse and constantly changing student body, facilitating adaptation to uncertain pedagogical contexts.

The European Union's Digital Education Action Plan (2021-2027) emphasises the need to strengthen cooperation in digital education and share good practices between institutions. ENID-Teach is aligned with this vision by promoting the construction of an international distributed network that positions teachers as nodes of intra- and inter-university connection, facilitating the dissemination of innovative teaching methodologies.

The ReCoIn-TaD network, of which several consortium partners are members, forms the basis of this initiative and will serve as a platform for collaboration and continuous training for university teachers.

The project is also linked to the horizontal priority of 'Inclusion and diversity in all fields of education', contributing to the fulfilment of SDG 4 (Quality Education). ENID-Teach promotes the development of inclusive and equitable digital education systems, facilitating access to university education for vulnerable groups.

The flexibility of the digital programmes developed will make it possible to:

- Extend access to higher education for students in rural areas or far from urban centres.
- Adapt resources to the needs of people with disabilities, guaranteeing digital accessibility for students with hearing or visual impairments.
- Reduce educational barriers through flexible models that adapt to different learning paces and styles.

ENID-Teach contributes to the creation of a more resilient, inclusive and adaptable university education, reinforcing the capacities of teaching staff to lead the digital transformation of their institutions. By consolidating an international collaborative network, the project promotes the construction of an innovative educational ecosystem, prepared to respond to the challenges of 21st-century education and guarantee learning opportunities for all.

Key pillars of the project

The project focuses on the implementation of specialised digital training programmes for teachers, with a focus on connect-

ed, collaborative, gamified, active and inverted (flipped learning) methodologies. These pedagogical strategies are developed through a microlearning programme based on Nano Open Online Courses (NOOCs), guaranteeing flexibility and accessibility in the training process. The objective is to provide teachers with methodological tools that they can adapt and apply to their specific contexts, thus promoting the development of inclusive and accessible content.

The role of teachers in the construction of networks

The project is based on Granovetter's (1973) sociological theory on the importance of weak ties in social networks. ENID-Teach believes that connections between university teachers, even if they are not close, are key channels for the dissemination of innovative ideas and the growth of educational communities. These ties provide access to diverse information and encourage the exchange of good teaching practices.

To strengthen these networks, ENID-Teach facilitates the creation of a database of teachers with common interests in digital pedagogies, hosted on the project portal (https://www.enidteach.eu). This platform acts as a collaborative space where teachers can share experiences, work on joint projects and build new pedagogical practices. In addition, the project relies on the *Network for International Cooperation in Knowledge Transfer and Digital Learning* (ReCoIn-TaD), expanding its scope and consolidating an inter-university digital ecosystem.

Projects goals

The overall objective of ENID-Teach is to provide comprehensive digital training to university teachers in flexible, digital and innovative pedagogical methodologies, promoting a distributed but cohesive academic community that drives digital transformation in higher education. Specific objectives include:

- Train teachers in flexible teaching practices, adapted to different pedagogical scenarios and to the needs of the students.

- Strengthen international academic networks, facilitating the exchange of good practices and inter-university collaboration.
- Develop online training programmes based on NOOCs and connected, collaborative, active and gamified methodologies.
- Promote the creation of accessible and inclusive content, guaranteeing equal opportunities in digital education.
- Build a network of inter-university cooperation that positions teachers as connection nodes between institutions.

Project activities and results

The development of ENID-Teach is organised around six fundamental activities that range from pedagogical design to the implementation and evaluation of training programmes:

- Design and preparation of the training programme in digital and flexible pedagogies.
- Production of Open Educational Resources (OER) in interactive and multilingual formats.
- Development of NOOCs in five languages (Spanish, French, English, Italian and Portuguese) and accessible.
- Implementation of the programme based on the principles of microlearning and accessibility of its contents.
- Evaluation of the impact of the programme, ensuring its effectiveness and adaptability.
- Creation of an inter-university cooperation network, strengthening collaboration and knowledge exchange.

The main expected results include:

- Training programme in digital skills and flexible methodologies.
- Five multilingual NOOCs addressing different innovative methodologies.
- Guide to good pedagogical practices for digital teaching.
- European network for cooperation in digital pedagogies.
- Research on the effectiveness of microlearning, consolidating knowledge transfer in digital environments.

A continuación, se presenta la descripción de estos resultados.

Training programme in flexible and digital methodologies: description and overall results

It answers the need to develop online skills training of teachers in flexible digital teaching practices. In addition, search for reinforce to harness the resilience of university institutions to different pedagogical scenarios and facilitate educational access to disadvantaged groups. Another objective is to create added value for the Erasmus+ programme by offering an online skills training programme in innovative, digital and multilingual methodologies.

Description

The training programme developed within the framework of the ENID-Teach project aims to train European university teachers in digital competences and flexible and innovative pedagogical methodologies. This programme responds to the need to adapt teaching practices to hybrid and digital educational environments, facilitating the transition to a more inclusive, accessible and connected teaching model.

Programme structure: microlearning and NOOCs

The programme, already implemented, is based on a microlearning model and is made up of five NOOCs (Nano Open Online Courses) designed to provide specialised training in key educational methodologies. Once delivered, these courses are made openly available and without tutoring, allowing teachers free access to the content and to train independently.

The NOOCs cover the following areas:

- Connected and Critical Methodologies.
- Collaborative and Research Methodologies.
- Active and Gamified Methodologies.
- Inverted Methodologies or Flipped Learning.
- Design of Flexible Digital Learning Programmes.

Each course has an estimated duration of 25 hours and is structured in microlessons or learning nuggets, which facilitates

quick and adaptable access. Upon completion, participants have received a free diploma or the possibility of obtaining a certificate with the recognition of 1 ECTS from the National University of Distance Education (UNED), provided that the requirements established by each institution are met.

Target group

University teachers

Elements of innovation

The **ENID-Teach** project has introduced four significant innovations that extend and surpass the results obtained in previous projects:

- Distributed Pedagogical Model. The programme is based on a critical and social pedagogy, rethought for digital and uncertain environments. This model distributes knowledge through interconnected educational networks, where teachers and students are configured as learning nodes. The network structure replaces traditional hierarchical systems, fostering a collaborative, decentralised and flexible environment, capable of responding to the diversity of contexts, disciplines and cultures.
- Microlearning: Agility and Flexibility. The use of microlessons or learning nuggets offers a dynamic and agile learning experience. The content is broken down into small units, facilitating progressive assimilation and adaptability to the teacher's pace. This methodology intersperses theory, practice, self-assessment and debate, promoting continuous training that combines:
  - Interactive materials.
  - Reflective activities.
  - Formative assessments.
  - Gamified elements.

The NOOC model, due to its brief and structured design, adapts to the individual schedules of teachers, allowing access to the content at any time and from any device.

- Multilingualism and accessibility. The programme is designed to be implemented in any European university, eliminating language barriers and guaranteeing universal access. The main characteristics that facilitate this expansion are:
  - Languages: the NOOCs will be available in Spanish, French, English, Italian and Portuguese.
  - Open access: the courses have been offered free of charge through the platform, which is independent and freely accessible. They will be available free of charge and open access without tutoring for the next 5 years.
  - Inclusion: the educational resources will be adapted for people with visual and hearing impairments, with subtitles in all videos and materials in multiple formats.
- 4. Open Educational Resources (OER). Each NOOC includes a minimum of 10 Open Educational Resources (OER), divided into:
  - 5 interactive resources: incorporating gamified elements, in 360°, designed using different media such as generative artificial intelligence (GAI) or tools such as Geneal.ly
  - 5 descriptive resources: complementary material providing theoretical information, practical examples and application guides.

These resources are available in a multilingual and accessible format, guaranteeing flexibility in the teaching-learning processes.

Programme results and scope

The programme's main achievements include:

- Training in digital and flexible methodologies.
- Training in the creation of accessible and inclusive content.
- Development of skills applicable to any discipline.
- Expansion of inter-university networks for the exchange of good practices.

The results developed within the framework of the training programme have been as follows:

Result 1. Training Programme in Digital Skills

A microlearning programme on digital skills training in flexible and innovative teaching practices. The programme formed by five multilingual and accessible NOOCs created on the basis of microlessons or learning nuggets following a blended methodology.

Needs it addresses:

- Developing teachers' digital skills in innovative pedagogies.
- Adapting teaching to digital environments and flexible models.
- Facilitating educational access for disadvantaged groups.

Final result:

- A complete online training programme in digital pedagogies, consisting of five multilingual NOOCs (Spanish, English, French, Italian and Portuguese).
- Free interactive online guide and downloadable PDF with the full programme on the project website or directly in PDF.
- Additionally, the 'Digital and flexible methodologies pedagogical framework' has been developed, which constitutes the theoretical reference for each of the methodologies implemented in the programme and their main characteristics, a document produced by the National University of Distance Education.

Key dimensions developed:

- Introduction
- Learning objectives
- Contents
- Tutoring process
- Resources
- Activities
- Evaluation system

Innovation developed:

- Distributed and social pedagogical model: Promotes network learning, without central hierarchies.
- Microlearning (microlessons): Small units of agile and adaptable content.

- Multiformat and multilingual: Guaranteed accessibility at an international level.

Impact and transferability:

- Creation of a digital educational ecosystem that encourages continuous learning.
- Transferability: Applicable in any European university thanks to the multilingual, inclusive and free approach.

Result 2. Development of NOOCs in flexible and innovative methodologies

Development and implementation of 5 NOOCs; that is, Nano Open, Massive and Online Courses, in this case focused on flexible and digital methodologies, in five thematic areas: 1. Connected and critical; 2. Collaborative and research-based; 3. Active and gamified; 4. Inverted or Flipped; 5. Design of flexible digital learning programmes.

Needs it responds to:

- Creating online courses that reflect current pedagogical demands.
- Ensuring that teachers can integrate innovative methodologies in a flexible way.

Final result:

- Five NOOCs:
  1. Connected and Critical Methodologies
  2. Collaborative and Research Methodologies
  3. Active and Gamified Methodologies
  4. Inverted (Flipped Learning)
  5. Design of Flexible Digital Programmes

Each NOOC lasts 25 hours and grants official certification.

Innovation:

- Agile and flexible distribution through microlessons.
- Modular approach: Possibility of taking the NOOCs independently or as a whole.
- OPENMOOC platform: Free global access.

Impact and Transferability:

- Strengthening of digital pedagogical competences.
- Transferable to different disciplines and educational contexts.

Result 3. Good practice guide on flexible digital pedagogies

A guide to good practice in digital and flexible pedagogy based on objective results. This guide summarises a description of each of the methodologies implemented. Its main objective is to help teachers reorient and pivot their subjects towards a flexible model.

Needs it responds to:

- Providing a resource to guide teachers in the implementation of digital methodologies.
- Promoting a smooth educational transition towards hybrid or completely digital models.

Final result:

- Interactive and downloadable guide with a detailed description of:
  - Connected and critical methodologies
  - Collaborative and research-based methodologies
  - Active and gamified
  - Flipped (Flipped Learning)
- Free and open access from the project website

Innovation:

- First comprehensive resource on flexible digital pedagogies.
- Adaptability to different educational contexts and institutional needs.

Impact and Transferability:

- Applicable in universities across Europe.
- Encourages the development of new flexible academic programmes.

In short, the ENID-Teach training programme continues to have an impact on the European university environment, offering training resources that enable institutions to strengthen

their digital teaching models. The NOOCs, being continuously available at no cost, guarantee that any teacher can access them, favouring a more flexible, inclusive and resilient higher education. Furthermore, all the resources are designed under the Creative Commons licence (CCBY-NC-SA) which allows them to be downloaded, used and reused in other contexts.

This model represents a step towards the consolidation of an open and collaborative digital educational ecosystem, capable of responding to the challenges of the 21st century and promoting continuous learning adapted to the needs of university teachers.

Impact and results obtained in the implementation of the training programme (NOOC)

The overall results indicate that a total of 827 teachers have participated in the training programme. Of these, 578 are university teachers from the European Union, more than 100 belong to other educational levels within the EU and 60 are teachers, both university and from other levels, from countries outside the EU. In total, the number of course participants, considering different profiles and origins, amounts to 3,044.

Geographical distribution (by language) of university teaching staff:

- Spain leads the way with 368 teachers, consolidating its position as the country with the highest representation.
- Portugal is in second place with 238 teachers, reflecting a notable interest from Portuguese-speaking teachers.
- Italy is in third place with 100 university teachers.

Participation by course

- The most popular course was *Gamified and Active Methodologies*, with:
  - 167 university teachers.
  - A total of 267 participants from various educational levels.
- In second place was the course on *Designing Flexible Learning Programmes*, with:
  - 111 university teachers.
  - A total of 175 participants.

These results demonstrate the interest of teaching staff in innovative and flexible methodologies, with a marked participation in programmes that promote dynamic and adaptive pedagogical approaches.

In relation to course completion, the final sample was made up of university teachers who completed the courses (having completed at least 70%), passed the corresponding final exam and/or participated in the workshops on methodologies implemented after the completion of the courses.

The total sample of university teachers in the European Union who meet these criteria amounts to more than 400 teachers, a figure that exceeds 520 when teachers at all educational levels are included. 95% of the participants accessed the courses in Spanish, English or Portuguese. There was a prevalence of Spanish teachers (306 teachers), followed by those who participated and passed the courses in English (90 teachers), and in third place, those who did so in Portuguese (103 teachers).

Impact and results of participation in Universities of the European Union

The data collected reflects the active participation of universities from various countries in the European Union within the framework of the project. In total, more than 120 universities have been part of the initiative, contributing to the development of the training and collaboration activities promoted throughout the programme. The countries with the highest representation are Spain, with 36 universities; Portugal, with 34; and Italy, with 25, in addition to other universities from different European Union countries.

These results show a strong involvement of Iberian universities, with Spain and Portugal leading the participation. Likewise, the presence of Italian and Bulgarian universities has been significant, consolidating a solid collaboration network in the European sphere.

The high level of participation of Spanish and Portuguese universities suggests a strong commitment to digital transformation and the adoption of flexible teaching methodologies. On the other hand, the lower participation of French universities could

be related to the existence of similar programmes at the national level or to a lower dissemination of the project in that context.

Collaboration between these universities strengthens the European Network in D-flexible Teaching, facilitating the exchange of good pedagogical practices in the European university environment. This level of involvement not only favours the transfer of knowledge and experiences but also contributes to consolidating a more cohesive educational community that is better prepared to face the challenges of the digital environment.

International cooperation network for knowledge transfer and digital learning (ReCoIn-Tad)

Description

The ENID-Teach project has led to the creation of a distributed international network of inter-university cooperation that promotes flexible and innovative digital teaching. This network is consolidated as a space where teachers act as intermediate nodes (anchors) that facilitate intra- and inter-university connections, promoting the dissemination of good pedagogical practices and digital methodologies adapted to the educational challenges of the 21st century.

The activity of creating an inter-university cooperation network to generate flexible and innovative practices is carried out throughout the project and is led by the UNED. This activity is cross-cutting in nature and is closely linked to the project's management actions, directly contributing to the achievement of the programme's third objective. As a result, the European Network in D-flexible Teaching is established.

The need for this network lies in the consolidation of a model of European inter-university cooperation, through the creation of a cohesive and distributed university network, where teaching staff act as intermediary nodes that facilitate the exchange of flexible and digital methodologies. The aim is to strengthen the connections between universities and contribute to the adaptation of the education system to the demands of the 21st century.

The network is developed on the basis of a distributed international structure, made up of the teaching staff who have participated in the training programme and who show an active commitment to the exchange of experiences in flexible digital teaching practices. This initiative represents the continuation and expansion of the ReCoIn-TaD network

The innovative nature of this network lies in its origin, based on previous experiences, and in its openness to any teacher interested in participating. In addition, it seeks to guarantee its stability and permanence through the signing of collaboration agreements between teachers, which will allow the flow of exchange of good practices and the development of joint activities to be maintained once the project is finished. The innovation focuses on giving prominence to the participating teachers, configuring the network not only as an international cooperation agreement between universities, but also as a space for direct collaboration between teachers.

Impact and results obtained in the implementation of ReCoIn-TaD network

The impact and transferability of this network is reflected in the expansion of the EPALE community, the analysis of social networks and the continuous growth of the ReCoIn-TaD network.

The network currently has a total of 578 members, of which 345 are university professors from the European Union, excluding those who are part of the institutions participating in the project.

In addition, the network includes other profiles, such as students and professionals interested in innovation and education, as it is a space open to anyone wishing to explore and share innovative educational practices.

The data is presented in detail below:

Teachers from the EU (excluding partner institutions):

- Total: 345 teachers from different European countries have joined the RECOIN-TAD network.
- Distribution by country:
  - Spain contributes 137 teachers.

- Italy has 25 teachers.
- Portugal adds 48 teachers.
- France registers 54 teachers.
- Other EU countries lead with 49 teachers, which represents a significant contribution to the total.

Teachers from outside the EU:

- Total: 53 teachers from non-EU countries participate in the network.

Other profiles from outside the EU:

- Total: 11 participants with diverse profiles (non-teachers) from outside the EU form part of the network.
- Distribution by country:
  - France and Spain contribute 4 participants each.
  - Portugal has 2 participants.
  - Bulgaria has 1 participant.

In summary, the following results are concluded:

- Balanced participation inside and outside the EU: The RECOIN-TAD network has managed to attract both teachers and other profiles from different European and non-European countries, consolidating its global and diverse character.
- Rest of European Union countries stands out as a key node within the EU, with high participation compared to other European countries.
- Spain has a strong international presence, reflected in its contribution of teachers from outside the EU, which indicates the capacity to extend the network beyond the EU's borders.
- Impact of the network: The network has not only managed to integrate teachers from academic institutions, but also diverse profiles, which broadens its scope and impact in different areas of digital and flexible education.
- Sustainability and growth: The incorporation of profiles from outside the EU reflects RECOIN-TAD's potential to establish itself as a global platform of reference in digital and collaborative pedagogies.

To ensure its sustainability, the network will continue to develop agreements and activities with participating members, thus consolidating an ecosystem of academic and professional cooperation that transcends the limits of the project and endures over time.

Conclusions

The results of the NOOCs training programme reflect significant participation by university teachers in Europe, with a total of 827 teachers, of whom 578 belong to universities in the European Union, more than 100 from other educational levels within the EU and 60 from institutions outside Europe. Overall, total participation in the courses, including different profiles and backgrounds, reached 3,044 participants.

The geographical distribution shows Spain in the lead, with 368 teachers, followed by Portugal with 238 and Italy with 105. These figures show a strong interest in digital training in the Iberian region, which suggests an institutional commitment to educational innovation.

In terms of participation by course, **Gamification and active methodologies** was the most popular, with 167 university teachers and a total of 267 participants. The second most popular course was **Design of flexible learning programmes**, with 111 university teachers and 175 participants in total. These figures reflect the preference of teachers for dynamic and adaptive methodologies that promote interaction and flexibility in teaching.

Regarding the completion of the courses, the final sample included more than 400 university teachers from the European Union who completed at least 70% of the content, passed the final exam and/or participated in the methodological workshops. When all educational levels are taken into account, this figure rises to over 520 teachers. The vast majority of participants (95%) accessed the courses in Spanish, English or Portuguese, with a notable prevalence of Spanish teachers (306), followed by those who participated in English (90) and Portuguese (103).

The involvement of European universities has been another of the key aspects of the programme, with more than 120 participating institutions. Spain leads the institutional presence with 36

universities, followed by Portugal with 34 and Italy with 25. The significant representation of Spanish and Portuguese universities reinforces the trend observed in teacher participation, reflecting a particular interest in digital transformation and the adoption of flexible methodologies.

These results highlight the consolidation of a collaborative network in flexible digital teaching within the European university space. Cooperation between universities has strengthened the **European Network in D-flexible Teaching**, promoting the exchange of good pedagogical practices and favouring the transfer of knowledge.

A key aspect of this collaboration has been the creation and expansion of the International Cooperation Network for Knowledge Transfer and Digital Learning (ReCoIn-TaD). The network currently has **578 members**, of which 345 are university teachers from the European Union, not including those belonging to the project's partner institutions. In addition, the network is open to the participation of students and professionals interested in educational innovation, making it a dynamic space for the exchange and development of good practices.

The consolidation and growth of **ReCoIn-TaD** guarantees the long-term sustainability of the project, facilitating the continuity of international cooperation and the implementation of innovative digital methodologies in the university environment. This network not only fosters academic collaboration, but also contributes to the creation of a more cohesive educational community that is prepared for the challenges of the digital environment.

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Research on the effectiveness of microlearning based on NOOCs: design, instruments and procedures

Investigación sobre la eficacia del microaprendizaje basado en los NOOC: diseño, instrumentos y procedimientos

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Abstract

This research evaluates the impact of microlearning through NOOCs (Nano Open Online Courses) in higher education, analysing their effectiveness as a pedagogical model in digital environments. Over the course of three years, data was collected at different stages of implementation, with a detailed study in the last six months of the project.

The analysis examines course participation and completion, the development of teachers' digital and pedagogical competences, and the efficiency of open educational resources (OER). A mixed methodology was applied, combining qualitative and quantitative analyses using interviews, focus groups and satisfaction questionnaires, with tools such as SPSS and Atlas Ti.

The study population includes 827 teachers from different educational levels. The specific sample for interviews and discussion groups includes 71 European university teachers, with interviews in Spanish, Italian, Portuguese and English, and 438 participants in evaluation questionnaires.

This study is a pioneer in evaluating the effectiveness of NOOCs over a period of three years and in five languages. Its results offer guidelines for higher education institutions, educational projects focused on digital transformation and teachers interested in applying microlearning methodologies.

Keywords
Microlearning, NOOCs, higher education, digital competences, flexible methodologies, open educational resources, digital transformation

Resumen
Esta investigación evalúa el impacto del microaprendizaje a través de NOOCs (Nano Open Online Courses) en la educación superior, analizando su eficacia como modelo pedagógico en entornos digitales. A lo largo de tres años, se recopilaron datos en distintas fases de implementación, con un estudio detallado en los últimos seis meses del proyecto.

El análisis examina la participación y finalización de los cursos, el desarrollo de competencias digitales y pedagógicas del profesorado, y la eficiencia de los recursos educativos abiertos (OER). Se aplicó una metodología mixta, combinando análisis cualitativos y cuantitativos mediante entrevistas, grupos de discusión y cuestionarios de satisfacción, con herramientas como SPSS y Atlas Ti.

La población del estudio incluye 827 docentes de distintos niveles educativos. La muestra específica para entrevistas y grupos de discusión abarca 71 docentes universitarios europeos, con entrevistas en español, italiano, portugués e inglés, y 438 participantes en cuestionarios de evaluación.

Este estudio es pionero en evaluar la efectividad de NOOCs en un período de tres años y en cinco idiomas. Sus resultados ofrecen directrices para instituciones de educación superior, proyectos educativos centrados en la transformación digital y docentes interesados en aplicar metodologías de microaprendizaje.

Palabras clave
Microaprendizaje, NOOCs, educación superior, competencias digitales, metodologías flexibles, recursos educativos abiertos, transformación digital.

Contextualisation and description of the research

The research responds to the need to scientifically evaluate and validate the impact of microlearning, implemented through NOOCs (Nano Open Online Courses), as an effective pedagogical model in higher education. It is essential to analyse whether this approach offers a solid basis for teaching and learning in digital environments, helping to generate empirical evidence to support its adoption in universities and continuing education centres.

This research not only provides a detailed analysis of the results obtained at the end of the project but also addresses a gap in the academic literature regarding the evaluation of microlearning methodologies on a large scale, in multilingual contexts and with open educational resources (OER).

During the three years of the project, data has been collected at different stages of implementation and iterative testing of the NOOCs. The most comprehensive study has been carried out during the last six months of the project, with the active collaboration of all the partner institutions.

The analysis covers:

- Evaluation of participation and completion of the courses.
- Impact on the development of teachers' digital and pedagogical competences.
- Efficiency of open educational resources (OER) and their integration into the teaching-learning process.

The methodological approach includes qualitative and quantitative analysis techniques, allowing for a comprehensive view of the impact of NOOCs.

The originality of the research lies in several aspects:

- **Pioneering approach:** this is the first time that the effectiveness of NOOCs has been analysed over a period of three years, with tests carried out in different educational contexts and in five languages (Spanish, English, French, Italian and Portuguese).
- **Open and accessible resources:** the study is based on the integration of interactive resources, promoting inclusive learning that can be adapted to the diverse needs of teachers.
- **Structured microlearning**: an innovative model is validated that fragments content into short, dynamic units (nuggets), facilitating access to and retention of knowledge.
- The publication of the results has a high potential impact on the academic community and the education sector. It is hoped that this research will serve as a reference for:
- **Higher education institutions** interested in implementing flexible continuous training models for their teaching staff.

- **European and national projects** that seek to strengthen digital transformation in the field of education.
- **Teachers and instructional designers** who wish to adapt microlearning methodologies in their daily practices.

In summary, the general objective of the research is to analyse the quality of the courses taught in the different languages taught and to offer an overall view of the evaluation of the five courses and different methodologies developed.

To achieve this **general objective**, the following specific objectives have been established:

- To evaluate the quality of courses that address collaborative, gamified, connected and hybrid methodologies, as well as those focused on the flexible design of educational programmes.
- To examine student evaluations of the course content, identifying perceptions and levels of satisfaction.
- To analyse the quality of the methodology, content and communication process implemented during the training programme.
- To study the technological quality of the resources used and the platform employed for the development of the courses.

Research methodology

Design

The research follows a mixed approach, combining qualitative and quantitative methods to offer a comprehensive perspective on the effectiveness of microlearning based on NOOCs. The quantitative analysis, centred on the data from the questionnaires, is developed from a descriptive analysis. The qualitative study, on the other hand, is based on discourse analysis, using interviews and discussion groups as the main data collection tools.

Two key tools are used for data analysis: SPSS (version 24) for statistical analysis and Atlas Ti HM for discourse analysis. The discursive analysis of interviews, discussion groups and open questions in the questionnaires allows for an in-depth exploration of teachers' perceptions and the contextualisation of their responses in the social and geographical environment analysed.

The qualitative process is carried out in five phases:

1. Definition of the universe of contents and selection of the sample.
2. Determination of the unit of analysis.
3. Establishment of thematic categories.
4. Coding of data.
5. Preparation of a conceptual map and extraction of conclusions.

This design facilitates the triangulation of data from various sources (interviews, discussion groups and questionnaires), reinforcing the validity and reliability of the results.

The analysis focuses on five key dimensions:

- Structure and organisation: assesses the clarity, sequence and design of the courses.
- Content: analyses the rigour, innovation and applicability of resources.
- Methodology: examines the relevance and effectiveness of the pedagogical strategies implemented.
- Technology: assesses the usability of the platform and its adaptation to different devices.
- Cohesion and affiliation: explores interactivity, collaboration and the sense of community among students.
- Overall satisfaction with the training programme.

Population and sample

The study population is made up of all the teachers participating in the courses, **827 teachers** from different educational levels, both European and international. From this population, a sample was taken consisting of **university teachers** who participat-

ed in interviews and/or discussion groups organised to evaluate each of the courses, taking as a reference the language in which they received the training (Italian, English, French, Spanish or Portuguese).

In general terms, and except for some particularities in the chapters, the sample is made up of 84 European university teachers. Of this group, 13 participated in four discussion groups and 71 in individual interviews.

In terms of the language distribution of the interviews, 26 were conducted in Spanish, 5 in Italian, 13 in Portuguese and 17 in English. The topics addressed in these interviews focused on the evaluation of each of the courses analysed, with the following distribution:

- NOOC 1: Connected methodologies → 9 interviews
- NOOC 2: Collaborative and research methodologies → 15 interviews
- NOOC 3: Active and gamified methodologies → 18 interviews
- NOOC 4: Hybrid methodologies → 9 interviews
- NOOC 5: Design of flexible digital learning programmes → 14 interviews.

On the other hand, the sample was made up of the teachers who answered the evaluation questionnaire, which were 438 participants from the five NOOCs. They are distributed by each NOOC as follows: NOOC 1, from France with 72 responses; NOOC 2, from Italy, with 73 responses; NOOC 3, from Portugal, with 126, NOOC 4 from Bulgaria, with a total of 81 responses and NOOC 5 from Spain, with 86 contributions.

Analysis and data collection tools

As indicated above, interviews, focus groups and satisfaction questionnaires are used to evaluate the training programme:

- In-depth interviews.
  - Carried out throughout the project with teachers participating in the NOOCs.

- Focuses on gathering subjective perceptions, experiences and suggestions regarding the methodology, content and usability of the courses.

  The interview is organised into six thematic blocks that reflect key dimensions of the design and development of the course. Each section addresses specific aspects of the user experience, with open-ended questions that allow for deep and detailed reflection: structure and organisation of the courses, content, methodology, technology, cohesion and affiliation, and conclusions.

  The evaluation of the NOOCs addresses six key dimensions to analyse the experience of the teaching staff. It seeks to assess the clarity and organisation of the course, as well as the quality, relevance and innovation of the content. In addition, the methodology is examined, evaluating the interaction, the evaluation system and the teaching support. At a technological level, possible barriers related to the platform and digital resources are explored. Cohesion and affiliation are analysed to understand the sense of belonging and collaboration among participants. Finally, general impressions are collected to identify strengths and areas for improvement, in order to optimise future editions and reinforce the training impact.

- Focus Groups

  Heterogeneous groups of participants were convened to collectively discuss and analyse the programme's strengths and areas for improvement.

  This format facilitated the identification of common patterns and divergences in the training experiences.

  The discussion groups follow the same structure and questions as the individual interviews, thus allowing for comparison and cross-referencing of the data obtained. This approach facilitates the triangulation of information, by contrasting individual perceptions with collective opinions, providing a more complete and nuanced view of the experience of teachers in NOOCs. Group responses enrich the analysis by revealing collaborative dynamics, identifying consensus and highlighting divergences that may not emerge in individual interviews.

- The satisfaction questionnaires:
  - Administered after the completion of each NOOC to assess overall satisfaction, the perceived level of learning and the applicability of the content.
  - They include closed questions with Likert scales and open questions that allow for descriptive analysis.

Part Two: Educational experience of Spanish university teachers

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The second part of this book, entitled *Educational Experience of Spanish University Teachers*, focuses on the analysis of the pedagogical experiences of university teachers in Spain within the framework of the ENID-Teach project. Through different case studies and critical analyses, it examines innovative methodologies applied in university teaching, highlighting their impact on the digital transformation of education. This section brings together research, within the framework of the project, on connected, collaborative, gamified, inverted and flexible methodologies, providing a theoretical framework, empirical evidence and reflections on their implementation in digital university contexts.

The content begins with a study of connected and critical methodologies, exploring how they favour interaction, critical thinking and the collective construction of knowledge. This is followed by an analysis of collaborative and investigative methodologies, which examines the role of teachers as facilitators and the importance of promoting teamwork in digital environments.

Gamification and active learning occupy a prominent place in this part of the book, addressing their integration into university teaching and showing specific experiences in Spain and other European countries. The flipped classroom model is also examined, analysing its advantages and challenges in digital education and its impact on students' autonomous learning.

Finally, a study is presented on the flexible design of digital programmes, which explores strategies for adapting teaching to student diversity and to the new demands of online learning.

This second part of the book offers a detailed analysis of the application of innovative methodologies in the Spanish univer-

sity context, within the framework of the project, highlighting their importance in the digitalisation of teaching and their influence on student learning. Through case studies, theoretical reflections and empirical results, it provides a comprehensive view of the challenges and opportunities facing higher education in the digital age.

Segunda parte: Experiencia educativa de los profesores universitarios españoles

La segunda parte de este libro, titulada *Educational Experience of Spanish University Teachers*, se centra en el análisis de las experiencias pedagógicas del profesorado universitario en España dentro del marco del proyecto ENID-Teach. A través de distintos estudios de caso y análisis críticos, se examinan metodologías innovadoras aplicadas en la enseñanza universitaria, destacando su impacto en la transformación digital de la educación. Esta sección reúne investigaciones, en el marco del proyecto, sobre metodologías conectadas, colaborativas, gamificadas, invertidas y flexibles, proporcionando un marco teórico, evidencias empíricas y reflexiones sobre su implementación en contextos universitarios digitales.

El contenido inicia con un estudio sobre las metodologías conectadas y críticas, explorando cómo favorecen la interacción, el pensamiento crítico y la construcción colectiva del conocimiento. A continuación, se presenta un análisis de las metodologías colaborativas e investigativas, en el que se examina el papel del profesorado como facilitador y la importancia de fomentar el trabajo en equipo en entornos digitales.

La gamificación y el aprendizaje activo ocupan un lugar destacado en esta parte del libro, abordando su integración en la enseñanza universitaria y mostrando experiencias concretas en España y otros países europeos. También se examina el modelo de aula invertida o flipped classroom, analizando sus ventajas y desafíos en la educación digital y su impacto en el aprendizaje autónomo del estudiantado.

Finalmente, se presenta un estudio sobre el diseño flexible de programas digitales, en el que se exploran estrategias para

adaptar la enseñanza a la diversidad del alumnado y a las nuevas exigencias del aprendizaje en línea.

Esta segunda parte del libro ofrece un análisis detallado sobre la aplicación de metodologías innovadoras en el contexto universitario español, en el marco del proyecto, destacando su importancia en la digitalización de la enseñanza y su influencia en el aprendizaje del estudiantado. A través de estudios de caso, reflexiones teóricas y resultados empíricos, se proporciona una visión integral de los desafíos y oportunidades que enfrenta la educación superior en la era digital.

Segunda parte: Experiência pedagógica dos professores universitários espanhóis

A segunda parte deste livro, intitulada *Experiência educativa dos professores universitários espanhóis*, centra-se na análise das experiências pedagógicas dos professores universitários em Espanha no âmbito do projeto ENID-Teach. Através de diferentes estudos de caso e análises críticas, examina metodologias inovadoras aplicadas no ensino universitário, destacando o seu impacto na transformação digital da educação. Esta secção reúne a investigação, no âmbito do projeto, sobre metodologias conectadas, colaborativas, gamificadas, invertidas e flexíveis, fornecendo um enquadramento teórico, evidências empíricas e reflexões sobre a sua implementação em contextos universitários digitais.

O conteúdo começa com um estudo das metodologias conectadas e críticas, explorando o modo como favorecem a interação, o pensamento crítico e a construção colectiva do conhecimento. Segue-se uma análise das metodologias colaborativas e investigativas, que examina o papel dos professores como facilitadores e a importância de promover o trabalho em equipa em ambientes digitais.

A gamificação e a aprendizagem ativa ocupam um lugar de destaque nesta parte do livro, abordando a sua integração no ensino universitário e mostrando experiências específicas em Espanha e noutros países europeus. O modelo de sala de aula invertida também é examinado, analisando as suas vantagens e desafios na educação digital e o seu impacto na aprendizagem autónoma dos alunos.

Por último, é apresentado um estudo sobre a conceção flexível de programas digitais, que explora estratégias para adaptar o ensino à diversidade dos estudantes e às novas exigências da aprendizagem em linha.

Esta segunda parte do livro oferece uma análise detalhada da aplicação de metodologias inovadoras no contexto universitário espanhol, no âmbito do projeto, destacando a sua importância na digitalização do ensino e a sua influência na aprendizagem dos alunos. Através de estudos de caso, reflexões teóricas e resultados empíricos, oferece uma visão abrangente dos desafios e oportunidades que o ensino superior enfrenta na era digital.

Seconda parte: Esperienza pedagogica degli insegnanti universitari spagnoli

La seconda parte di questo libro, intitolata *Esperienza educativa dei docenti universitari spagnoli*, si concentra sull'analisi delle esperienze pedagogiche dei docenti universitari in Spagna nell'ambito del progetto ENID-Teach. Attraverso diversi casi di studio e analisi critiche, esamina le metodologie innovative applicate all'insegnamento universitario, evidenziandone l'impatto sulla trasformazione digitale dell'istruzione. Questa sezione riunisce le ricerche condotte nell'ambito del progetto sulle metodologie connesse, collaborative, gamificate, invertite e flessibili, fornendo un quadro teorico, prove empiriche e riflessioni sulla loro applicazione in contesti universitari digitali.

Il contenuto inizia con uno studio delle metodologie connesse e critiche, esplorando come esse favoriscano l'interazione, il pensiero critico e la costruzione collettiva della conoscenza. Segue un'analisi delle metodologie collaborative e investigative, che esamina il ruolo dei docenti come facilitatori e l'importanza di promuovere il lavoro di squadra negli ambienti digitali.

La gamification e l'apprendimento attivo occupano un posto di rilievo in questa parte del libro, affrontando la loro integrazione nell'insegnamento universitario e mostrando esperienze specifiche in Spagna e in altri Paesi europei. Viene inoltre esaminato il modello della flipped classroom, analizzandone i vantaggi e le sfide nella didattica digitale e il suo impatto sull'apprendimento autonomo degli studenti.

Infine, viene presentato uno studio sulla progettazione flessibile dei programmi digitali, che esplora le strategie per adattare l'insegnamento alla diversità degli studenti e alle nuove esigenze dell'apprendimento online.

Questa seconda parte del libro offre un'analisi dettagliata dell'applicazione di metodologie innovative nel contesto universitario spagnolo, nell'ambito del progetto, evidenziando la loro importanza nella digitalizzazione dell'insegnamento e la loro influenza sull'apprendimento degli studenti. Attraverso casi di studio, riflessioni teoriche e risultati empirici, fornisce una visione completa delle sfide e delle opportunità che l'istruzione superiore deve affrontare nell'era digitale.

Deuxième partie: Expérience pédagogique des professeurs d'université espagnols

La deuxième partie de cet ouvrage, intitulée *Educational Experience of Spanish University Teachers*, se concentre sur l'analyse des expériences pédagogiques des enseignants universitaires en Espagne dans le cadre du projet ENID-Teach. À travers différentes études de cas et analyses critiques, elle examine les méthodologies innovantes appliquées à l'enseignement universitaire, en soulignant leur impact sur la transformation numérique de l'éducation. Cette section rassemble les recherches menées dans le cadre du projet sur les méthodologies connectées, collaboratives, gamifiées, inversées et flexibles, en fournissant un cadre théorique, des preuves empiriques et des réflexions sur leur mise en œuvre dans des contextes universitaires numériques.

Le contenu commence par une étude des méthodologies connectées et critiques, explorant la manière dont elles favorisent l'interaction, la pensée critique et la construction collective de la connaissance. Vient ensuite une analyse des méthodologies collaboratives et d'investigation, qui examine le rôle des enseignants en tant que facilitateurs et l'importance de promouvoir le travail d'équipe dans les environnements numériques.

La gamification et l'apprentissage actif occupent une place prépondérante dans cette partie du livre, qui traite de leur intégration dans l'enseignement universitaire et présente des expériences spécifiques en Espagne et dans d'autres pays européens. Le modèle de la classe inversée est également examiné, en analysant ses avantages et ses défis dans l'éducation numérique et son impact sur l'apprentissage autonome des étudiants.

Enfin, une étude est présentée sur la conception flexible des programmes numériques, qui explore les stratégies d'adaptation

de l'enseignement à la diversité des étudiants et aux nouvelles exigences de l'apprentissage en ligne.

Cette deuxième partie du livre propose une analyse détaillée de l'application de méthodologies innovantes dans le contexte universitaire espagnol, dans le cadre du projet, en soulignant leur importance dans la numérisation de l'enseignement et leur influence sur l'apprentissage des étudiants. À travers des études de cas, des réflexions théoriques et des résultats empiriques, elle offre une vue d'ensemble des défis et des opportunités auxquels l'enseignement supérieur est confronté à l'ère numérique.

3

Critical connections: experience in connected and critical methodologies

Conexiones críticas: experiencia en metodologías conectadas y críticas

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Abstract
This chapter presents an analysis of the educational experience of Spanish university teachers in the NOOC1 'Connected and Critical Methodologies', part of the Erasmus+ project 'European Network for Flexible Learning (ENID-Teach)', which aims to train teachers in digital technologies and online teaching. The NOOC aims to train teachers to face the challenges of digital education, promoting connected methodologies based on critical thinking and reflective use of digital resources, with a learner-centred perspective. The main objective of NOOC1 is to train teachers in the creation of connected and critical courses, fostering participation and critical thinking through digital tools. The approach is based on the principles of connectivism, promoting interaction, strategic use of digital networks and verification of information sources. In addition, the programme seeks to develop decision-making skills to favour autonomous learning. A qualitative methodology was used, through interviews and focus groups. The results show a positive assessment of the digital tools and methodologies, although challenges were identified, such as the lack of time to implement the new methodologies and student resistance to active learning. NOOC1 had a positive impact on teaching practices, improving future interventions in digital education.

Keywords: Connected methodologies, Critical methodologies, Flexible methodologies, Connectivism, Teacher training

Resumen
Este capítulo presenta un análisis de la experiencia educativa de los profesores universitarios españoles en el NOOC1 «Metodologías conectadas y críticas», parte del proyecto Erasmus+ «Red Europea para el Aprendizaje Flexible (ENID-Teach)», que tiene como objetivo formar a los profesores en tecnologías digitales y enseñanza en línea. El NOOC tiene como objetivo formar a los profesores para que afronten los retos de la educación digital, promoviendo metodologías conectadas basadas en el pensamiento crítico y el uso reflexivo de los recursos digitales, con una perspectiva centrada en el alumno. El objetivo principal de NOOC1 es formar a los profesores en la creación de cursos conectados y críticos, fomentando la participación y el pensamiento crítico a través de herramientas digitales. El enfoque se basa en los principios del conectivismo, promoviendo la interacción, el uso estratégico de las redes digitales y la verificación de las fuentes de información. Además, el programa busca desarrollar habilidades de toma de decisiones para favorecer el aprendizaje autónomo. Se utilizó una metodología cualitativa, a través de entrevistas y grupos de discusión. Los resultados muestran una valoración positiva de las herramientas y metodologías digitales, aunque se identificaron desafíos, como la falta de tiempo para implementar las nuevas metodologías y la resistencia de los estudiantes al aprendizaje activo. NOOC1 tuvo un impacto positivo en las prácticas docentes, mejorando futuras intervenciones en educación digital.

Palabras clave: Metodologías conectadas, Metodologías críticas, Metodologías flexibles, Conectivismo, Formación de profesores

Introduction

This chapter develops a detailed analysis of the educational experience of Spanish university teachers in the NOOC1 (Open Online Training Course) 'Connected and Critical Methodologies' developed in the framework of the Erasmus+ project 'European Network on Flexible D-Teaching (ENID-Teach)'. This project aims to provide training for university teachers on digital technologies and online teaching. Specifically, NOOC 1 'Connected and Critical Methodologies' aims to train teachers in the competences needed to face the current challenges of digital teaching and to promote connected methodologies based on critical thinking.

The main objective of NOOC1 is to train teachers to create courses or modules that are both connected and critical, promoting a reflective and responsive approach to the use of digital resources. This objective is based on a student-centered educational perspective, which seeks to empower student learning through technological tools designed to encourage participation, critical thinking and the connection between knowledge and its context. In this framework, we emphasize that NOOC 1 is based on the fundamental principles of connectivism (Siemens, 2012), which seek to enrich learning processes through strategies that promote interaction and critical thinking. This approach focuses on fostering exchanges that include a diversity of opinions and resources, recognizing the importance of plurality in the construction of knowledge. In addition, it encourages a conscious and strategic use of the dynamics generated by the actors present in the networks, maximizing their potential to facilitate learning. It also highlights the relevance of resorting to non-human agents and processes to access quality information, emphasizing rigorous verification of sources as a key component. This aspect is central in the current times of development of Generative Artificial Intelligence and its impact on student learning. Within this framework, the NOOC1 aims for participants to develop a solid command of decision-making processes, orienting them towards more critical and autonomous learning in digital environments.

In order to carry out the evaluation and development of NOOC 1, a methodology based on a qualitative approach has been implemented. The sample is composed of a selection of teachers from Spanish universities who have participated in this first NOOC. Individual interviews and focus groups were used as data collection instruments, with the express consent of each teacher to participate, also guaranteeing the privacy of their personal data. These instruments were used to find out the teachers' opinions on the contents and methodologies implemented in NOOC 1, as well as to evaluate the applicability of the knowledge acquired in their educational context.

The results obtained from the interviews and focus groups highlight several relevant aspects. NOOC 1 participants expressed a positive assessment of the use of digital tools and the proposed methodologies, highlighting that these favor more flexible, accessible, and inclusive teaching. Regarding the NOOC1

methodology itself, teachers expressed their satisfaction with the training due to the high quality of the content and the possibility of learning at their own pace. At the same time, some challenges were also pointed out, such as the lack of time needed to fully implement the new methodologies in their educational contexts and the resistance of the students to the proposal of an active attitude towards their own learning processes. Similarly, teachers recognise the value of generating networks of exchange and participation among colleagues and its benefits for their training but assess the additional time these exchanges require.

In sum, the methodology used and the sample selected provided a detailed insight into the effects of NOOC 1 'Connected and Critical Methodologies' on the participating teachers that was evaluated as positive, which will enable them to improve their future interventions in the field of digital education.

Theoretical framework

When addressing the issue of connected and critical methodologies, it is necessary to talk about digital learning. This is defined as learning that takes advantage of the capabilities of the network and takes place in digital environments through the use of the Internet (Santoveña-Casal, 2021). It brings together methodological aspects, strategies and processes that are based on the use of digital technologies (Santoveña-Casal, S. & Roldán Roldán, 2024). In this context, connected learning underlines the importance of hyper connections and networked structures, highlighting the central role of social and interpersonal interactions in the construction of knowledge (Santoveña-Casal, 2021).

Connected methodologies find their foundations in Siemens' (2005) postulates on connectivism, a pedagogical theory that promotes learning through the creation of digital connections and interactions. This approach emphasizes the role of technology not as an end in itself, but as a means to facilitate interaction between individuals and non-human agents, such as software and databases, in order to enrich the teaching and learning process. Unlike traditional pedagogical approaches, connectivism has transformed educational practices by integrating collabo-

rative dynamics and connected digital resources, moving away from transmissive models (Mulumeoderhwa, 2024).

Connectivism emphasizes the need to connect students, teachers and other key learning actors through networks and digital tools. This approach fosters collaborative learning in which online resources and technology play an enabling role, allowing students and teachers to develop greater autonomy and motivation. In addition, distance interactions and joint work between the different actors promote the creation of a 'collective intelligence', in which the active participation of learners drives the joint construction of knowledge.

A key element of this approach is the 'presence of digital technologies', which is broken down into three main dimensions: cognitive presence, referring to mental processes that connect facts and concepts; social presence, encompassing socio-emotional interactions and adaptive communication; and designed presence, related to the purposeful use of digital resources for learning (Bossu, 2020). To implement connectivism effectively, both students and teachers must understand and manage the dynamics of digital interactions and design and use resources that enhance connected learning.

These ideas are related to the perspective of Perkins (2001), who introduces the concept of distributed learning, which is divided into three dimensions: 'socially distributed learning', 'symbolically distributed learning' and 'physically distributed learning', the latter being particularly relevant for its inclusion of the possibilities offered by the Internet and interactions in digital networks. From this perspective, technology is conceived as a medium that facilitates interaction between people and non-human agents, enriching educational processes.

The integration of digital devices and learning systems into educational practices requires strategies aligned with connectivism principles. These strategies promote active, student-centered learning, reducing the emphasis on traditional methods such as lectures and tutorials. The aim is to transform the student into a co-creator of their learning through collaborative projects and practical tasks that favor interaction with diverse agents and access to specialized digital resources. In this framework, Generative Artificial Intelligence (GAI) emerges as a central resource for connectivism, as it expands the possibilities for interaction and

knowledge construction. According to Siemens (2005), learning occurs through the creation and exploitation of knowledge networks that include both individuals and non-human agents, such as digital technologies. The use of connectivism principles contributes to the strengthening of key competences. It is crucial to foster the exchange of ideas and resources, facilitating access to experts and specialized knowledge bases. Furthermore, the use of non-human tools, such as databases and knowledge management systems, enables students to identify specific needs, make informed decisions and make connections between different areas of knowledge. In this sense, Generative Artificial Intelligence (GAI) acts as a strategic node within these networks by facilitating hyper-connectedness and promoting collaboration between human and non-human agents (Area-Moreira, 2024). Thus, we argue that these technologies enhance learning by personalizing experiences, generating original content and fostering access to diversified knowledge sources.

An essential strategy is the creation of continuous learning networks, supported by digital tools and social networks that favor sustained collaboration over time. The inclusion of these technologies in connected learning requires careful planning, involving all educational actors, fostering equitable access to resources and promoting student participation and autonomy in the construction of knowledge.

Talking about autonomy in education necessarily implies referring to the development of critical thinking, an essential skill in the context of critical pedagogical methodologies. In the digital age, where information overload and misinformation are prevalent phenomena, critical thinking becomes a key competence. This process implies an active mental disposition that allows analyzing, evaluating and making informed decisions based on accurate, verified information supported by scientific principles (Santoveña- Casal, S. & Roldán Roldán, 2024). Beyond distinguishing between what is true and what is false, critical thinking requires questioning interpretations, the reliability of sources and the soundness of arguments, which are fundamental aspects to face problems such as fake news, rumors, conspiracy theories and scientific denialism widely spread on the Internet.

This critical approach faces major challenges due to the influence of mass media and social networks, which tend to amplify

misinformation, exacerbating users' cognitive biases. Cognitive biases, as mental shortcuts that simplify information processing, often lead to erroneous conclusions or the perpetuation of incorrect beliefs. To counteract these biases and make more informed decisions, critical thinking must rely on cognitive strategies such as rigorous evaluation of sources, comparison of different perspectives and fact-checking. As anticipated, these skills can be strengthened through pedagogical approaches such as connectivism, which promotes autonomous learning and reflective control over information, using multiple sources and learning communities as key tools.

A fundamental aspect of critical thinking is the students' attitude towards information. It is essential to cultivate an intellectual curiosity that encourages enquiry, questioning and critical reflection on the content consumed. Necessary critical skills include the ability to distinguish between facts, interpretations and opinions, as well as to evaluate the epistemological quality of information sources. In parallel, an attitude of intellectual humility must be developed, recognizing that knowledge is dynamic and subject to constant revision as new evidence emerges.

In this context, the development of critical thinking becomes more relevant due to the proliferation of Generative Artificial Intelligence (GAI) applications. These tools, while offering great opportunities, also present challenges related to the veracity and reliability of the information they generate. Critical thinking, therefore, involves not only distinguishing between fact and opinion, but adopting an active stance of research, analysis and reflection that enables students to navigate responsibly in an environment of complex and often contradictory information (Perkins, 2024).

The development of critical thinking must be a shared effort between students and teachers. While students strengthen their capacity for analysis and informed decision-making, teachers have a responsibility to create an educational environment that values critical reflection, analytical rigor and informed evaluation of information. This collaborative approach fosters competencies that are essential for both students and teachers, while building an educational community committed to the pursuit of reliable and ethical knowledge.

To conclude, we argue that critical thinking is a complex process that combines cognitive skills with personal and social at-

titudes. Its promotion within the educational environment not only forms informed and responsible citizens, but also enables them to face the challenges of a digital society characterized by an abundance of information and the constant presence of cognitive biases (López Aymes,2012). The explicit integration of these competences in pedagogical practices reinforces students' autonomy, fosters their ability to verify and contextualize information, and prepares them to actively participate in a dynamic, interconnected society.

Fostering critical thinking in connected digital environments represents an essential component of the contemporary pedagogical process. This approach includes the use of digital technologies to enrich interaction with learners and resources, while promoting a culture of critical reflection. Adopting connectivism strategies that leverage digital resources to evaluate, validate and contrast information not only transforms teaching, but also prepares students for a digital world characterised by constant evolution and complexity.

Objectives

As a general objective, we propose to analyze the quality, development and results of the NOOC1 'Connected and Critical Methodologies', in which teachers from Spanish universities have participated. The purpose of this NOOC1 is to train university teachers to face the challenges of digital education, promoting connected methodologies that encourage critical thinking and the reflective use of digital resources. In order to carry out this analysis, aspects such as the structure and organization of the NOOC1, the methodology used, the content taught, the technologies used, as well as the cohesion and sense of belonging generated have been considered.

The specific objectives were as follows:

- Evaluate the quality of NOOC1 in terms of the methodology used and the contents developed during its implementation.
- To explore the trainees' perception of the technologies, the digital resources and the platform used.

- To analyze the students' evaluation of the participation, relevance and communication of NOOC1.
- To identify the trainees' opinion on the transferability and applicability of NOOC1 contents and proposals in their teaching practice.

Sample

As anticipated in the introduction, in order to carry out the evaluation of NOOC 1' "Connected and Critical Methodologies", a sample of seven professors from Spanish universities was selected to participate in individual interviews and focus groups. These professors teach in different disciplines in Spanish universities, thus representing a variety of knowledge areas and institutional backgrounds.

Table 3.1. Teachers participating in interviews and focus groups.

Professor	University	Discipline	Participation in focus groups or individual interview
P1	University of the Basque Country	Philosophy and Anthropology	Individual interview
P2	University of Málaga	Urban Planning-Architecture	Individual interview
P3	University of Alcalá	Electronic Communications Engineering	Individual interview
P4	University of Salamanca	Rehabilitation	Focus group 1
P5	University of Leon	Ecology and Animal Biology	Focus group 1
P6	University of Valladolid	Agricultural and Forestry Engineering	Focus group 2
P7	University of Valladolid	Computer science	Focus group 2

In order to participate in the interviews and focus groups, informed consent was requested from each teacher. It has also been made clear that the code of ethics (UNED, 2021) will be taken into consideration, respecting the privacy of personal data. In this way, for the treatment of the information, a coding has been

generated that combines the participation in the interviews or in the focus groups with the number of teachers.

Results

As anticipated, the data collection process to deepen the participants' experiences and perceptions and thus analyse and evaluate the outcome of NOOC 1, was conducted through interviews and focus groups. In this context, teachers were asked to complete an online form to register and express their interest in participating. During the interviews and focus groups, various aspects of the course were addressed, from its structure and organisation to the technological experience and the level of cohesion among participants.

Regarding the **structure and organisation** of NOOC 1, participants' perceptions of the overall layout of the course were probed. They were asked to express their opinion on the way the course was organised, evaluating aspects such as clarity, flow of activities and coherence with the general objectives of the course.

Participants evaluated the structure and organisation of NOOC1 very positively. They considered the course to be 'very comfortable and fluid' (FG2) and found it 'very well structured and coherent' (FG2). They also noted that it was clear where each topic begins and ends (FG2). It is considered that 'the structure and organisation of NOOC1 is adequate and the application is fairly well organised.' (I3)

With regard to the **content** of NOOC 1, participants' opinions on the learning resources offered were explored, in particular their interactivity, innovation and suitability for university teachers. In addition, the quality and coherence of the content was analysed, assessing whether the objectives, content and resources were effectively aligned. We also asked about the relationship of the proposed learning activities with the content, assessing whether they were appropriate to the course and level, as well as their complexity.

The content of the NOOC1 was also very positively evaluated and it was proposed that a compendium should be produced so that all the materials could be available for downloading and accessible. It is valued that the contents are available in five

languages, and it is proposed that they be compiled and made available in pdf format in the institutional repositories of the participating universities (FG2). In this sense, it is stated that 'availability in several languages is important' (FG2) and the supplementary resources are highlighted, for those who wish to expand. These materials are considered to be well put together and the videos are appreciated as they explain the practical activities in a concrete way. They also consider the material to be useful 'for preparing the teaching report' (FG2). The proposal of activities has been very useful, as well as the possibility of transferring them to the classes themselves, as it has been stated that they are going to 'use them mainly in the next classes' (I2).

In relation to the **methodology**, participants were asked to express their perception of the process of communication and interaction between participants. They were asked to evaluate whether this process was interesting and of high quality. In addition, the appropriateness of the evaluation system was analysed, assessing its clarity, difficulty and relation to the course content. As for the performance of the teaching staff, they were asked about the support provided, the roles generated and the presence of the teaching staff during the course. Finally, participants were asked to describe their NOOC 1 learning experience, including their level of satisfaction, the effort required to complete the course and the applicability of what they had learned.

The methodology of the course was well evaluated. It should be noted that communication has been fair, as no daily e-mails have been received insisting repeatedly on participation in the course. However, there was a lack of participation in the forums by the teaching staff to encourage or motivate participation within each forum. The possibility of going at one's own pace and managing one's own learning time is valued. Although it is understood that the dynamics of this type of training proposal requires the autonomy of the students for its development, they would have liked to have had 'integration with the rest of the participants as well as with the teaching staff' and to have 'a unidirectional relationship' (I2).

In terms of **technology,** participants' technical experience during the course was explored. They were asked to describe whether they had experienced problems with the platform or re-

sources and to rate their experience on a technical level, covering both usability and accessibility aspects.

In relation to the platform and accessibility, some errors in access to some resources have been reported, but they consider that these have been few errors in accordance with the wealth and quantity of digital materials offered. They also point out that, in some cases, some pages were only available in one language, but this was not an impediment to understanding the content. In this sense, they appreciate the amount of material made available and understand the efforts to keep the information up to date (FG2). In general, the interviewees consider that they have had difficulties in changing the NOOC1 profile picture on the platform, but some of them have managed to change it. The platform has been rated positively and one of the teachers interviewed considered that he would like his university to have such a platform (I3).

With regard to **cohesion and affiliation** within the group, participants were asked to indicate their degree of belonging to the course group, assessing aspects such as bonding with other course members and the perception that participants had similar needs and goals. They were also asked about the degree of cohesion they had developed within the group, including their intention to prolong their participation in the course or the associated social network and their willingness to access the e-course or social network again in the future.

In general, both in the interviews and in the focus groups, the perception of low participation was expressed, although it was attributed to the responsibility for the low participation in the forums (I1, I2, FG1, FG2). The coordination of tasks and content with work, personal and family commitments is said to have resulted in low participation. In general, the participants commented that they have accessed the content but have not participated much in the exchanges. However, they value very positively the possibility of having the interviews and having this moment of more personalised interaction (FG2).

At the end of the interviews and focus groups, participants were invited to share **their final impressions**, indicating the positive aspects of the course and explaining why they considered them as such. They were also asked to mention what they liked

least about the course and to provide any additional comments they considered relevant to improving the learning experience.

In this sense, they mentioned as positive that NOOC1 'fits the timetable' (GF2) as they consider that there is coherence between contents and activities and the timetable foreseen for its development. They also highlight the applicability of the contents directly in teaching and value the fluidity of the platform for access to the large number of materials, activities and resources offered by this first NOOC. (I2, I3) It has been recurrently proposed 'that a repository could be included for permanent consultation' (I3). They also asked for training proposals such as these in the future (FG1). They also valued the fact that the NOOC1 'offers us digital tools that we need today for teaching practice that we have to integrate' (GF1).

Conclusions

The analysis of NOOC1 reveals, in general terms, a positive evaluation from the perspective of the teachers interviewed, both individually and in the focus groups.

Participants valued the structure, content and applicability of NOOC1 to their educational practice. The quality and innovation of the resources, together with the clarity of the organisation, were highlighted as facilitating navigation and contributing to the achievement of learning objectives. The flexibility provided by the microlearning approach was particularly appreciated, allowing autonomous access adapted to the needs of the participants. However, the difficulty related to the availability of time to deal with all contents and activities has become evident, especially for combining the course with personal, work and family activities. At the same time, they consider that the applicability of the proposals implies an extensive preparation time for the classes, which they do not always have. However, they value having the material in the long term, so that they can return to it in the future.

The structure and organisation of NOOC1 was particularly positively assessed, highlighting the clarity and layout of the contents and the transparency of the different materials. The coherence between contents, objectives and methodology used

was also highlighted. With regard to resources, these were highlighted. However, teachers mentioned some minor errors in the access, layout or overlapping of languages in a few texts and digital resources.

Regarding the methodology, the whole group recognised the characteristics of the NOOC1, understanding their responsibility in the course and appropriation of the course. However, during the interviews and focus groups, it was commented that they felt at ease in the interviews, being able to share with colleagues, and they missed this aspect of the course. Although they recognise that the scarce participation in the forums was their own responsibility due to the limited time they have, they realise the importance of interacting with others, especially since NOOC1 is precisely about this conceptual perspective. In this sense, they recognise that greater participation among teachers and colleagues would have favoured their learning processes and general appropriation of the course.

As for the technological dimension, although most participants did not experience technical problems, some reported minor navigation errors, which, on a few occasions, caused problems in accessing a resource or activity.

Finally, cohesion and a sense of belonging were key aspects of the course experience. In general, they recognise that they have not taken advantage of the opportunities that the course has provided for interaction and exchange with other colleagues. For this reason, their experience of participation was individual and not very collaborative. It is noteworthy that they affirm that it is not the design of the NOOC1 that favours this situation, but personal decisions that have made interactions minimal, although they have been enriched by reading the contributions of their colleagues in the forums. This is also why they appreciate the possibility of interviews to be able to express and exchange about their NOOC1 experience. Finally, they have valued the possibility of the course, they are grateful for the opportunity, and they ask to continue with the offer of New NOOCs.

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4

Collaborative and research methodologies: critical analysis from the teaching staff

Metodologías colaborativas y de investigación: análisis crítico del profesorado

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Abstract
In the current educational context, both generally and within the university sphere, the importance of implementing active and collaborative methodologies in the classroom is particularly emphasised. These methodologies address the multimodal reality of the new generations and the present and future challenges of a constantly changing society. Within this context, and as part of the Erasmus+ project "European Network in D-flexible Teaching (ENID-Teach)," the course "Collaborative and Research Methodologies" has been developed. Following its implementation, it has become necessary to gather participants' feedback on the course to identify strengths and potential areas for improvement. The study employed a qualitative methodology through semi-structured interviews with nine participants. The findings highlight the high regard and practical applicability of the course content among practising university lecturers. The importance of this system for professional development and pedagogical updating is underscored, as it offers flexibility in terms of scheduling and adapts to various paces and levels of availability. Furthermore, the study underscores the value of consolidating the practical application of the course content and advancing interactive dynamics to foster the creation of genuine learning communities.

Keywords: Collaborative learning, inquiry-based learning, active methods, semi-structured interviewing, pedagogical updating.

Resumen

En el contexto educativo actual, tanto en general como en el ámbito universitario, se hace especial hincapié en la importancia de implementar metodologías activas y colaborativas en el aula. Estas metodologías abordan la realidad multimodal de las nuevas generaciones y los retos presentes y futuros de una sociedad en constante cambio. En este contexto, y como parte del proyecto Erasmus+ «European Network in D-flexible Teaching (ENID-Teach)», se ha desarrollado el curso «Metodologías de colaboración e investigación». Tras su implementación, se ha hecho necesario recabar la opinión de los participantes sobre el curso para identificar los puntos fuertes y las posibles áreas de mejora. El estudio empleó una metodología cualitativa a través de entrevistas semiestructuradas con nueve participantes. Los resultados destacan la gran consideración y aplicabilidad práctica del contenido del curso entre los profesores universitarios en activo. Se subraya la importancia de este sistema para el desarrollo profesional y la actualización pedagógica, ya que ofrece flexibilidad en cuanto a la programación y se adapta a diversos ritmos y niveles de disponibilidad. Además, el estudio subraya el valor de consolidar la aplicación práctica del contenido del curso y de promover dinámicas interactivas para fomentar la creación de auténticas comunidades de aprendizaje.

Palabras clave: Aprendizaje colaborativo, aprendizaje basado en la investigación, métodos activos, entrevistas semiestructuradas, actualización pedagógica.

Introduction

The NOOC 2, titled "Collaborative and Research Methodologies," is part of the Erasmus+ project "European Network in D-flexible Teaching (ENID-Teach)." This programme aims to provide university and other level educators with an online course focused on educational methodologies and the use of digital tools to implement innovative teaching approaches.

The course seeks to update teaching competencies in research, collaboration, and digital literacy, catering to the needs of new generations who engage in a multimodal world through formats such as videos, texts, and games. To achieve this, it addresses the

importance of bridging the digital divide between digital-native students and digital-immigrant educators by adopting technologies that promote interaction, active learning, and critical thinking within a constructivist educational model. These tools not only enhance collaboration but also optimise tasks and strengthen professional networks.

Structured into five thematic units, each comprising two topics, the programme offers a total of 25 hours of learning. The content covers collaborative learning, distributed cognition, digital assessment, and innovative methodologies. It employs an interactive approach incorporating videos, discussion forums, and supplementary materials, enabling participants to progress according to their interests while fostering the exchange of ideas within an active learning community.

According to the NOOC (ECO Learning, 2024), student-centred active methodologies have transformed the educational landscape in recent years, driven by technological advancements and access to digital resources. These methodologies develop essential skills such as complex problem-solving and critical thinking while connecting learning to real-world contexts. Additionally, they encourage exploration, deep inquiry, and the collective construction of knowledge—key characteristics for future research-focused approaches.

Theoretical framework

Before addressing collaborative learning as an active teaching method, it is essential to define what these methods entail. According to Gros (2011), active methodologies are educational approaches that reframe the teacher's role from a more traditional perspective, allowing students to take an active role as responsible and central agents of their own learning. A more specific definition is offered by Jiménez-Hernández (2018, p. 53), who defines an active method as: "one in which the focus of the learning process lies mainly on the students, and therefore, the teaching-learning process depends on their participation and commitment."

Active methodology directs the teaching-learning process towards engaging in activities, without diminishing the impor-

tance of content, which gains meaning within the context of these activities (Gros, 2011). These methods are characterised by active student participation, breaking away from the traditional teaching model. The teacher assumes the role of mediator and facilitator, promoting collaborative work, reflection, and the development of critical thinking through strategies such as solving real-world problems (Peralta and Guamán, 2020).

As highlighted by Peñalva and Leiva (2019), the concept of active methodologies is not new. According to Labrador and Andreu (2008), the late 19th and early 20th centuries saw the emergence of the educational reform movement known as the New School or Active School. This approach is based on principles that promote a renewed perspective on the needs and development of children. Furthermore, González-Fernández and García-González (2012) identify five modes of learning within the New School framework:

- Active: Each individual must take an active role in their own learning process, constructing knowledge in a personal way.
- Self-regulated: Students should be capable of observing and reflecting on their own activities, as well as evaluating the results obtained.
- Constructive: Knowledge is not an exact replica of reality, but a personal creation shaped by individual experiences.
- Situated: Learning is more effective when the context provides practical opportunities to apply what has been learned.
- Social: Learning is a process that occurs through interaction with others, as teaching and learning are inherent to social relationships.

Collaborative Learning

According to Abramo (2024), collaborative learning is an educational approach that encourages students, teachers, or researchers to work together towards a common goal, such as solving problems, learning concepts, completing tasks, or creating products. This method fosters active learning, personal responsibility, and reflection on ideas and thought processes. In this context, the teacher transitions from being a knowledge transmitter to a facilitator and designer of intellectual experiences. Responsibili-

ties include assigning roles, monitoring progress, and evaluating both individual and group performance.

Collaborative learning is defined as a complex process that considers learning to be active, situated, and based on the co-construction of knowledge. While it occurs individually, it is influenced by the interactions and actions of others (Ferreira, 2021).

This approach relies on active interaction among participants, who present and defend ideas, question perspectives, and collectively construct knowledge (Torres, 2004). It has proven effective across various age groups and disciplines (Hmelo-Silver et al., 2013). However, it extends beyond verbal exchanges or students' cognitive processes, as it is deeply influenced by the temporal, spatial, and social context in which it occurs. Furthermore, it depends on the holistic engagement of all group members' minds and bodies, an area still underexplored in research (Ferreira, 2021).

For these dynamics to be effective, proper group management is essential. According to Koh et al. (2007), small groups are more effective at identifying and solving problems. Groups of four or five members tend to be most efficient, while larger groups are more prone to conflicts and reduced effectiveness.

Classroom layout plays a crucial role in group work. Group members must sit together and face one another, have a clear view of the teacher, and be spaced adequately to minimise distractions. Additionally, easy access to peers, the teacher, and materials is essential. The classroom should also allow for quick group rearrangement to facilitate collaborative learning dynamics (Johnson et al., 1999a).

The use of technology in collaborative learning enhances interaction, constant communication, and teamwork, even in remote settings like those experienced during the pandemic. It also familiarises students with digital tools and improves their perception of these resources. Integrating technology into this process not only provides intrinsic and extrinsic motivation but also increases satisfaction with the outcomes, making collaborative learning more effective and enriching (Abramo, 2024).

The core principle of collaborative learning lies in group cooperation rather than competition. Similar to cooperative learning, it is based on the idea that a group can solve a task more efficiently than an individual.

It is therefore important to briefly distinguish between cooperative and collaborative learning, given their similarities. According to Barkley et al. (2012), the terms are often used interchangeably but have significant differences. Cooperative learning focuses on small group work to maximise learning and emerged as an alternative to traditional teaching, characterised by promoting competition. In contrast, collaborative learning, influenced by social constructivism, occurs when teachers and students actively work together in the learning process.

As Abramo (2024) points out, the benefits of collaborative learning are numerous, including the development of essential skills such as collaboration, problem-solving, critical thinking, communication, self-management, and leadership. Participants shift from being passive recipients of information to active creators of knowledge, making learning a dynamic and constructive process. This active involvement increases interest and motivation in the learning experience.

Beyond collaborative learning, several other educational methods offer diverse benefits to the teaching and learning process:

- Cooperative Learning: As noted by Juárez et al. (2019), this approach supports the development of competencies such as leadership, teamwork, critical thinking, communication, autonomous learning, reflection, conflict resolution, and decision-making. Martínez (2016a, 2016b) also highlights the importance of emotional competence for fostering positive school environments. This method enhances emotional management through communication, empathy, conflict resolution, and solidarity while strengthening linguistic, social, and civic skills critical for addressing bullying.
- Project-Based Learning: García-Varcálcel and Basilotta (2017) note that this method contributes to knowledge acquisition, collaborative skills, critical thinking, problem-solving (Mergendoller et al., 2006), and engagement with learning. It also fosters social values such as companionship, solidarity, and respect. This approach motivates participants by aligning with their interests and allows for the integration of ICT tools (Guerrero and Tirado, 2015), evaluating the impact of decisions on outcomes (Mínguez et al., 2012). It enhances logical understanding of content, facilitating retention and transfer-

ability (Thomas, 2000) and connects learning to real-world situations (Guerrero and Tirado, 2015).

- Problem-Based Learning (PBL): This method offers numerous advantages. Poot-Delgado (2013) emphasises its ability to develop critical thinking by requiring students to analyse and delve deeply into problem-solving. Casa et al. (2019) indicate that it promotes systemic thinking through communication and dialogue, integrating tacit knowledge into learning (Villegas, 2017). In terms of competencies, Duque and Largo-Taborda (2021) highlight the development of scientific skills, such as inquiry and explanation of phenomena, as well as analytical and text interpretation abilities. All these aspects enhance motivation, curiosity, and cognitive skills development.
- Inquiry-Based Learning. According to Torres (2012) in Almeida et al. (2020), inquiry-based learning emerged to involve students in investigative processes that enable them to develop skills applicable to their professional lives. This approach uses teaching strategies designed by the teacher to foster active learning, where students build knowledge through practical experience, independent work, and collaborative learning. These dynamics encourage scientific, technological, humanistic, and social innovation while developing critical and reflective skills through solving real-world problems (Peñaherrera et al., 2014).
- As an active methodology, inquiry-based learning centres the student in the educational process, encouraging them to ask questions, explore problems, and propose solutions independently and collaboratively. This requires teachers and students to strengthen their research skills and integrate this approach into academic practice, preparing students to address professional challenges through inquiry and critical analysis (Peñaherrera et al., 2014; Almeida et al., 2020). Ruiz and Estrada (2021) note that this method connects research with learning, allowing students to actively participate in scientific processes under teacher guidance.

Through disciplinary or interdisciplinary methodologies, students develop competencies such as:

- Identifying and structuring research problems.
- Proposing theories and solutions.

- Selecting appropriate methodologies.
- Generating and analysing evidence.
- Drawing conclusions through inductive and hypothetico-deductive reasoning.

This model is closely aligned with contemporary university education, which aims to prepare students to address unprecedented situations and generate knowledge through research skills (Peñaherrera et al., 2014). According to Levy and Petrulis (2012), inquiry-based pedagogies foster deeper knowledge construction, enhancing the educational process (Santana-Vega et al., 2020).

Griffiths (2004) and Healey (2005) in Santana-Vega et al. (2020) identify four modalities of inquiry-based learning:

- Research-led: The curriculum focuses on the teacher, who conveys information based on their research results. Students learn about these findings.
- Research-oriented: The emphasis is on fostering a research ethos, highlighting the processes that generate knowledge. Students learn while understanding the research process.
- Research-based: The distinction between students and teachers is minimal. The curriculum centres on research activities, with students learning by acting as researchers.
- Research-tutored: Students analyse research findings in group discussions guided by a facilitating teacher.

In summary, this approach is a key tool for connecting theory and practice, fostering autonomous, collaborative, and experience-based learning. Santana-Vega et al. (2020) conclude: "Inquiry-based learning promotes a teaching process that: a) fosters the development of research competencies in a cohort of students who embrace the challenge of self-learning; b) provides a space for knowledge creation stimulated by inquiry; and c) encourages students' interest and commitment to their learning process and producing academically rigorous work" (p. 534).

Objectives

Building on the theoretical foundations that underscore the importance of active methodologies in daily teaching practice, the development of "NOOC 2: Collaborative and Research Methodologies" prompted an evaluation of its alignment with contemporary realities.

Specific objectives included:

- Evaluating the structure and organisation of the NOOC.
- Assessing the relevance of the course content.
- Evaluating the appropriateness of the methodology employed.
- Understanding participants' opinions regarding the functionality and suitability of the technological components used.
- Analysing the cohesion and affiliation fostered among course participants.

Sample

To address these objectives, a descriptive-interpretative study was conducted to explore the subject from the perspective of those involved (Gibbs, 2012). A qualitative methodology was used, employing semi-structured interviews with NOOC participants.

The interview guide, developed ad hoc within the ENID-Teach project, was structured around five main dimensions:

- Structure and organisation of the NOOC.
- Content, including learning resources and proposed activities.
- Methodology, such as communication systems, evaluation methods, and teaching practices.
- Technology, focusing on the platform and resources.
- Cohesion and affiliation, encompassing group identity and participation.

Nine in-depth interviews were conducted with participants who had completed the NOOC (56% women, 44% men; all university lecturers from Spain). Participation was voluntary, based on availability and a collaborative attitude. Interviews were conducted on two specific dates (July and November 2024), averag-

ing 14 minutes in duration. They were conducted online, recorded, and complied with ethical guidelines.

The interviews were transcribed, and responses were categorised and analysed using content analysis techniques. Categories were developed based on associations and similarities while ensuring thoroughness, exclusivity, and reliability in coding (González-Fernández et al., 2024).

Results

The results obtained in the research show that the structure and organisation of 'NOOC 2: Collaborative and Research Methodologies' was perceived by the interviewees as adequate (54%):

> Well structured and adequate for the scheduled time. (I2)

> I liked the structure of the course, it was not tedious. (I7)

> Very useful to have all the syllabus and materials available on the platform. I find the guide that tells you where you have left off very useful, given that the course was done over several days, and this allows you to navigate very easily through all the materials. (I3)

They also highlight the flexibility of the programme (23%), a fact that favours its implementation, as opposed to the training established in specific and fixed timetables typical of their universities of origin, and which does not allow them to advance in the necessary pedagogical updating:

> I highlight the flexibility of the programme, which allowed me to integrate it with other activities and to advance in learning at my own pace. (I5)

This fact is related to the careful progression (15%) of the course contents, moving from general elements and concepts to more specific ones:

> I really liked the way it was organised and the step-by-step progress. (I1)

However, the complexity (8%) of certain concepts is also highlighted, especially for those teachers who are not from the field of pedagogy:

> There is a more complex conceptual part, especially for those of us who are not from the field of pedagogy, but which subsequently leads to the rest of the ideas. (I6)

As regards the content of the course itself (resources, content and learning activities), ranging from content to learning resources and proposed activities, in a general perspective, the interviewees highlight their appropriateness (45%), usefulness for the future in the field of university teaching (25%) and that they are sufficient (6%):

> The resources and contents are good, attractive and intuitive, highlighting the short video format. (I9)

> Having an explanatory video has been interesting to approach the learning situations. (I3)

> The content, highlighting its innovation and high interactivity, is in line with the objectives of the course. (I4)

> The material is very well prepared, very well cared for. I highlight the videos, valuing positively that they are not created by artificial intelligence, but that real people appear. (I8)

The possibility of generating specific PDFs of certain content is also positively valued (6%), although it would be more appropriate to have the possibility of downloading all the course materials and resources in a single file (12%):

> I would have liked to be able to download all the material, to have the links to the videos, to build my own repository. (I7)

Similarly, it is mentioned that it could be equally interesting to develop learning activities with a more practical approach (6%), proposing times and tasks for direct application in the classroom:

> It would be interesting to design specific activities so that we could apply the contents of the course in our own classrooms and tell about the experience we have had in this process. (I1).

From the point of view of the methodology considered in the development of the NOOC (communication and interaction, evaluation system and teaching performance), the interviewees highlight its adequacy (54%):

> Well the information provided through the notice board and having written to us by e-mail (I2).

> The evaluation system has been adequate in terms of difficulty and clarity of instructions, and we are grateful for the corresponding feedback (I9).

However, they consider it necessary to make the forums and interaction (34%) with and between the participants and the teaching team more dynamic and dynamic, as well as to introduce a more practical approach (8%):

> I think that the participation of course attendees should be encouraged more. (I1)

> There is a lack of interaction between participants, particularly in the forums, which are underused. Activities could be generated to create a certain amount of interaction. (I4)

> It would be interesting to offer more information on how to interact and participate in the forums, especially for people who are less used to them. (I3)

> I would have liked to have some more practical dynamics, perhaps with a specific case study. (I7)

In the technological dimension (functioning of the platform, resources and experience at a technical level), the optimal technological experience is highlighted (43%) and, especially, the intuitive functioning of the platform and the feedback it produces (25%):

> On a technological level, the experience has been very good. (I2)

> The platform seems very clear to me. (I3)

> The platform's index that tells you where you are, as well as the possibility of moving from one tab to the next without having to go back, is very appropriate. (I6)

> I highlight the way the platform works and its ease of interaction, as well as the feedback it provides on the different questions. (I7)

However, some specific technical problems with the platform itself (16%) and with the functioning of some of the links provided (16%) were also reported:

> The platform was generally effective, although with the occasional technical problem, such as the messaging function. (I4)

> I had occasional difficulties navigating certain sections, although the explanatory videos were effective in solving these problems. (I5)

> The platform works well, the videos load well, although some links need to be polished (I8).

Finally, about cohesion and affiliation, most of the interviewees agreed that there was little interaction (42%) between and with fellow students on the course:

> I have been out of the dynamic of interaction with the rest of the participants. (I6)

> I haven't interacted much by choice. (I2)

However, they consider it necessary to make the forums and interaction (34%) with and between the participants and the teaching team more dynamic and dynamic, as well as to introduce a more practical approach (8%):

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> It would be interesting to offer more information on how to interact and participate in the forums, especially for people who are less used to them. (I3)

> I would have liked to have some more practical dynamics, perhaps with a specific case study. (I7)

In a similar vein, the minimal sense of community developed (33%) and poor group cohesion (16%):

> Cohesion and affiliation within the group were limited. I personally showed no interest in extending connections beyond the course, reflecting a lack of deeper group identity. (I5)

> I did not perceive a sense of community among the participants as a whole, possibly due to the individualistic approach of the course. (I4)

> Although at first glance cohesion was very limited, it is no less true that the simple fact of sharing problems and interests with a group of people gives a certain sense of cohesion. (I1)

Similarly, the importance of developing more fluid interaction on the part of the teaching staff is also indicated (9%):

> There is a sense of loneliness, so it seems appropriate to develop a more fluid interaction on the part of the teaching team and to deepen the feedback. (I8)

Conclusions

The results obtained confirm the university teaching staff's interest in extending and updating their pedagogical training, with the aim of bringing students closer to and developing the contents of the subject they teach from a more functional, practical,

applied and dynamic perspective, without ignoring the necessary innovation to respond successfully to the present and future demands of society.

In this context, and although they express an interest in such training, university teaching staff find limitations to training in this field due to the restrictions and time limitations inherent to other training institutions, which is why they highlight the importance of developing this type of distance learning course. Training proposals that adapt not only to the interests of the participants, but also to their own schedules and training rhythms: the adaptation of the course to the rhythms and schedules of the participants is highlighted, making it possible to combine it with the teaching task.

Consequently, satisfaction with 'NOOC 2: Collaborative and Research Methodologies' is high. The structure and organisation of the course is highly valued, especially with regard to its development, contents, learning resources, methodology and evaluation.

Its content has been adequate. By way of example, the learning achieved by the participants has been considered positive in terms of methodology directly applicable in the classroom and future references for further deepening in the subject, being useful not only for direct application in teaching, but also to advance in research and collaboration between colleagues in the same area of knowledge.

The variety of materials and formats, especially the videos, their duration, personalisation and humanism, are highly valued. Certainly, the importance and appropriateness of the videos provided is highlighted, even though they could be better supported by subsequent explanatory texts. This idea confirms the suitability of complementing visual information with written information. Given the relevance of the resources presented, the interest in creating one's own resource bank is encouraged, thus strengthening the demand to obtain a printed version, or if necessary a virtual version, in order to set up one's own repository of teaching methodologies. An example of this collection of open resources could be those presented by CESED.org or the INTEF's classroom of the future. To qualify the idea further, Santos-Hermosa and Abadal (2022) consider that open educational resources are those educational materials that can be accessed freely and openly or with permissions (open licences), allowing

their use, reuse, adaptation and sharing as a means of aiding the teaching-learning process. For these authors, open educational resources are vital to meet the educational challenges currently facing the university system, although they can also be extrapolated to other educational levels. Two of their main benefits are the speed with which they can be implemented in educational practices and the fact that they are free of charge, which means that teachers do not have to depend on commercial content providers.

However, and especially from the point of view of methodology, it is appropriate to continue to make progress in this demand to facilitate the implementation of content in the classroom and to establish subsequent feedback, both with colleagues and with the teaching staff of the course. It therefore seems appropriate to respond to this request for a more practical perspective of the contents under analysis; in short, to combine theory, educational practice and subsequent reflection on the whole process (García-Vargas and Medina, 2022).

An important point in any teaching and learning process is the medium or support. In this case, the relevance of the technology, the platform used and its operation is highlighted. The platform is pleasant, intuitive, and allows the common thread of the course to be maintained, with flexibility, given that the development of these courses is done according to the timetable of each student and on different days. This is a positive aspect of the NOOC. As Barrera and Guapi (2018) say, dynamism in virtual education depends on the methodological design developed by the teacher, based on the content to be taught. Having a platform or virtual classroom does not guarantee its effectiveness as a means of learning; without proper planning, it can be limited to being an agenda with reminders and resources of little impact.

As indicated above, it seems equally reasonable to continue to make progress in practical activities, accessibility and interaction through the forums. Despite being a distance learning course, where participants have different paces, the idea of continuous and fluid interaction between all of them, also with the teaching team, is still demanded, allowing progress to be made towards greater cohesion and affiliation, and to create a true learning community. In this sense, it is agreed with Juárez et al. (2020) that virtual forums are a tool that is widely used as a means of

fostering collaborative learning, also seeking the acquisition of skills and knowledge. As the authors state 'some research has shown that interaction through virtual forums creates opportunities for dialogue, encourages reflection, allows the formation and reaffirmation of meanings, supports the structuring and organisation of thoughts and has a positive effect on both students' learning and the quality of their work' (p. 162).

In summary, the potential of NOOC is highlighted, the positive and enriching experience that has allowed active university teachers to introduce new tools and techniques to continue improving and updating their own teaching practice, in coherence with the most current educational needs.

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5

Gamification and active learning: pedagogical innovation in Europe

Gamificación y aprendizaje activo: innovación pedagógica en Europa

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Abstract
The incorporation of active and gamified methodologies in our classrooms is positioned as a key element to address the educational challenges of a society in constant transformation. Within this framework, and as part of the Erasmus+ European network in D-flexible Teaching (ENID-Teach) project, the course "Active and Gamified Learning Methodologies" was designed and implemented, aimed at training university teachers in innovative pedagogical practices. This chapter presents the results of a qualitative analysis based on semi-structured interviews with ten teachers participating in the course, with the aim of identifying strengths, limitations and possible improvements. The results obtained highlight a high appreciation of the structure of the NOOC and the applicability of the contents, especially in the area of collaborative teaching and research. In addition, the flexibility of the timetable and the capacity of the course to adapt to the needs of the teaching staff are highlighted as differentiating elements. Some of the improvements detected are related to interaction in virtual environments and the strengthening of cohesion among participants. This type of training is presented as a fundamental

tool for teacher updating, favoring the adoption of active methodologies that promote meaningful learning in the university environment.

Keywords: Gamification, active learning, collaborative methodologies, teacher training, pedagogical innovation.

Resumen
La incorporación de metodologías activas y gamificadas en nuestras aulas se posiciona como un elemento clave para abordar los retos educativos de una sociedad en constante transformación. En este marco, y como parte de la red europea Erasmus+ en el proyecto D-flexible Teaching (ENID-Teach), se diseñó e implementó el curso «Metodologías de aprendizaje activo y gamificado», destinado a formar a profesores universitarios en prácticas pedagógicas innovadoras. Este capítulo presenta los resultados de un análisis cualitativo basado en entrevistas semiestructuradas con diez profesores que participaron en el curso, con el objetivo de identificar fortalezas, limitaciones y posibles mejoras. Los resultados obtenidos destacan una alta valoración de la estructura del NOOC y la aplicabilidad de los contenidos, especialmente en el área de la enseñanza y la investigación colaborativas. Además, se destacan como elementos diferenciadores la flexibilidad del horario y la capacidad del curso para adaptarse a las necesidades del profesorado. Algunas de las mejoras detectadas están relacionadas con la interacción en entornos virtuales y el fortalecimiento de la cohesión entre los participantes. Este tipo de formación se presenta como una herramienta fundamental para la actualización docente, favoreciendo la adopción de metodologías activas que promuevan el aprendizaje significativo en el entorno universitario.

Palabras clave: Gamificación, aprendizaje activo, metodologías colaborativas, formación docente, innovación pedagógica.

Introduction

The implementation of different NOOCs (Nano Open Online Courses) is one of the key initiatives of the Erasmus+ European network in D-flexible Teaching (ENID-Teach) project, coordinated by UNED. Specifically, NOOC 3 is designed to train university teachers in the design and implementation of pedagogical practices based on active learning and gamification. Combining microlearning with an international perspective, NOOC 3 is available in several languages (Spanish, English, French, Italian,

Portuguese and German), which facilitates its access and adaptation to different educational realities. With a duration of two months and a one-credit certification, this course is positioned as a flexible and high-impact proposal for teacher updating in the context of higher education.

In an increasingly digitalised and globalised world, active and gamified methodologies are becoming indispensable tools for pedagogical innovation. These methodologies aim to foster the development of critical skills such as collaboration, creativity and problem solving, in addition to increasing student engagement and motivation. In this context, the ENID-Teach project responds to the current demands of higher education by promoting teacher training focused on the application of innovative pedagogic strategies.

In this chapter, the impact of NOOC 3 is analyzed from the perspective of the participating teachers, exploring both the strengths of the course and areas for improvement. From a theoretical approach based on the advantages of gamification and active learning (Werbach, 2012; Ortiz-Colón, Jordán, & Agreda, 2018), and through a qualitative data analysis, the contributions of NOOC to teacher training in higher education are identified. This analysis not only highlights the relevance of the proposal but also provides a framework for future formative initiatives that respond to the current challenges of university teaching.

Theoretical framework

Gamification, originally conceived for business contexts with the aim of increasing engagement and productivity (Deterding et al., 2011), has found fertile ground for pedagogical innovation in the field of education. This approach has evolved into a key tool in our classrooms, aligning with the priorities of the European Commission, which promotes the use of emerging technologies to foster more motivating and adaptive learning.

Several studies have demonstrated the positive impact of gamification in educational environments. For example, Alonso-García et al (2021) analyzed gamification experiences carried out in higher education institutions in Spain over the last few years, observing significant improvements in student motiva-

tion, engagement and academic performance. These results support the potential of gamification to transform the learning experience. In addition, recent research highlights that its interactive and immersive nature fosters deeper engagement, promoting higher levels of cognitive processing and critical thinking skills, essential elements for the development of competencies in the 21st century (OY Yuliana & Palumian, 2023).

The application of these strategies is also rooted in the principles of game design, which include achievable challenges, immediate feedback and the incorporation of rewards. These characteristics allow gamification to be perceived as a tool that is not only playful, but also highly pedagogical, contributing to the creation of immersive and personalized learning environments.

Gamification and European context

In the challenging context of the 21st century digital society, the labor market increasingly demands flexible, creative professionals with a broad background in skills and competencies (van Laar et al., 2018). These demands not only affect the labor market, but also the educational field, driving the need to integrate technologies and methodologies that promote meaningful learning. That is why, in this framework, the integration of technologies has given rise to new educational scenarios that expand and diversify interaction strategies between teachers and students, as well as among students themselves. Methodologies that increase student motivation and facilitate the construction and incorporation of knowledge through the dynamics produced in the teaching and learning processes.

In this context, today's university, which aims to remain a space for training professionals and citizens to respond to current needs and problems, is configured as a space for simulating the work scenario, using active learning strategies that promote not only quality technical training, but also the development of skills demanded by the jobs themselves (Mora et al., 2020). Gamification, defined by Burke (2012) as the application of game designs and techniques in non-game environments, is particularly relevant in this framework. Werbach (2012) identifies three essential elements in a gamified activity: the dynamics, which implicitly

structure the game; the mechanics, which drive its development; and the components, which represent specific implementations of the dynamics and mechanics (Rodriguez-Simon, 2022).

Gamification, as a pedagogical strategy, is introduced in classrooms through the interaction of its various components, promoting collaborative attitudes and behaviours among students. According to Ortiz-Colón, Jordán and Agreda (2018), it is essential to maintain an appropriate balance between the level of challenge posed and the capabilities of the students, thus ensuring that the activities contain achievable challenges, which favour effective and motivating learning.

Also, one of the main objectives of gamification is to foster motivation, which implies the commitment of students to active participation and, in most cases, leads to improved academic results in the short and medium term. Its purpose is to generate interest and prevent students from losing enthusiasm, helping them to get out of their comfort zone into a learning zone through dynamics specifically designed for this purpose (Forés, Sánchez & Sancho, 2014). It is crucial that the challenges posed are achievable, as excessive challenges can generate frustration. The ideal balance in these activities should combine learning with the development of positive attitudes (Caponetto, Earp and Ott, 2014).

Recent studies highlight that gamification not only improves student motivation and engagement but also develops essential competencies for the contemporary work context. These include the ability to work in groups, listen to opinions, learn autonomously, apply knowledge in practice, analyze and synthesize information (Murillo-Zamorano et al., 2021). For example, in a comparative study conducted in the European university context, it was shown that students who participated in gamified activities achieved significantly higher levels of engagement and performance compared to those exposed to traditional methodologies.

In essence, gamification attempts to transform learning into an active, participatory and, in some cases, immersive experience for the student, not forgetting that it is not about turning education into a game, but about taking advantage of game elements and using playful resources to reinforce pedagogical objective

Pedagogical innovation based on active learning

If we talk about active learning, we must think of placing the student as the protagonist of the educational process. To this end, we can use strategies that combine practical activities and game elements (as in the case of gamification) to enhance intrinsic motivation based on extrinsic motivation. The interactive and immersive nature of gamification fosters deeper engagement, promoting higher levels of cognitive processing and critical thinking skills. In addition, immediate feedback and rewards provide continuous reinforcement, promoting a growth mindset (OY Yuliana & Palumian, 2023).

Parallel and complementary to gamification, the Learning by Doing methodology appears, focused on active learning through action, doing and implementation of specific strategies. This methodology puts the focus on problem solving through experimentation and creativity in concrete situations (Bradberry and De Maio, 2019). As Rodriguez-Simon (2022) points out, it is a process that promotes the active participation of students in their own learning, freeing them from prejudices and preconceived ideas, and encouraging the adoption of new perspectives that integrate critical thinking.

This approach reinforces the active role of the learner, making him/her a central agent of his/her cognitive and practical development. In this way, it facilitates the acquisition of learning that is both meaningful and adaptive to different contexts.

Another of the most well-known and complementary methodologies is flipped learning, which combines face-to-face and virtual teaching, allowing students to assimilate content at home and use classroom time to solve problems and participate in interactive activities. This approach fosters autonomy and learning regulation, in addition to increasing student motivation (Parra-González et al., 2020).

The combination of active learning and gamification also favors the development of transversal skills, such as creativity, collaboration and problem solving. These skills are essential in a work environment characterized by its constant technological evolution. For example, in a study by Murillo-Zamorano et al. (2021), it was observed that active and gamified strategies allowed students to improve their ability to analyze and synthesize

information, skills that are increasingly in demand in the digital society.

In Europe, the European Commission promotes active learning through programs that finance innovative projects that include gamified technologies and strategies in the classroom. In this sense, the NOOC 3 of the training course proposed by the Erasmus+ project, "European network in D-flexible Teaching (ENID-Teach)" and coordinated by UNED, is based on microlearning and presents an overview of active and gamified learning methodologies and tools in higher education. The main objective of the NOOC is the training in the design of teaching and research following the collaborative methodology.

Critical perspectives and future proposals

Despite its advantages, the implementation of gamification faces significant barriers, including the need for teacher training in the design of gamified activities and the technological gap between educational institutions in different socioeconomic contexts (European Commission, 2022). It has also been questioned whether gamification prioritizes extrinsic over intrinsic motivation, which could limit the depth of learning (Nicholson, 2015). In addition, there is a risk that gamified activities focus more on entertainment than on the acquisition of meaningful competencies.

On the other hand, a critical stance should be maintained regarding the economization of gamification. Marin and Landers (2021) warn that, although this strategy has been used in various industries to generate revenue, its true value lies in its transformative capacity within educational and social systems. This critical approach involves prioritizing the design of activities that promote reflection, collaboration and inclusion.

Transforming classrooms into motivating spaces represents an important part of the pedagogical innovation proposed by the European Commission, which seeks quality academic results through its programs, and to prepare students with competencies in line with current times. However, it requires adequate teacher training and careful design of programs that respect the Universal Design for Learning (UDL).

In conclusion, we can state that these approaches, associated with the educational innovation goals proposed by the European

Union, are based on the premise of transforming the classroom into a dynamic and motivating environment, with the student himself at the center of the learning process.

The combination of gamification and active learning is essential for present and future classrooms. The characteristic elements of the games, the narratives used that place the student in a situation and transform him/her, making the experience more immersive, and the gamified activities that include content from the theoretical area of the subject, enhance active and participatory learning, and stimulate problem solving and collaborative work in students.

Objectives

From the theoretical foundations that demonstrate the relevance of gamification and active learning in the university environment, the need arises to analyze the perceptions of teachers about these methodologies in Europe, specifically through the study of NOOCs. This analysis seeks to evaluate the adequacy of these courses to the current educational demands and to identify good practices that promote pedagogical innovation.

To achieve this general objective, the following specific objectives are proposed:

- Assess the structure and organization of the NOOCs, evaluating their design and accessibility.
- To determine the relevance and quality of the contents developed in these courses.
- To analyze the relevance of the methodologies used and their coherence with the principles of active learning.
- To know the opinion of the participants on the functioning and adequacy of the technological component used.
- To examine the degree of cohesion and collaboration generated among the participants during the development of the course.

These objectives allow offering a clear and structured vision that contributes to optimize the use of NOOCs as key tools in the training of university professors.

Sample

In order to achieve the proposed objectives, a descriptive-interpretative research approach was used, designed to explore the object of study from the perceptions and experiences of the participants (Creswell, 2014). A qualitative methodology was chosen, using semi-structured interviews as the main tool for collecting information, addressed to the teachers participating in the NOOC analyzed.

The sample consisted of ten university professors from Spain, selected on a voluntary basis. The group included five men and five women, covering various academic categories, from assistant professors to full professors. This selection sought to ensure a balanced and representative perspective of the experiences and perceptions of university faculty in relation to gamification and active learning in Europe.

Data collection instrument

Semi-structured interviews, designed by the project research team, were used as the main instrument for data collection. The structure of the interviews was designed around five key dimensions related to the subject matter of the study:

- Structure and Organization of the NOOC: Perceptions about the clarity, flexibility and design of the courses.
- Content: Opinions about the relevance, timeliness and applicability of the content offered.
- Methodology: Evaluation of the effectiveness of the methodologies used to promote active learning.
- Technology: Use, accessibility and impact of the technological tools used in the NOOCs.
- Cohesion and Affiliation: Perceptions of how cohesion among students and sense of belonging are fostered.

The use of open-ended questions allowed participants to express their ideas and experiences in depth, favoring the exploration of individual nuances and perspectives.

Data collection process

The interviews were conducted virtually, using the Microsoft Teams videoconferencing tool, with the objective of guaranteeing both accessibility and comfort for the participants. Each session lasted between 15 and 45 minutes and was audio-recorded with the express authorization of the participants. Subsequently, the recordings were transcribed verbatim to facilitate a detailed and rigorous analysis of the information obtained.

Data analysis

The data obtained were analyzed using a thematic analysis approach. This method made it possible to identify patterns, trends and key differences in the responses, organizing the results into the five thematic dimensions established. The analysis was carried out using the Atlas.ti program (version 25.0.1).

Results

This section breaks down the results of the analysis of the different interviews.

Structure and organization of the NOOC

There is a large number of positive ideas related to the topic, specifically 47 quotes extracted from the interviews have been highlighted, suggesting that teachers have many perceptions and opinions about the "Structure and organization of the NOOC". Above all, they focus on clarity of structure, organization of content and assessment.

The evaluation of the organization and structure of the course is very positive, highlighting a series of key aspects that influence its effectiveness, with comments that emphasize the well-organized and sequential presentation of the contents. The balance between videos and text resources was considered adequate, facilitating autonomous learning follow-up. The course was praised for its flexible progression and clear guidelines, and participants considered the format to be perfect and the pace beneficial for a smooth learning experience, the clarity of the structure, considering it "easy to follow" and with a progressive organization of

the contents that facilitates learning. Another aspect adequately valued is the evaluation within the NOOCs, one of the participants highlighted: "The evaluation is clear and well structured". In general, the course was well structured, cohesive, logical and coherent, creating a pleasant and understandable progression for the participants.

Some of the negative aspects about the structure and organization focus on the layout of the platform considering it somewhat confusing or the lack of feedback.

In addition, some suggestions were made to improve the design and make it clearer and easier to use, such as the correct explanation or layout of the distribution platform could benefit from improvements in terms of ease of use and clarity. Also, the timing of when the course is started could help with follow-up.

Content

With regard to the content, 110 statements were analysed that positively mentioned the NOOC's content, highlighting dimensions such as relevance, clarity, and currency. The analysis of the interviews reveals that the teaching staff perceive the NOOC content as a key factor in ensuring the effectiveness of learning. Overall, participants highly valued the relevance of the content, describing it as "highly relevant and useful." Another recurring aspect was the quality and currency of the materials, which were regarded as innovative, well-crafted, and high-quality educational resources, striking a good balance between coherence and engagement. The content was deemed appropriate and practical for university-level educators, with a suitable level of difficulty, covering a wide range of topics with a high degree of rigour. The inclusion of gamification techniques and interactivity was particularly appreciated. Participants reported positive experiences with the materials and tools provided, and the resources were well-aligned with the course objectives. The content was considered appropriate for its applicability to university teaching.

The participants also valued the use of multiple languages, practical examples, and the variety of resources, such as videos and written materials. Overall, the resources were deemed valuable and engaging for professional development in higher education teaching.

With regard to improvements, some participants suggested that it would be beneficial to adapt the content further to specific learning contexts. One teacher remarked: "The content is highly relevant, but it should focus more on specific learning situations." Additionally, some educators emphasised the importance of keeping the materials up to date to reflect current educational trends. A representative comment was: "It is crucial for the content to align with current educational trends."

Methodology

In terms of methodology, 87 references related to various aspects were recorded. One of the key points highlighted in the interviews was the application of active methodologies in the NOOC, which were deemed essential for promoting participatory learning. Teachers agreed that these strategies, such as group dynamics and practical activities, are fundamental for motivating students and maintaining their engagement. As one interviewee noted: "The use of active methodologies fosters student interaction and engagement."

The evaluation of the course's approach highlighted its alignment with students' existing habits, incorporating a mix of videos, texts, and interactive activities to ensure a deep understanding and satisfaction with the learning activities. Participants found the materials appropriate and well-balanced in terms of difficulty, and considered the gamification activities and peer-review tasks to be innovative. The asynchronous format was praised for its flexibility and effective use of materials, though some issues with participation were noted. The methodology facilitated interaction and featured effective tools for motivation, in line with the course content. Participants appreciated the quality of the videos and the presentation of topics, considering the course highly useful. The instructors were commended for their role, and participants regarded the approach as satisfactory and potentially beneficial for their own teaching practices.

One of the most frequently discussed aspects of the methodology relates to the assessment system. The assessment system was described as dynamic and appropriate, relying solely on a questionnaire without any specific activities. It was well-explained and compatible with participants' workloads, which facilitated

its completion. Peer evaluation was considered an interesting feature, making the system suitable in several respects.

However, some negative aspects were reported, particularly regarding technical issues. A lack of participation in the forum due to these technical problems affected the ability to provide a positive evaluation in this area. Limited engagement in communication channels (forums) and delays in resolving technical issues were highlighted as areas for improvement.

Technology

The technology dimension was analyzed through 34 references. The evaluation of this aspect of the course highlighted positive features such as the step-by-step guidance, easy navigation, comprehensive content, and the potential of the platform. Overall, the experience was positive, though some areas were identified as needing improvement.

The negative aspects raised by the interviewees focused primarily on technical issues, including confusion when completing activities, difficulties in accessing support, problems with the content in certain modules, and technical challenges such as broken links and issues with class recordings.

Some of the suggested improvements centred on the platform itself. It was recommended that clearer instructions be provided, and the initial setup process, such as updating profile information, should be simplified to make it more intuitive for users. Additionally, improvements to the user interface design were deemed necessary to enhance the overall user experience.

Cohesion and affiliation

Finally, the dimension of cohesion and affiliation was analysed through 34 references. In this dimension, opinions were mixed. Some participants expressed a strong sense of community among students but noted the lack of visibility of tutors and technical staff during the course. One of the reasons suggested for this lack of cohesion was the short duration of the course, which limited opportunities for interaction. While cohesion and affiliation among participants were evident, with hopes of establishing valuable connections, some participants felt a lack of commitment from peers, as they struggled to find enough participants for peer evaluation activities.

In terms of suggested improvements, it was considered important to enhance the presence of instructors and support staff to foster a stronger sense of belonging and support within the group. Clearer guidelines for interaction, improved technical support, and more flexible connection options were also recommended. Encouraging active participation from all members and addressing issues directly could help sustain commitment and facilitate smoother communication among students.

Overall, the results demonstrate that NOOCs represent an innovative and valuable pedagogical tool in higher education, excelling in promoting active learning and gamification. University faculty perceptions highlight key aspects such as structural clarity, the relevance of the content, and the implementation of active methodologies that foster student interaction and engagement. However, critical areas for improvement were identified, including the need for more intuitive platforms, more personalized content, stronger technical support, and strategies to enhance cohesion and the sense of belonging among participants.

These findings underscore the importance of balancing technological and pedagogical advancements with a more accessible, inclusive, and tailored experience for both students and educators. The results not only highlight the current achievements of NOOCs but also provide a strategic framework for their future evolution, solidifying their position as an indispensable resource in university educational innovation.

Conclusions

The results obtained show that the implementation of NOOC 3: Active and Gamified Learning, as part of the ENID-Teach project, has provided an enriching training experience aligned with the current needs of teaching staff. These findings confirm that gamification and active learning, as pedagogical strategies, generate high interest and acceptance among university faculty, establishing themselves as key elements for educational innovation in Europe. This approach addresses the current demands for transformation in higher education, aligning with the goals set by the European Commission and highlighting its potential to

promote dynamic, inclusive, and engaged learning (Burke, 2012; Rodríguez-Simon, 2022).

In this context, it has been confirmed that the course design effectively meets the demands for flexibility and accessibility expressed by the participants of the NOOC. The participants positively evaluated the course's clear and progressive structure, highlighting the balanced combination of audiovisual and written resources, as well as the organization that facilitates autonomy in the learning process. These aspects not only contribute to knowledge acquisition but also enhance a seamless and effective educational experience, as emphasized by Ortiz-Colón, Jordán, and Agreda (2018) regarding the importance of well-structured pedagogical design.

With regard to the content, its relevance, quality, and up-to-date nature were particularly highlighted, making it applicable in both teaching and research contexts. The inclusion of gamification techniques and interactivity, aligned with the principles of active learning, was highly valued, fulfilling the objective of generating interest and engagement among participants (Forés, Sánchez, and Sancho, 2014). However, some teachers pointed out the need to contextualize the content further within specific classroom scenarios, which could enhance its practical applicability.

From a methodological perspective, the active and participatory activities proved effective in promoting participant engagement, reaffirming the relevance of approaches such as *Learning by Doing* (Bradberry and De Maio, 2019). However, areas for improvement were identified, particularly in terms of participation in forums and feedback, underlining the importance of creating smoother spaces for interaction and collective reflection.

Regarding the technological dimension, the platform used was generally considered intuitive and adequate, though some users reported technical limitations. Aspects such as navigation clarity, resolution of technical issues, and more efficient support emerged as key points for future developments.

Finally, it was noted that the dimension of cohesion and affiliation among participants could benefit from greater involvement by the teaching team and a course design that fosters more opportunities for interaction, thus strengthening the sense of

belonging and community. As Caponetto, Earp, and Ott (2014) highlight, these aspects are crucial for maximising the impact of collaborative and gamified strategies.

We can conclude that this type of training is consolidating as a valuable tool for teacher development, both for its ability to integrate pedagogical innovations and digital resources into a flexible environment and for its adaptability to current needs. However, the identified areas for improvement—such as enhancing interaction, technical support, and content personalisation—point to the necessity of evolving towards more inclusive and effective training proposals. This approach will allow the objectives outlined within the ENID-Teach project to be consolidated, transforming learning into a more active, collaborative, and immersive experience, in line with the demands and challenges currently facing education.

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6

Flipped Methodologies: Redefining Learning In Digital University Environments

Metodologías invertidas: redefinir el aprendizaje en entornos universitarios digitales

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Abstract
The transformation of the educational model in universities is a process that began in the early years of the 20th century, a transformation aimed at developing and consolidating a pedagogical practice based on innovation. More than two decades later, we can say that there is still a long way to go in terms of innovative learning processes. It is true that there is a growing tendency in teaching practice to implement an alternative type of teaching that places the student at the centre of the educational process from the perspective of the current digitalisation, and it is in this context that the inverted methodology begins to play a relevant role in the teaching and learning processes in higher education. The work presented here presents a training proposal for university teachers and other professionals in the education sector in relation to flipped methodologies in the framework of the Erasmus+ project 'European Network for D-Flexible Teaching (ENID-Teach)', the main objective being the analysis of students' opinions regarding their level of satisfaction. The results, structured in five dimensions, show adequate levels of satisfaction in four of them, with cohesion and belonging being the one with the lowest score.

Keywords: Flipped classroom, blended learning, educational technology, students centered learning educational innovations, teaching practice, learning processes, alternative education, digitization.

Resumen

La transformación del modelo educativo en las universidades es un proceso que se inició a principios del siglo XX, una transformación dirigida a desarrollar y consolidar una práctica pedagógica basada en la innovación. Más de dos décadas después, podemos decir que aún queda un largo camino por recorrer en cuanto a procesos de aprendizaje innovadores. Es cierto que existe una tendencia creciente en la práctica docente a implementar un tipo de enseñanza alternativa que sitúe al estudiante en el centro del proceso educativo desde la perspectiva de la digitalización actual, y es en este contexto donde la metodología invertida comienza a desempeñar un papel relevante en los procesos de enseñanza y aprendizaje en la educación superior. El trabajo que aquí se presenta presenta una propuesta de formación para profesores universitarios y otros profesionales del sector educativo en relación con las metodologías invertidas en el marco del proyecto Erasmus+ «European Network for D-Flexible Teaching (ENID-Teach)», siendo el objetivo principal el análisis de las opiniones de los estudiantes sobre su nivel de satisfacción. Los resultados, estructurados en cinco dimensiones, muestran niveles adecuados de satisfacción en cuatro de ellas, siendo la cohesión y la pertenencia la que obtiene la puntuación más baja.

Palabras clave: Aula invertida, aprendizaje combinado, tecnología educativa, aprendizaje centrado en el alumno, innovaciones educativas, práctica docente, procesos de aprendizaje, educación alternativa, digitalización.

Introduction

In recent years, a number of factors have converged to accelerate a series of methodological changes in the teaching and learning processes at the different levels of education. In pre-university education, the need to apply a methodological diversity that enriches the teaching and learning processes, a methodological diversity that places the students at the centre of the educational process and allows them to play an active role that favours the development of significant learning, is well known and internalised by the teaching staff. This situation, typical of pre-university

teaching, is not so common in higher education, where there is greater reluctance to make methodological changes.

As early as 1999, the Bologna Plan proposed the need for a methodological change in the university environment, moving from a behaviourist model to one based on constructivism (Alonso, 2019) and responding to the challenges that were already emerging from the new communication and information societies. These challenges, moving away from the simple transmission of knowledge of traditional models, proposed an educational process understood as a whole, an aspect that would imply that teaching action would begin to be directed towards the training of students in competences, including learning to know, learning to do, learning to live together and learning to be. All this under the general idea of lifelong learning through competence in learning to learn (Delors, 1996).

This new concept of competence has confronted institutions, teachers and students with new challenges that have not yet been fully resolved. In fact, institutions and teachers are still searching for their identity from a methodological and pedagogical point of view, trying to adapt to a student body whose main characteristic is that of being digital natives. As we have said, the methodological change in which the university is immersed at an international level will also entail a series of challenges for students, including the need to learn how to learn, to go beyond the simple and commonplace in order to project and solve problems of different kinds, to create learning networks with different educational agents, to self-regulate and take responsibility for their own learning process and to be able to set short, medium and long-term goals (Durán et al., 2021). From the perspective described above, inverted methodologies are configured as a suitable tool for educational innovation and, therefore, for addressing the educational challenges to which teachers and students must respond.

Theoretical framework

Concept and approach

Just as the first industrial revolution, at the end of the second half of the 18th century, influenced the education systems of the

time, today what could be called the fourth industrial revolution, based on digital technologies or the Internet of Things, is having a decisive impact on the configuration of education systems and, consequently, on the teaching and learning processes that take place in university classrooms. In this sense, one of the main objectives of current educational action is to be able to promote active learning processes, accompanied by the benefits offered by ICT (Domínguez & Palomares, 2020).

In this sense, from the perspective that learning is generated by what the student does and not by what the teacher presents, the implementation of ICT tools will lead to new educational contexts, such as teaching and learning situations based on the dissociation of space and time in which the teacher and the student have traditionally been related (Alarcón & Alarcón, 2021), where innovative methodologies such as the flipped classroom become particularly relevant.

The consolidation of the inverted methodology or flipped classroom can be found in two American teachers, Jonathan Bergmann and Aaron Sams. In the first decade of the 2000s, faced with the lack of attendance of some of their students, they decided to record the educational content presented via PowerPoint so that they could follow the normal rhythm of the course. As they progressed with their recordings, they realised that these recordings were being watched not only by the absent students, but also by the majority of those who did attend. From this point they began to reverse their teaching method (Sandoval et al., 2021).

The flipped classroom methodology is based on various theories of learning, the most prominent of which is constructivism. However, the flipped classroom is also related to the positivist approach to learning in terms of the value of the observable and connectivism with regard to the incorporation of technology and the configuration of connections and specialised nodes as learning activities (Solorzano & García, 2016; Cabrera et al., 2021). In this way, the flipped classroom seeks to take advantage of the communicative, collaborative, informative, interactive and creative potential of information and communication technologies in the context of a new learning culture. This methodology implies a different way of learning in which students access learning in spaces other than the classroom, mainly at home, through videos, audio, images or other educational resources inserted in

virtual platforms that are easily accessible to students (Cabrera et al., 2021). This makes it possible to make better use of class time to provide more personalised support to students in resolving doubts or promoting other processes of acquisition and application of curricular knowledge (Domínguez & Palomares, 2021). In short, the inverted methodology involves the transfer of learning processes that previously took place in the classroom outside the classroom, with the teacher being transformed from a source of knowledge to be transmitted to the students into a guide and facilitator of sources of information (González & Abad, 2020).

Advantages and disadvantages of the inverted methodology

The inverted methodology, like other active methodologies, arises from the need to offer an alternative to the traditional methodology. The latter is a methodology based on behaviourism and characterised by the fact that the teacher is the only source of knowledge, a knowledge that is transmitted and given to the students to memorise. In short, a methodology in which there is excessive concern for discipline and order and in which decisions are taken by the teacher himself, with the pupil being a passive agent and therefore not very motivated to learn.

In contrast to these characteristics, the flipped classroom aims to prevent students from dropping out of the classroom and to increase their motivation and interest. In this sense, it is noteworthy that among the advantages of using the flipped classroom methodology is the fact that there is greater student involvement in the educational process, as it adapts to the learning pace of each student (Domínguez & Palomares, 2021). Likewise, in the flipped classroom, teaching time is better used because students, who know in advance the subject matter that will be developed in class, show higher levels of participation, interactivity and motivation (Zavala, 2021). This is not trivial. Considering how the brain works from the perspective of neuroeducation, knowledge is accessed through emotion, understood as a catalytic energy for learning. This emotion, in order to facilitate learning, is presented in the classroom in the form of interest, attention and curiosity, an aspect that can be channelled through various innovative methodologies, including the flipped classroom.

In this context, it is worth noting that Universal Design for Learning has emerged in recent years. Universal Design for Learning is a model which, based on the most recent and innovative learning theories such as neuroeducation, combines an inclusive approach to education with various suggestions for its use. In this sense, this model takes into account that students have different ways of accessing, expressing and participating in learning.

According to this model, we can say that the inverted methodology responds to the postulates of Universal Design for Learning by giving students the opportunity to access knowledge outside the classroom through different resources, an aspect that will allow them to interact and collaborate with their peers through different forms of expression and implementation of learning, resulting in higher levels of motivation and involvement. Based on the above, we can say that the inverted methodology responds to the need to give the teaching and learning process an inclusive character, since by offering students a wide variety of resources in different formats to be worked on outside the classroom, it responds to the different learning rhythms of students, making them more autonomous and responsible for their educational process.

However, like any methodology, this teaching model has some drawbacks. For example, in order to be successful, the inverted methodology requires an enormous degree of responsibility and involvement on the part of the student, i.e. if the student does not carry out the tasks assigned outside the classroom, it will not be possible to develop or deepen them in the classroom. In addition, the inverted methodology requires adequate technological competence on the part of the teacher, since it is necessary to merge technology and pedagogy. In fact, the implementation of this teaching model implies a greater workload for the teacher in terms of lesson planning, as there is little room for improvisation in terms of techniques or content, and each activity developed in the classroom is closely linked to work done outside the classroom (Zavala, 2021). In this sense, another disadvantage observed is that its application in the classroom is limited, that is, the flipped classroom only serves to work on some content and therefore its application cannot be extended throughout the course, as it would also lose its motivational value for the students (Hernández & Tecpan, 2017).

Background on the implementation of the inverted methodology

The flipped classroom has established itself as one of the main teaching methodologies in the field of higher education, as well as in other educational stages. For example, Peralta et al. (2020) implemented this methodology in residents of the specialities of Biomedical and Diagnostics in the areas of Chemistry. The results concluded that the inverted methodology was better adapted to the learning pace of each of the students, avoiding feelings of frustration that usually occur with traditional methodology due to not being able to follow the pace of the class set by the teacher. In addition, the evaluation process was valued very positively as it was not only the result, but also the process.

Following the same line of results, but at the secondary level, we find the study by Rodríguez et al. (2024). In the field of mathematics, they applied the inverse methodology to determine the impact on academic performance with a sample of 134 students. A quasi-experimental study with a quantitative approach was carried out, using the inverted methodology in the experimental group and the traditional methodology in the control group. The results confirm the hypothesis that the flipped classroom has positive and significantly better results in academic performance than the traditional methodology, and it is added that there are a number of ICT applications that are very useful because of their ease of use in the context of the flipped methodology, such as Canva, YouTube, PowerPoint or Edpuzzzle.

More generally, González and Abad (2020), in a systematic review of the existing literature on higher education, conclude that students positively value the collaborative environment created by the inverted method. Regarding the impact on academic performance, they highlight that there are no clear results, with some discrepancies between studies, although they tend to agree that there are improvements in final grades. Likewise, the reluctance to see the disappearance of the lecture classes typical of the traditional methodology in those areas of knowledge that require it is recognised, although at the same time it is considered necessary to combine them with methodologies that favour the development of significant learning, including the inverted methodology approach.

Finally, we also find research that points out some of the limitations of the inverse methodology. This is the case of the market research (2020). In this case, the study was carried out in veterinary and zootechnical studies in the subject of parasitology in the context of traditional teaching, and it concludes that the inverted methodology requires students to have ICT skills, that students who are used to memorising feel insecure in applying the new methodology, and that the inverted methodology does not have an adequate evaluation model or one adapted to the characteristics of the methodology.

Objectives

General objective:

- Analyse what students think and how satisfied they feel with the course.

Specific objectives:

- Find out what they think about the structure and organisation of the course.
- Find out what they think about the content, educational resources and activities proposed.
- To know their opinion on the methodology used, including the communication processes, the evaluation system and the performance of the teaching staff.
- Find out their satisfaction with their learning experience.
- Find out what their experience was like from a technical point of view and whether they had any problems with the platform on which the course is hosted or with the learning resources.
- To know the degree of cohesion and sense of belonging that students have developed in the course and whether they intend or wish to continue their participation in the network or course in the future.

Sample

The sample consists of 10 subjects, of whom 9 are male and 1 is female. The profiles are as follows:

Six male university professors, one female university professor, two male post-doctoral researchers and one male secondary school teacher. All of them belong to public institutions in the Spanish education system, with the exception of one professor who belongs to an Italian public university.

Results

The results obtained come from interviews with students who have taken the NOOC (Nano Open Online Course) 'Inverted Methodologies' of the European project ENID-Teach, in one of its four iterations. This NOOC is part of the training proposal of the Erasmus+ project 'European Network for D-Flexible Teaching (ENID-Teach)', coordinated by Universidad Nacional de Educación a Distancia - U.N.E.D. Its aim is to provide digital training for online teaching to educational professionals, mainly university professors.

For a clearer presentation of the results, they will be divided into 5 dimensions, corresponding to 1. structure and organisation of the NOOC, 2. content, 3. methodology, 4. Technology, and 5. cohesion and belonging.

Dimension 1: Structure and organisation of the NOOC

In general terms, the interviewees consider the structure and organization of the NOOC to be adequate, consistent and good sequencing ["I found the structure of the course clear and well organised." (4:4:1:1)], ["The structure was well thought out" (4:5:1:1)], ["A consistent structure, starting with theoretical models, then practical development and finishing with technological tools" (2:4:1:1)], ["is quite logically thought out" (2:5:1:1)], ["First provide the content, let's say the sense and the functioning of this type of education, and then give the means, how it is done, I think it's good" (2:5:1:2)], ["The organization of how it was set

up (...) I thought it was good, it was very useful the fact that you were entering and you had items to do" (2:2:1:1)], ["Each (block) was well oriented to the objective it was aiming for" (2:3:1:1)], ["Each (block) was fairly well divided and the contents were fairly well organised" (2:3:1:2)], ["It is very appropriate. You can tell there are many editions of this. Everything leads to the following, which makes it easy to follow" (4:2:1:1:)].

Dimension 2: Content

In terms of content, the students consider the content appropriate, interesting, rigorous, useful and with coherence among objectives, content and activities ["I liked (the content) very much" (2:3:2:2)], ["I found the content quite interesting because it gave me a broader perspective (he already applied this methodology in his classes)" (2:3:2:3)], ["it helped me to understand the flipped classroom from a more theoretical point of view" (2:3:2:4)], ["I found quite useful how to apply the flipped classroom to a more practical case and I learned quite few things that I didn't have in mind when I thought about this kind of methodologies" (2:3:2:5)], although one student has comment that sometimes the contents are too descriptive and that it would be necessary to go into more depth in the explanation of some of them ["I think that sometimes (...) too descriptive and lacking a bit of explanation at the content level" (2:2:2:1)] and another students remarks the lack of practical examples ["Perhaps there could have been a concrete example, a concrete explanation, a concrete case, one of a successful experience in this case on inverted methodology" (2:1:2:1)], ["I missed practical examples such as a video of what a flipped classroom would look like in practice" (2:4:2:4)]

Learning resources are considered valid, appropriated and adequate in which it was possible to participate ["I think all the resources are quite complete" (2:5:2:3)], ["Yes, they were well-founded and, for me, they were right." (4:1:2:2)], ["The resources have worked very well for me" (2:5:2:2)], ["I liked them very much. The PDFs are particularly useful because I can refer to them after the course." (4:2:2:1)], ["Theoretical materials in pdf are excellent" (2:4:2:3)], ["they (resources) are not excessively long, they are quite to the point, especially the video theme" (2:3:2:1)], ["I think that they covered the contents well, that they

were accessible to those who had studied the first units during the course" (2:1:2:2)], ["in my case, as a newcomer, it has helped me and I have found out everything, so that I as a student and I as a teacher, in other words, I think they are quite valid and have a fairly open range of operation"(2:5:2:1)]. However, one student considers descriptive videos worse than videos where a person appears ["I consider the voice-over videos or avatar videos worse than videos with a person in them" (2:4:2:1)] and quite simple ["I really enjoyed interactive resources, they were really innovative, but perhaps bit simple" (2:4:2:2)].

The activities are considered adequate, appropriate to the course and level and useful, [I think that the activities were also adequate (2:1:2:4)], ["Activities (...) this was very useful, especially the work, the final part good to the final part, I think it was good" (2:2:2:2)], ["the questions were pertinent, with a final activity to develop a lesson that I can apply in a real lesson" (2:5:2:6)], and aligned with the level of the course but quite theoretical ["the activities were fairly well aligned with the level of the course but I would find it interesting to add something a bit more practical, smaller and more specific in some of the modules" (2:3:2:6)], while others lacked examples in the more complex activities ["But in the activity to be sent to another pair, I would appreciate an example, so that I can be guided, because we did not have enough information to carry it out." (4:1:2:4)], and more practical activities ["The activities were good, but including more compulsory practical exercises would have been useful to reinforce learning" (4:5:2:1)].

Dimension 3: Methodology

The communication process is not considered to facilitate communication and interaction between members, and it is considered to be somewhat poor, limited and without continuity ["I did not see much communication" (4:1:3:1)], ["If you start and everyone says, well, I am such and such and no one starts a discussion. No discussion is generated either." (2:2:3:1)], ["An online course gives a lot of flexibility, of course, but in the end, you are on your own and there is not much interaction. I might do some kind of group dynamic to facilitate that kind of interaction" (2:3:3:1)], ["I did not have much interaction with the other participants"

(2:4:3:1)], ["I visited the forums a few times and there wasn't much conversation." (4:1:3:3)].

The evaluation system is considered correct for the majority of the students ["The assessment was adequate and the instructions were clear" (4:5:3:1)], ["The evaluation system was correct, with questionnaires and a final peer review activity that encompassed all the knowledge acquired in the course" (2:4:3:2)], ["The evaluation system has been adequate" (2:5:3:2)], ["as far as the evaluation system is concerned, it seems to me to be quite appropriate overall" (2:3:3:2)], ["I found it interesting and useful. The peer review gave me new ideas and was an instructive experience." (4:3:3:1)], but not clear for others, ["The evaluation, I am not very clear how it worked" (2:2:3:2)] and peer to peer final activity did not always work ["I did all the activities, but nobody assessed my work in the peer review. I would like this aspect to be better managed" (4:2:3:2)].

The performance of the teaching team has not been adequate ["I had some questions regarding certain things on the platform that sometimes I didn't register some test that maybe you did and I put it on the forum and the truth is that I haven't had an answer" (2:3:3:3)], ["We have not had much teacher presence" (2:3:3:4)], ["I received feedback in the forums, but responses sometimes took several days." (4:4:3:2)],but some of them consider that it is not necessary ["The main contact with the teaching staff was the email messages we received with reminders about the course, deadlines, etc., which was appreciated to regain motivation, but in the development of the course there was not much interaction, although I don't consider it necessary either"] although some students considered it correct ["Overall, teacher support was good" (4:5:3:5)] and another ones appreciated the teachers presence behind the course ["When you read the contents, you see that there is someone behind all this, so I do consider that there is a presence of teaching staff" (2:5:3:3)].

In general terms, the learning experience of the NOOC is considered good ["I found the content correct, the methodology too, the support provided too, especially the last activity" (2:1:3:2)], ["I found the overall experience satisfactory" (2:4:3:5)], ["My experience with the course is that I came from not knowing anything and having some interest in this to recognise this type of education, so my experience is positive in this theoretical part, I

would really need to apply it in class, but this theoretical experience has been good, really good" (2:5:3:4)], since the subject matter is considered interesting and does not involve a great effort ["The idea is not extremely complicated, although I think it has potential in some points" (2:2:3:5)]. Some of them have already implemented the new knowledge ["I already have used what I have learned in the course" (2:3:3:6)] or improved the way they previously implemented this methodology ["I liked the course very much, it has helped me to give a context to what I was applying (in my classrooms), even to improve it" (2:3:3:5)].

Dimension 4: Technology

On the technical side, a number of problems have been reported with the platform ["I have had problems with the platform, especially with some questionnaires that were sent and did not appear as sent. You had to do it several times for one of them to register it" (2:3:4:1)], ["I would say not very well. There were days when it seemed like the platform was down and it was hard to get in, but then it worked fine." (4:1:4:1)], ["The platform was difficult for me to find things on the platform, the truth is that I found it a bit strange and difficult to use" (2:1:4:1)], ["It was a little difficult for me to get to grips with the platform you used" (2:1:1:1)]; especially with the videos ["The platform is quite bad for watching videos on mobile, it is very difficult to change the settings because the buttons are very small" (2:4:4:1)], ["The videos were not very audible and apart from that, I think the videos already had a subtitle in English or Spanish, I don't remember, and then another subtitle was put on top, so with the two subtitles, practically half of the video screen could no longer be seen" (2:1:2:4)], ["The quality of the videos that I mentioned before, the noise and the subtitles made it difficult for me to follow the audiovisual material" (2:1:4:2)]; and with the progress bar ["I had the feeling that I was doing things and they were not reflected in my progress bar or sometimes apparently without doing anything, it seemed that the progress bar went up" (2:1:1:2)], ["although in general terms I would say that the platform is fine, it should be clarified how progress is made" (2:4:4:2)]. However, other students report that they have had a good technical experience ["I had no major technical problems. Everything worked

fine" (4:2:4:1)], ["On a technological level it is fine" (2:2:4:2)], ["I have not had any problems with the application or the application technology" (2:5:4:1)], ["On a technical level, my experience has been effective, it has not wasted my time" (2:5:4:2)]; on both mobile devices and computers ["Both from the mobile and from the computer and I don't think I had any problems" (2:2:4:1)],

Dimension 5: Cohesion and affiliation

Regarding to cohesion and affiliation, most of the respondents state that it was zero or very low ["I didn't have a feeling of belonging to a group, I think we were all going from our position, trying to access this content, but as a group I don't think we didn't work" (2:5:5:1)], ["My experience was more individual. I did not have much perception of cohesion with other participants." (4:1:5:1)], ["I have no feeling of belonging to the group" (2:3:5:2)], ["I haven't felt that belonging" (2:1:5:1)], ["I have not been part of the community" (2:4:5:1)], with little interaction with other members of the group, ["I have participated in the forum and there has been a response from some colleagues, but in general there has not been much participation or interaction" (2:3:5:1)], ["I interacted very little" (2:2:5:1)], ["The interaction is an aspect to reinforce" (2:3:5:3)], with some of them even stating that their interaction was zero ["I have not had any interaction with the group" (2:5:5:2)]. However, when asked if they would like to broaden their participation in the course and in the network, the majority of respondents said yes. ["Yes, I would be interested in joining a group that could advise me and ask for more advice" (2:1:5:3)], ["I would like to be able to access the course in the future and have contact with people who have taken it because it is something that is very enriching to be able to have opinions from peers about their application of what they have learnt" (2:3:5:4)], although some indicated that they were not aware of this possibility ["I was not even aware of the existence of the possibility of prolonging as a virtual community" (2:4:5:2)].

Conclusions

The profile of university students has changed significantly compared to decades ago. Nowadays, students are expected to make decisions and play an active and autonomous role in their educational process. In this context, teaching requires a process of educational innovation that guarantees quality and ensures that students improve their level of motivation and academic performance.

Thus, with the aim of responding to the needs of current students and contributing to the process of innovation and improvement of the quality of teaching in university classrooms, a training process on inverted methodology was proposed for teachers, mainly in higher education. The main objective was to analyse the level of satisfaction of the participants with the course. In this sense, we can say that the participants were generally satisfied with the training process. If we look at the specific objectives, they were structured according to a number of dimensions. The results were satisfactory in terms of the structure and organisation of the course, as well as in terms of content and activities. Similarly, in terms of the methodological dimension, the evaluation process was considered to be correct, although the teaching performance, according to some of the participants, was not adequate due to the lack of interaction. Similarly, from the methodological point of view, it is considered that the training process did not contribute to interaction and communication among the participating members, an aspect that is related to another of the dimensions analysed, cohesion and belonging. In this respect, the participants consider that this lack of group interaction led to a lack of feeling of belonging to the group. Finally, from a technological point of view, there were mixed opinions, with some trainees considering that everything worked correctly and others stating that the platform on which the course was hosted was not very intuitive and that there were problems with viewing the videos.

On the other hand, the analysis of the level of satisfaction based on the participation in training courses was not without its difficulties, mainly in the conduct of the interviews. In this sense, it is worth highlighting the difficulty of contacting participants and arranging the appropriate interviews for data collection.

In any case, as a prospective, it would be interesting to extend this training course to successive years, trying to reach a greater number of university teachers. To this end, social networks and other educational platforms should play a fundamental role. Likewise, the extension of the training courses on inverted methodology will require a process of improvement in some of the dimensions that should be based on the analysis carried out in this work.

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7

Flexible design: digital programmes adapted to the needs of learning in Europe

Diseño flexible: programas digitales adaptados a las necesidades de aprendizaje en Europa

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Abstract
This topic is a part of the educational proposal of the Erasmus + project, "European network in D-flexible teaching (ENID-Teach)". A teacher training program for Professors and for other areas within education with the aim of addressing the difficulties that teachers may encounter in uncertain contexts while teaching. The Part Two: Educational Experience of Spanish University Teachers consists of a series of topics based on flexible digital learning programs which are based on an inclusive approach suitable for all people within an adaptive skills framework that allows digital accessibility for all students with the support of digitization. The topic *Flexible Design: digital programmes adapted to the needs of Spanish learning* is oriented towards the knowledge related to the methodologies and pedagogies of flexible learning; the design of flexible programs according to different methodologies taking into account the different learning models and environments suitable for the development of flexible learning and the universal design of learning in an inclusive education based on a flexible digital or hybrid methodology.

Keywords: Flexible pedagogies, flexible design, active learning, digital content, DUA, accessible learning objects, interaction, program design, university *teaching*, areas of education.

Resumen
Este tema forma parte de la propuesta educativa del proyecto Erasmus +, «Red europea de enseñanza digital flexible (ENID-Teach)». Un programa de formación docente para profesores y para otras áreas de la educación con el objetivo de abordar las dificultades que los profesores pueden encontrar en contextos inciertos durante la enseñanza. La segunda parte: Experiencia educativa de los profesores universitarios españoles consiste en una serie de temas basados en programas de aprendizaje digital flexible que se basan en un enfoque inclusivo adecuado para todas las personas dentro de un marco de habilidades adaptativas que permite la accesibilidad digital para todos los estudiantes con el apoyo de la digitalización. El tema *Diseño flexible: programas digitales adaptados a las necesidades del aprendizaje* español está orientado al conocimiento relacionado con las metodologías y pedagogías del aprendizaje flexible; el diseño de programas flexibles según diferentes metodologías teniendo en cuenta los diferentes modelos y entornos de aprendizaje adecuados para el desarrollo del aprendizaje flexible y el diseño universal del aprendizaje en una educación inclusiva basada en una metodología digital flexible o híbrida.

Palabras clave: Pedagogías flexibles, diseño flexible, aprendizaje activo, contenido digital, DUA, objetos de aprendizaje accesibles, interacción, diseño de programas, *enseñanza de* la universidad, áreas de educación.

Introduction

The challenges associated with the competences for flexible design based on digital programs adapted to learning needs, imply new challenges for teachers. In the framework of flexible design competences, in formative terms, tools as well as *resources* are provided which allow university teachers and education professionals to generate and offer more accessible responses to new and innovative pedagogies and flexible learning methodologies.

The university of the 21st century is facing new challenges developing a framework of digital competences by making education more flexible by including digital tools in order to improve digital skills and knowledge, making the education of university students more flexible in a more extended context. According to Mosquera Gende (2022), "online university can be a good scenario to promote flexible education and to encourage active and

informal learning". The aim is to develop pedagogies where students have greater participation and autonomy through which new competences are acquired. In short, "to develop blended learning programs, using *microlearning*, *podcasting* and *gaming* resources that allow a theoretical-practical acquisition of the framework of competences designed" (Morales-Romo, et al. 2024).

Flexible digital pedagogy and methodology in learning processes is an ideal resource that adapts to the new pedagogical scenarios and also to the different learner profiles by developing different teaching and learning methods. When talking about flexible digital pedagogy, one must take into account what is meant by flexibility in these contexts and what are the different variables involved. For Santoveña-Casal (2023), "flexible digital pedagogies are those based on flexible and blended learning processes, centered on the student". In short, students learn when they want, how they want and about what they want to learn (Willems, 2011).

Collins and Moonen (2011), speak of two major interconnected lines in the change of the university, pedagogical flexibility and logistical flexibility. Methodologies based on strategies offering students the possibility of choosing the different learning activities, and where accessibility favors the participation of all, avoiding differences and inequalities in access to technology (digital divide). Within the strategies provided to the student one has to take into account the Universal Design for Learning (UDL) as a learning method that provides different teaching options and accessible learning processes respecting the diverse student body and at the same time focused on technologies, knowledge, and teachers' experiences.

Methodologies aligned with flexibility and participatory approach are characterized by their connected, active, collaborative, gamified and hybrid nature. Methodologies based on connected learning aim to create a multidimensional formal education environment aligned with active and collaborative methodologies where the student is an active part of the teaching and learning process. Gamification is another educational methodology aligned with active methodologies and offers the possibility of incorporating flexibility in learning. In the opinion of Buenaño-Barreno, et al. (2021) "this methodology uses the dynamics of games in order to 'create knowledge, improve skills,

develop competences or reward specific actions¨. The game as an educational strategy is a way to internalize knowledge in a playful way and helps to solve problems such as: lack of attention, demotivation and others... (Asunción, 2019, p.8).

Within the framework of flexible learning, it is essential to understand the conceptual models that direct educational practice towards the adaptability and personalization of the teaching-learning process. Models such as Technological Pedagogical Content Knowledge (TPACK) based on technological pedagogical knowledge of content and the Substitution, Augmentation, Modification and Redefinition model (SAMR) integrating technology in order to optimize the quality of digital education, ensuring diverse access that offers equality, and establishing a working model accessible to all teachers improving the integration of ICTs in the design of the various activities analyzing our own teaching practice in terms of inclusion and flexibility.

In summary, the key elements of a flexible pedagogical design are the pedagogical richness, the methodology to be followed, the technical support, the technologies and social resources used, without leaving behind the ability to adapt to the profile and diversity of the student body (Santoveña-Casal, 2023). The Wheel of Universal Design for Learning (UDL) is a tool that brings together various applications and digital resources to facilitate the implementation of the principles of UDL in the classroom; therefore, we can affirm that co-teaching as UDL, offers a significant potential to transform the flexible digital environment into an inclusive, equitable and effective space.

Theoretical framework

In the past decades, education has undergone significant changes as a consequence of the adoption and use of technological resources. When we refer to digitalization, we are referring to a society where most of the information is digital. We are in a post-digital pedagogical context, with post-digital methodologies based on the immediate, interactive, social, contextual, ubiquitous, on-demand. We are immersed in the era of flexible learning pedagogies and methodologies. A contribution of this perspective of thought lies in the fact of considering that

education is at a "turning point" due to the large amount of accessible information and data, hence, today's society resists the classical idea of education (Picón, et al. 2021). According to Bauman (2008), we are facing a liquid education understood as a process; knowledge stops being permanent and becomes of instantaneous use, disposable or with a finite character that adapts to changes, erasing the inequalities between face-to-face and virtual education. Following these reflections, we wonder about the challenges facing education today. According to Bauman (2013), in his paper "Educating in Liquid Modernity", he poses challenges such as: 1) The challenge of dealing with a large amount of information; 2) The challenge of harmonizing the teacher-student relationship. In short, we are talking about a type of flexible pedagogy that adapts to changes without inequalities between face-to-face and virtual education where the fusion between social media, digital technology, media, personal and social life leads us to know what the pedagogies and methodologies of flexible learning in the post-digital era are.

Immersed in the Higher Education of the XXI century we observe that information and communication technologies have become important elements that contribute to improving the teaching process (Guerrero et al., 2020). Technology in the teaching-learning process is essential nowadays, so the training proposal of the Erasmus + project "European network in D-flexible teaching (ENID-Teach)" develops a training program that aims to respond to the difficulties in the performance of teachers' functions in uncertain times. New technologies create connections that otherwise would not be possible. In this evolution of technologies we find new concepts related to ICTs, such as Learning and Knowledge Technologies (LKT), considered as the pedagogical term for ICTs; Relationship, Information and Knowledge Technologies, favoring interaction between students and teachers on a horizontal communicative level; and finally, Technologies of Empowerment and Participation (TEP), favoring communication, teamwork and the development of autonomy in the teaching-learning process.

With the aforementioned training proposal in the development of the different NOOCs in five languages (Spanish, English, French, Italian and Portuguese), the focus has been on making more digitalized and flexible models more visible, without

detracting from the level of education or the end of face-to-face teaching.

The topic Flexible design: digital programmes adapted to the needs in Europe learning, shows the evidence and opinions of the participants in relation to training in the design of flexible digital learning programs based on a common approach for all people. According to opinions expressed by the participants in the digital program adapted to the needs of learning (Results section), the program has allowed to deepen the pedagogies and methodologies of flexible learning. The participants have deepened in flexible training based on the rich connected, active, collaborative, gamified and hybrid methodologies. It highlights the impact of new variables influencing the degree of flexibility in academic teaching practice in general and in university teaching in particular. In relation to didactic resources, a variety of tools have been offered to learn how to design and publish accessible learning objects based on the Universal Design for Learning (UDL) allowing the elaboration of new programs based on a flexible digital (or hybrid) methodology and pedagogy to improve educational equity in general and teaching functions in particular, being valued for its methodological impact.

The teachers and/or higher education professionals participating in the program have the opportunity to participate in flexible digital pedagogies as an ideal resource for teaching practice, with the support of digitalization adapting to different pedagogical scenarios, it being a valued starting point given the criteria and rigor with which the different teaching resources have been developed. The concept of digital and flexible pedagogy is analyzed thoroughly, the methodological flexibility of learning in terms of place, time, method and pace of teaching-learning is analyzed. It presents a student-centered model and highlights the main elements that define accessibility, to conclude with the universal design of learning, formulating a proposal for teaching practice according to the acquisition of various ideas for implementation in academic programs. Social networks are an ideal tool for establishing communicative processes in collaborative work in networks in these educational methodologies, favoring the participation of the members of the educational community through the development of tools for the design of flexible programs. Specific tools are presented, such as Genially, Canva, Educaplay,

etc., elaborating flexible and accessible learning environments and the evaluation and self-evaluation of the students' learning process. At the same time, different free access spaces are presented, offering the user the use of various learning resources.

In the past years progress has been made in the field of inclusion in university studies. In recent years, progress has been made in the field of inclusion in university studies. We start from the idea that inclusive education is understood as the opportunity for any individual to participate on equal terms in any academic activity. Guaranteeing the right of all people to education entails adaptations in the system that guarantee access, permanence and development under equal conditions. Based on these premises, the Universal Design for Learning (UDL) attempts to respond to the needs inherent to inclusive education. The UDL is based on the need to focus on student diversity from the beginning of didactic planning in order to offer the same learning opportunities to all students regardless of their characteristics and needs. As an alternative to traditional design in flexible design, the application of SAD in the context is analyzed, exploring strategic and effective knowledge networks related to the use of technology in teaching and learning, whose principles the participant can select as an alternative to traditional design considering the "what", the "how", and "why", with the analysis of the participant's own teaching practice.

In this sense, it is essential to carry out a rigorous training of and for teachers, with the aim that its influence is subsequently extended to students. This idea has been one of the foundations of the Erasmus + project, "European network in D-flexible teaching (ENID-Teach), in general, and of the Flexible Design: digital programmes adapted to the needs of Spanish learning, in particular.

Objectives

General objective:

- To know the overall satisfaction of the students with the course.

Specific objectives:

- Collect and analyse information on students' opinions about the structure and organisation of the NOOC.
- Collect and analyse information on students' opinions on the content of the NOOC.
- Collect and analyse information on students' opinions about the methodology used in the NOOC.
- Collect and analyse information about the students' opinions on the technical aspects and whether they experienced any problems.
- Collect and analyse information on students' opinions about cohesion and affiliation in the course and their sense of belonging to the group.
- To find out what students consider to be the strengths of the course.
- To find out what students feel needs to be improved in the course.

Sample

The sample consists of 9 subjects, 4 male and 5 female. The profiles are as follows: Three female university professors, three male university professors, one female researcher, one female secondary school teacher and one male Master University student. All belong to public institutions of the Spanish educational system.

Results

The results presented here come from interviews with people who have taken the course "Design of flexible learning digital programs" (in NOOC format: Nano Open Online Course) of the European project ENID-Teach, in some of its different editions. This NOOC is part of the training proposal of the European Erasmus+ project 'European Network for D-Flexible Teaching (ENID-Teach)', developed by a group of European universities and institutions: Universidad Nacional de Educación a Distancia - U.N.E.D., Burgaski Svoboden Universitet, Università degli

Studi di Catania, Universidade Aberta and Savoir-Devenir; and coordinated by the Universidad Nacional de Educación a Distancia - U.N.E.D. itself. One of the main objectives of the project is to provide training in flexible teaching methods for European university teachers and other education professionals.

The results are presented below in five dimensions:

- Structure and organisation of the NOOC.
- Content.
- Methodology.
- Technology.
- Cohesion and affiliation.

Dimension 1: Structure and organisation of the NOOC

With regard to the structure and organisation of the NOOC, all the interviewees stated that it was good ["In my opinion it is good, it is very well structured" (3:5:1:1)], ["I found the organisation to be quite adequate" (3:3:1:1)], ["Good, in general I found it easy to follow" (3:4:1:1)], ["Not only was the subject matter well structured or organised... (3:3:1:2)], ["It is very well structured and this made it very easy for me to learn" (2:2:1:1)], ["Very manageable and easy to follow" (2:2:1:2)], ["In principle, the structure is accessible and organised according to the modules or sections" (1:2:1:1)], ["The structure was very good, very well done, very well explained, everything was included in the course" (1:1:1:1)], with a correct sequencing of the contents, starting with more general aspects and continuing with more specific ones ["It starts with more general things and continues with more specific ones, so good" (3:4:1:2)].

Dimension 2: Content

Regarding the content of the course, the interviewees state that it is generally good, well structured, well sequenced and flexible ["I found the content very good" (3:4:2:3)], ["The content is quite satisfactory" (3:3:2:3)], ["It is adapted to what the course is about" (2:2:2:4)], ["The content has gone from less to more and is very well structured" (3:5:2:4)], ["For me, the content was very flexible and I understood it very well" (3:5:2:5)]. They also point out

that it is well related to the objectives ["The objectives are met' (2:2:2:5)], ["The proposed content was interesting, as I said, relating the key aspects of the NOOC to their respective objectives" (1:2:2:3)], supported by bibliographical references ["The content was very good, supported with references and citations..." (1:1:2:3)] and is innovative and interesting ["There were things that I did not know and that are interesting for the students" (2:2:2:8)], ["Important content for teachers" (2:2:2:7)], although they also point out some aspects that they see as negative, such as that the information in the videos and the documents was too similar ["The videos were a bit repetitive because at the end, it was a little doll repeating what we had already read, at least in the order I did it, reading the PDFs first" (1:1:2:2)] or that there was a lot of information, but not enough feedback ["There is a lot of information, but not enough feedback" (3:3:2:2)]..

The learning resources are also considered to be of high quality and interactive by most of the interviewees ["I generally found them good" (3:4:2:1)], ["The resources were very satisfying, interactive and used gamification" (3:5:2:1)], ["The descriptives were very good" (1:1:2:1)], ["They were very interactive" (2:2:2:1)], although some people also highlight some negative aspects, such as that the videos were a bit simple ["The short videos were good, although maybe a bit simple" (1:2:2:1)] or that the quizzes did not provide feedback on incorrect answers, only indicating whether you got it right or wrong ["Maybe the quizzes could be improved, as you don't get feedback on wrong answers" (3:4:2:2)].

As far as the activities are concerned, they were generally very well considered, appropriate to the content and objectives and interactive ["I found the activities relevant to what I learned in the course" (3:4:2:6)], ["I found the activities good given my prior knowledge" (3:4:2:5)], ["The activities were appropriate" (3:3:2:4)], ["The learning activities were appropriate to the content and objectives of the course" (1:2:2:4)], ["They used tools that made the activities agile and interactive" (3:5:2:3)]. In the activities proposed in the different topics, students highlighted the possibility of having unlimited attempts ["I found the activities appropriate and interactive and the good thing was that if we had different levels of knowledge, there were unlimited attempts, you could see the result and try again or review the content" (3:5:2:6)], although they also mentioned that some in-

teractive activity did not offer feedback on wrong answers ["The quizzes should be improved, as they do not offer feedback on wrong answers" (3:4:2:2)]. As for the final optional activity, one student indicated that he felt that there was a big jump from the theoretical content to the practical activity ["In the final activity, I saw a big jump between the theory seen during the course and what you had to do afterwards. It was related to the contents, but from theory to practice was a bit of a risky leap for me" (1:1:2:4)], although it is true that the course was aimed at university teachers and this was pointed out by one student.

Dimension 3: Methodology

The communicative and interactive process is described as poor or non-existent by most interviewees ["I had no interaction at all, I just watched the videos and answered questions" (3:3:3:1)], ["Maybe the interaction could have been improved more" (3:3:3:2)], ["One of the concerns I shared with my colleagues, outside NOOC, was that we expected a certain level of interaction" (1:2:3:1)], ["There was almost no communication and interaction on the course wall, where we hardly ever went in, just to ask some clueless question" (1:1:2:1)], although some also consider it adequate and positive ["The interaction process I perceive as adequate, I have participated in the forums and you can read the comments of your colleagues, participate..." (3:5:3:1)], ["The interaction and participation, both with classmates and with teachers has been adequate in my opinion" (3:5:3:2)], highlighting the forums ["the part of the forums seems important to me" (2:2:3:1)] and they appreciate the fact of not feeling alone in the course ["seeing that we are not alone seems interesting to me" (2:2:3:2)] and sharing experiences with other teachers ["I highlight sharing experiences with other teachers" (2:2:3:3)].

With regard to the performance and presence of the teaching staff on the course, there are mixed opinions; some defend good communication between teachers and students ["there was good communication" (1:1:3:5)], ["I had positive feedback from the teachers" (3:5:3:7)], answering the doubts raised ["The times I asked the teachers questions, they answered them in the section of the platform or by mail" (1:2:3:3)]. Others indicated that they did not have interaction with the teachers, ["As I followed

the course with the videos and interactive activities, I did not interact much with the teachers" (2:2:3:8)], indicating that they did not consider it necessary ["I did not have interaction with the teachers directly because I did not consider it necessary" (2:2:3:9)] and others, however, consider that there was no faculty presence on the course ["They have not tutored the courses" (2:1:3:3)], ["Sometimes I missed their accompaniment" (2:1:3:4)], ['I did not perceive their presence" (3:3:3:4)].

The assessment system has been described as good or adequate by the majority of the interviewees ["The assessment was correct" (3:5:3:3)], ["Yes, the assessment system was good" ('3:3:3:3')], ["The assessment system was adequate" (3:4:3:2)], clearly described ["The instructions are given very well at the beginning of the course" (2:2:3:4)], appropriate to the content ["It is appropriate to the content" (2:2:3:6)] and to the level of the course ["the level is appropriate to the level of the course" (2:2:3:5)], ["The level is appropriate to the level of the course" (2:2:3:5)].

The learning experience in the course in general terms has been considered good in 100% of the interviews ["In general, very satisfactory" (1:1:3:6)], ["The overall experience was very positive" (3:4:3:5)], ["In general, the experience has been very positive, I liked the course" (3:3:3:7)], ["It has been satisfactory to do the course" (3:5:3:7)], ["It has been an interesting experience, I liked seeing the integration of flexible pedagogy and active methodologies" (1:2:3:3)], highlighting the application of what has been learnt in teaching practice ["Very satisfied, I learned new resources and I will put them into practice next year" (2:2:3:11)], ["It provides important resources that can be applicable to our daily lives" (2:2:3:16)].

Dimension 4: Technology

Regarding the technological aspect, problems are reported in most cases ["At the technological level I had several errors" (3:5:4:3)], especially with the progress bar ["I had some problems with the progress bar" (3:5:4:1)], ["I downloaded the guides, did all the activities and did not reach 100% in the progress bar" (3:5:4:2)], ["It did not compute my progress" (2:2:4:6)] and with

document registration ["I did an evaluation survey and it was not registering correctly" (3:5:4:4)], although there are also students who do not report problems ["I haven't had any problems" (3:3:4:1)], ["Nothing, no problems, everything worked correctly and could be accessed at all times" (1:1:4:1)].

When asked how they would rate their overall technical experience, opinions are mixed. While most consider it good ["I found the technical experience very good" (3:4:4:2)], ["The technical experience is very satisfactory" (3:3:4:3)], ["The overall experience at the technical level was good" (3:5:4:5)], ["My experience at the overall level very good" (2:2:4:3)], others consider it simple considering the tools that exist today ["On a technical level it worked well, but perhaps I expected something more sophisticated with all the tools we have available now" (1:1:4:2)] or bad ["My experience was somewhat annoying and a waste of time at times" (1:2:4:2)].

Dimension 5: Cohesion and affiliation

The dimension of cohesion and affiliation is the lowest rated. The feeling of belonging to the group was generally very low or non-existent ["I had no group feeling" (2:1:5:1)], ["I had no group feeling in NOOC 5" (3:2:5:1)], ["There is no group feeling" (3:1:5:1)], ["To be honest, I didn't feel like I belonged to the group" (3:4:5:1)], ["There is definitely no cohesion. I've only read comments from some, directed at the teachers" (1:2:5:1)], with some highlighting this as a positive aspect ["It's basically an individual course and I think this is one of its advantages" (3:4:5:4)], although there are also subjects who have developed this feeling of belonging ["I've made connections, especially with people related to education, which is my area of work" (3:5:5:1)], ["You feel that cohesion with the rest of the participants" (2:2:5:3)]. When asked about their intention to prolong their participation in the course or in the social network, they are generally not interested, although some subjects highlight that they would like to be informed about new courses ["I would like to be informed if there are new courses" (3:4:5:5)], ["I would like to be informed of more courses of this type" (3:2:5:5)] and to be able to access the virtual course in the future ["I would like to have frequent access to the

virtual course" (3:2:5:6)], ["I would like to have frequent access to the virtual course" (2:1:5:3)].

Conclusions

As one moves up the educational ladder, the pedagogical training of teachers in general, and in active and flexible methods in particular, tends to decline. In pre-primary and primary education, teachers have specific university degrees in education to be able to carry out their duties. However, when it comes to secondary education, the pedagogical training required to enter the profession decreases considerably, to the point where at best one year of training is sufficient. Going one step further, at university level, teachers do not receive any pedagogical training and are not required to do so throughout their careers. This is a major problem; the teachers who are responsible for the education of students at the highest level of education are mostly not trained in pedagogy at all. This generally results in a lack of pedagogical skills and strategies, leading to the implementation of an outdated and ineffective educational methodology, in which the teacher does not have the necessary tools to facilitate a teaching-learning process that facilitates the acquisition of knowledge by the students and is adapted to the needs of each individual. In this context, the European Erasmus+ project "European Network for D-Flexible Teaching (ENID-Teach)" was created, which offers open training to all education professionals, but mainly to university teachers, on flexible and innovative digital educational methodologies, where the student is at the centre of the teaching-learning process.

The main objective of this research was to find out the general satisfaction of the students with the course 'Design of digital programmes for flexible teaching'. In this sense, we can point out that all the respondents gave a positive response in this sense, highlighting mainly the content, the structure and organisation and the flexibility of the course.

Looking at the specific objectives, the structure and organisation was rated positively by all respondents. As for the content dimension, it is also one of the most highly rated dimensions, as its high quality and its relation to the proposed objectives are

highlighted. The educational resources and activities proposed are also highly rated in most cases. In terms of methodology, the evaluation system is considered good in most cases, but the communication and interaction process are one of the lowest rated, described as poor or non-existent in most cases. As regards the performance of the teaching staff, opinions are mixed. In the technological dimension, when asked about the overall experience, we also find mixed opinions, although the majority describe it as good. However, a large number of students had problems with different aspects of the platform. The last dimension, cohesion and belonging, is also one of the lowest rated, as the sense of belonging to the group is generally low or non-existent, although several respondents show interest in continuing to access the course in the future.

Finally, it is important to stress that these results are very useful for educational professionals who design and develop online courses in general, and in the field of education and more specifically in the design of flexible programmes in particular, since the analysis carried out in this study provides very valuable information on the best and worst dimensions rated by university professors in this training.

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Part Three: Educational experience of European university teaching staff

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The third part of this book, entitled *Educational experience of European university teaching staff*, focuses on the analysis of the effectiveness of microlearning as a teacher training strategy in the five NOOCs evaluated within the European context. Through an approach based on empirical evaluation, the implementation of NOOCs (Nano Open Online Courses) and their impact on the development of digital and pedagogical competences of university teachers in Europe are examined.

Each chapter begins with a conceptual framework that contextualises the importance of microlearning in higher education, establishing its theoretical and methodological foundations within each methodology analysed. The key characteristics of NOOCs, their pedagogical structure and the advantages they offer in terms of flexibility and accessibility for teachers are detailed. The objectives of the study are also presented, with a focus on the evaluation of the quality of the courses, the perception of the students and the effectiveness of the open educational resources used in the training process.

Throughout the chapters, the research design and the methodology used are described, combining qualitative and quantitative analyses to provide a comprehensive view of the teaching experience. The results of the implementation of the NOOCs are presented based on the opinions of the teachers interviewed or surveyed, exploring the impact of the training on their teaching practice. In addition, the role of academic cooperation networks in the dissemination and sustainability of these training models is analysed.

This third part concludes with an evaluation of the training programme, measuring its impact, the level of satisfaction of the participants and the perceived usefulness of the courses in their teaching activity. Finally, key recommendations are drawn for the design of future digital training strategies, highlighting the potential of microlearning to transform university teaching and strengthen teacher training in an increasingly digitalised environment.

Tercera parte: Experiencia educativa del personal docente universitario europeo

La tercera parte de este libro, titulada *Experiencia educativa del personal docente universitario europeo*, se centra en el análisis de la efectividad del microaprendizaje como estrategia de formación docente en los cinco NOOCs evaluados dentro del contexto europeo. A través de un enfoque basado en la evaluación empírica, se examina la implementación de los NOOCs (Nano Open Online Courses) y su impacto en el desarrollo de competencias digitales y pedagógicas del profesorado universitario en Europa.

Cada capítulo comienza con un marco conceptual que contextualiza la importancia del microaprendizaje en la educación superior, estableciendo sus fundamentos teóricos y metodológicos dentro de cada metodología analizada. Se detallan las características clave de los NOOCs, su estructura pedagógica y las ventajas que ofrecen en términos de flexibilidad y accesibilidad para el profesorado. Asimismo, se presentan los objetivos del estudio, con un enfoque en la evaluación de la calidad de los cursos, la percepción del alumnado y la eficacia de los recursos educativos abiertos utilizados en el proceso formativo.

A lo largo de los capítulos, se describe el diseño de la investigación y la metodología empleada, combinando análisis cualitativos y cuantitativos para proporcionar una visión integral de la experiencia docente. Se presentan los resultados de la implementación de los NOOCs a partir de las opiniones del profesorado entrevistado o encuestado, explorando el impacto de la formación en su práctica docente. Además, se analiza el papel de las redes de cooperación académica en la difusión y sostenibilidad de estos modelos formativos.

Esta tercera parte concluye con una evaluación del programa de formación, midiendo su impacto, el nivel de satisfacción de los participantes y la utilidad percibida de los cursos en su actividad docente. Finalmente, se extraen recomendaciones clave para el diseño de futuras estrategias de formación digital, destacando el potencial del microaprendizaje para transformar la enseñanza universitaria y fortalecer la capacitación del profesorado en un entorno cada vez más digitalizado.

Terceira parte: Experiência educativa do pessoal docente universitário europeu

A terceira parte deste livro, intitulada *Experiência educativa do pessoal docente universitário europeu*, centra-se na análise da eficácia da microaprendizagem como estratégia de formação de professores nos cinco NOOCs avaliados no contexto europeu. Através de uma abordagem de avaliação empírica, examina a implementação de NOOCs (Nano Open Online Courses) e o seu impacto no desenvolvimento de competências digitais e pedagógicas do pessoal docente universitário na Europa.

Cada capítulo começa com um quadro concetual que contextualiza a importância da microaprendizagem no ensino superior, definindo os seus fundamentos teóricos e metodológicos no âmbito de cada metodologia analisada. São detalhadas as principais caraterísticas dos NOOCs, a sua estrutura pedagógica e as vantagens que oferecem em termos de flexibilidade e acessibilidade para os professores. São também apresentados os objectivos do estudo, com destaque para a avaliação da qualidade dos cursos, a perceção dos alunos e a eficácia dos recursos educativos abertos utilizados no processo de formação.

Ao longo dos capítulos, são descritos o desenho e a metodologia de investigação utilizados, combinando análises qualitativas e quantitativas para proporcionar uma visão abrangente da experiência de ensino. Os resultados da implementação dos NOOC são apresentados com base nas opiniões dos professores entrevistados ou inquiridos, explorando o impacto da formação na sua prática pedagógica. Além disso, é analisado o papel das redes de cooperação académica na disseminação e sustentabilidade destes modelos de formação.

Esta terceira parte conclui com uma avaliação do programa de formação, medindo o seu impacto, o nível de satisfação dos participantes e a utilidade percebida dos cursos na sua atividade docente. Por último, são formuladas recomendações fundamentais para a conceção de futuras estratégias de formação digital, salientando o potencial da microaprendizagem para transformar o ensino universitário e reforçar a formação de professores num ambiente cada vez mais digitalizado.

Terza parte: Esperienza formativa del personale docente universitario europeo

La terza parte di questo libro, intitolata *Esperienza formativa del personale docente universitario europeo*, si concentra sull'analisi dell'efficacia del microapprendimento come strategia nella formazione degli insegnanti, applicata nei cinque NOOC valutati nel contesto europeo. Attraverso un approccio di valutazione empirica, vengono esaminati l'implementazione dei NOOC (Nano Open Online Courses) e il loro impatto sullo sviluppo delle competenze digitali e pedagogiche del personale docente universitario in Europa.

Ogni capitolo inizia con un quadro concettuale che contestualizza l'importanza del microapprendimento nell'istruzione superiore, definendone i fondamenti teorici e metodologici all'interno di ogni metodologia analizzata. Vengono illustrate le caratteristiche principali dei NOOC, la loro struttura pedagogica e i vantaggi che offrono in termini di flessibilità e accessibilità per gli insegnanti. Vengono inoltre presentati gli obiettivi dello studio, con particolare attenzione alla valutazione della qualità dei corsi, alla percezione degli studenti e all'efficacia delle risorse educative aperte utilizzate nel processo formativo.

Nel corso dei capitoli vengono descritti il disegno di ricerca e la metodologia utilizzata, che combina analisi qualitative e quantitative per fornire una visione completa dell'esperienza didattica. I risultati dell'implementazione dei NOOC sono presentati sulla base delle opinioni dei docenti intervistati, esplorando l'impatto della formazione sulla loro pratica didattica. Inoltre, viene analizzato il ruolo delle reti di cooperazione accademica nella diffusione e sostenibilità di questi modelli di formazione.

Questa terza parte si conclude con una valutazione del programma di formazione, che misura il suo impatto, il livello di soddisfazione dei partecipanti e l'utilità dei corsi ai fini della loro attività didattica. Infine, vengono formulate raccomandazioni chiave per la progettazione di future strategie di formazione digitale, evidenziando il potenziale del microapprendimento per trasformare l'insegnamento universitario e rafforzare la formazione degli insegnanti in un ambiente sempre più digitalizzato.

Troisième partie: Expérience éducative du personnel enseignant des universités européennes

La troisième partie de ce livre, intitulée « *Educational experience of European university teaching staff* », se concentre sur l'analyse de l'efficacité du microlearning en tant que stratégie de formation des enseignants dans les cinq NOOCs évalués dans le contexte européen. Grâce à une approche d'évaluation empirique, il examine la mise en œuvre des NOOC (Nano Open Online Courses) et leur impact sur le développement des compétences numériques et pédagogiques du personnel enseignant des universités en Europe.

Chaque chapitre commence par un cadre conceptuel qui contextualise l'importance du microapprentissage dans l'enseignement supérieur, en exposant ses fondements théoriques et méthodologiques dans chaque méthodologie analysée. Les principales caractéristiques des CONO, leur structure pédagogique et les avantages qu'ils offrent en termes de flexibilité et d'accessibilité pour les enseignants sont détaillés. Les objectifs de l'étude sont également présentés, en mettant l'accent sur l'évaluation de la qualité des cours, la perception des étudiants et l'efficacité des ressources éducatives libres utilisées dans le processus de formation.

Tout au long des chapitres, la conception de la recherche et la méthodologie utilisée sont décrites, combinant des analyses qualitatives et quantitatives pour fournir une vue d'ensemble de l'expérience d'enseignement. Les résultats de la mise en œuvre des NOOC sont présentés sur la base des opinions des enseignants interrogés ou sondés, explorant l'impact de la formation sur leur pratique d'enseignement. En outre, le rôle des réseaux de

coopération universitaire dans la diffusion et la durabilité de ces modèles de formation est analysé.

Cette troisième partie se termine par une évaluation du programme de formation, mesurant son impact, le niveau de satisfaction des participants et l'utilité perçue des cours dans leur activité d'enseignement. Enfin, des recommandations clés sont formulées pour la conception de futures stratégies de formation numérique, soulignant le potentiel du microapprentissage pour transformer l'enseignement universitaire et renforcer la formation des enseignants dans un environnement de plus en plus numérisé.

8

Innovative and flexible methodologies in Europe: connected, collaborative, gamified, hybrid and inclusive design

Metodologías innovadoras y flexibles en Europa: diseño conectado, colaborativo, gamificado, híbrido e inclusivo.

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Abstract
The chapter presents an analysis of evaluations of five NOOCs (Nano Open Online Courses) for teacher education, focusing on connected methodologies, collaborative, gamification, hybrid approaches and flexible learning. Through interviews and focus groups in English, six key dimensions are examined: structure, content, methodology, technology, cohesion and overall satisfaction. The sample consisted of 23 female professors from European universities (Italy, Bulgaria, Romania and Haiti). The findings reveal a positive assessment of the courses in terms of clarity, innovation and applicability. However, challenges associated with a lack of interactivity, navigation difficulties and a predominantly individual learning experience are identified. While some NOOCs manage to integrate applicable methodologies and accessible technology, others show limitations in collaborative processes and technical problems that affect continuity. The analysis concludes that, although the overall

level of satisfaction is high, it is recommended to strengthen interactivity, optimise the usability of the platforms and promote greater participation to consolidate the sense of community and improve the learning experience.

Keywords: Flexible methodologies, Hybrid methodologies, Gamified methodologies, Connected methodologies, Collaborative methodologies, Flexible programme design.

Resumen

El capítulo presenta un análisis de las evaluaciones de cinco cursos en línea abiertos y masivos (NOOC) para la formación de docentes, centrándose en metodologías conectadas, colaborativas, de ludificación, enfoques híbridos y aprendizaje flexible. A través de entrevistas y grupos de discusión en inglés, se examinan seis dimensiones clave: estructura, contenido, metodología, tecnología, cohesión y satisfacción general. La muestra estaba formada por 23 profesoras de universidades europeas (Italia, Bulgaria, Rumanía y Haití). Los resultados revelan una valoración positiva de los cursos en términos de claridad, innovación y aplicabilidad. Sin embargo, se identifican desafíos asociados a la falta de interactividad, dificultades de navegación y una experiencia de aprendizaje predominantemente individual. Mientras que algunos NOOC logran integrar metodologías aplicables y tecnología accesible, otros muestran limitaciones en los procesos colaborativos y problemas técnicos que afectan a la continuidad. El análisis concluye que, aunque el nivel general de satisfacción es alto, se recomienda reforzar la interactividad, optimizar la usabilidad de las plataformas y promover una mayor participación para consolidar el sentido de comunidad y mejorar la experiencia de aprendizaje.

Palabras clave: Metodologías flexibles, metodologías híbridas, metodologías gamificadas, metodologías conectadas, metodologías colaborativas, diseño de programas flexibles.

Introduction

In the context of digital education, NOOCs (Nano Open Online Courses) have emerged as an innovative modality that offers short, accessible and specialised training in various areas of knowledge. Their popularity lies in the flexibility they offer partic-

ipants, allowing them to learn at their own pace and adapting to their needs. However, the quality and effectiveness of these courses depend to a large extent on the structure of the programme, the relevance of the content and the overall experience they offer.

This chapter opens the second part of the book, which is devoted to the evaluation of courses and methodologies implemented at European level. The sample analysed is made up of 23 participants, members of the European university teaching staff, 22 of whom are women. Eight of these participants took part in focus groups (divided into three discussion groups), while 17 took part in interviews.

The chapter presents the results of the interviews and focus groups, conducted in English, with the participation of course participants from different European regions. The diversity of contexts and perspectives enriches the analysis, providing multidimensional approaches and varied experiences.

The success of a NOOC is not only measured by the richness of its materials, but also by the methodology applied, technological accessibility and opportunities for interaction. Intuitive platforms and interactive methodologies facilitate learning, while deficiencies in these aspects can lead to disengagement, reduced participation and limited pedagogical benefits. Cohesion and affiliation among participants play a key role in this process, fostering collaboration and a sense of community through forums, social networks and discussion groups.

This study aims to analyse and compare five NOOCs (NOOC 1, NOOC 2, NOOC 3, NOOC 4 and NOOC 5), evaluating their structure, content quality, methodology, technology, cohesion and affiliation. Through individual interviews and focus groups, data were collected to identify strengths and areas for improvement in each of these courses.

This analysis offers a comprehensive view of the current state of the NOOCs, providing practical recommendations to optimise their design and implementation in order to improve the student experience and maximise the pedagogical impact of these training programmes.

Theoretical framework

The development of a quality education system depends, to a large extent, on the capacity of universities to configure themselves as spaces for global and flexible participation. This approach implies adapting academic programmes to innovative digital models that respond to uncertain situations and guarantee equal access to education, especially for vulnerable populations (Santoveña-Casal, 2021). The implementation of these models requires teachers trained in digital pedagogies and methodologies, able to adjust to the needs of students and the context (Santoveña-Casal and Roldán Roldán, 2024).

Throughout the chapter, evaluations of different methodologies applied in the courses are examined, with a focus on critical thinking, collaboration and research, as well as gamified and active approaches. In addition, the use of hybrid methodologies is analysed and students' evaluations of the design of digital and flexible programmes aimed at promoting accessible and inclusive education are collected. This analysis falls within the framework of microlearning, highlighting its relevance and potential to respond to the demands of the current educational landscape.

From a general perspective, **connected and critical methodologies** are based on digital learning, defined as learning that takes advantage of the potential of the network and takes place in digital environments via the Internet. This learning encompasses methodological aspects, strategies and processes using digital technologies. Connected learning emphasises hyperconnectedness and networked structure, highlighting the importance of social and interpersonal variables in the acquisition of knowledge (Santoveña-Casal, 2021).

Connected learning is generated from the connection processes and links created within and outside the educational community, allowing students to take an active position and create their own connections (Santoveña-Casal, 2021). Siemens' (2012) connectivist theory emphasises that learning implies that each person can decide what to learn, when and where, interpreting information according to their personal context. Interpersonal and digital networks provide the framework in which this information flows, generating diverse and enriching interpretations.

The role of **active methodologies** is fundamental in the transformation of teaching practices, placing students at the centre of the learning process. These types of methodologies not only promote meaningful learning but also develop critical and reflective competences (Santoveña-Casal, 2021). Teachers, in this context, assume a guiding role, guiding learning through participatory dynamics and collaborative experiences.

Gamification in education has been consolidated as a key tool to improve motivation and reinforce learning. It is defined as the integration of game mechanics in non-game contexts, with the aim of transforming classroom dynamics and fostering active collaboration. As Santoveña-Casal (2021) states, gamification is not only about playing games, but also about designing subjects, teaching units or entire programmes with a structure that simulates a game. This approach seeks not only final results, but also continuous participation and the development of team competences.

In the wake of the 2019 pandemic, there was a notable increase in the adoption of online education, with a global growth of 900 % since 2000 (Global Education Network, 2020) and of **blended or hybrid methodology**. In Spain, this growth was 28 % during the confinement (El Economista, 2020). This change has prompted face-to-face educational institutions to develop distance or digital education programmes, adopting hybrid methodologies that combine face-to-face and virtual training.

Flexible digital pedagogy is defined as an educational strategy that, supported by digitalisation, makes it possible to adapt the teaching process to the changing needs of students and to respond effectively to unforeseen situations. This pedagogy is characterised by its ability to adjust to diverse pedagogical contexts, learner profiles and learning scenarios, offering multiple forms of teaching and knowledge acquisition (Santoveña-Casal and Roldán Roldán, 2024).

In essence, flexible learning design facilitates a more accessible and inclusive education, allowing for a personalisation of the educational process that enhances the development of competences in dynamic and diverse environments.

Burge, Campbell and Gibson (2011) identify key characteristics of flexible education, including:

- Continuous accessibility: courses available 24 hours a day, seven days a week.
- Adaptability and reduced costs: the ability to deliver online courses with flexible time frames.
- Multi-format and customisation: use of multimedia resources adapted to different learning styles.
- Relevance and adaptive assessment: content aligned with the real world and assessment systems adjustable to learners' needs.

Santoveña-Casal (2023) stresses that 'pedagogical flexibility refers to the different options students have during learning: how they want to learn and what they want to learn'. Furthermore, following Willems (2011), she underlines four essential elements:

- Flexibility in multimedia formats and social media.
- Adaptation of environments to personal learning styles.
- Applicable and useful content for society and the future of students.
- Adaptation of the assessment system to individual needs.

This chapter analyses and compares the evaluations of five NOOCs (Nano Open Online Courses) focused on teacher training in digital competences, gamification, connected learning and hybrid methodologies. Through interviews and focus groups, data is collected to identify strengths and areas for improvement in each of the courses:

- NOOC 1: Connected methodologies.
- NOOC 2: Collaborative and research methodologies.
- NOOC 3: Active and gamified methodologies.
- NOOC 4: Hybrid methodologies.
- NOOC 5: Design of flexible digital learning programmes.

The analysis focuses on five key dimensions:

- Structure and organisation: assesses the clarity, sequence and design of the courses.
- Content: analyses the rigour, innovation and applicability of resources.

- Methodology: examines the relevance and effectiveness of the pedagogical strategies implemented.
- Technology: assesses the usability of the platform and its adaptation to different devices.
- Cohesion and affiliation: explores interactivity, collaboration and the sense of community among students.

A sixth dimension is also presented:

- Conclusion and overall satisfaction: reflects the learners' overall perception of the learning experience.

The chapter highlights the importance of microlearning as a fundamental tool for transforming the current educational landscape, underlining its ability to respond to the emerging needs of digital and flexible education.

Objectives

The general objective is to analyse the quality of courses taught in English, taking as a reference the different methodologies applied and to offer a comprehensive view of the impact of the different methodologies on learning.

In order to achieve this general objective, the following specific objectives are established:

- To assess the quality of courses that address collaborative, gamified, connected and hybrid methodologies, as well as those focused on the flexible design of educational programmes.
- To examine the students' assessment of course content, identifying perceptions and levels of satisfaction.
- To analyse the quality of the methodology, contents and communication process implemented during the training programme.
- To study the technological quality of the resources used and the platform used for the development of the courses.

Sample

The sample is made up of 23 students, university professors from Europe (Italy, Bulgaria, Romania and Haiti), 24 of whom are women. Of this group, 8 participated in focus groups (distributed among three discussion groups) and 17 carried out interviews.

According to the countries of origin, the universities are distributed as follows:

- Italy: 3
- Bulgaria: 18
- Romania: 1
- Haiti: 1

Regarding the distribution of the courses analysed:

- 36% evaluated the course on gamification (NOOC 3).
- 24% analysed the course on hybrid methodologies (NOOC 4).
- 16% focused on the course on collaborative methodologies (NOOC 2).
- 12% analysed the course on connected methodologies (NOOC 1).
- Another 12% evaluated the course on programme design (NOOC 5).

The data presented are obtained from the second and third intermediate interactions.

Results

Course Methodology and Organisation Dimension

The assessment of the quality of the courses in terms of the structure and organisation dimension reveals a generally positive perception on the part of the participants interviewed (I) and of the focus groups (FG).

In general terms, the majority of respondents highlighted that the courses were well organised and that the structure facilitated learning: 'organised very well' (I1), 'very well structured' (I2) and

'intuitive and clear' (I3, I10). Clarity and ease of navigation were consistently mentioned, reflecting careful planning and logical arrangement of content. One interviewee stressed that the course provides 'a more effective way to teach and to attend the class' (I4), while another indicated that the internal structure of each unit contained 'a well balanced' amount of text, resources and activities (FG2).

However, while most opinions reflected satisfaction, some focus group participants raised concerns about certain aspects of the organisation. In particular, it was mentioned that, although the overall structure was not clear, at certain times 'some things... were not very clear in the organisation' (FG1). It was also pointed out that some activities, in two of the courses analysed, required leaving the platform, which led to some confusion and difficulties in navigation: 'we must leave the platform for external platforms' (FG3).

The length of the course was also a recurring theme. While some people felt that the content was adequate, others felt that the length of the course could limit interaction due to its focus on rapid, individualised learning. This comment was highlighted in two of the courses analysed: 'the contents were quite a lot, although you could choose not to complete some of them' (FG1).

In terms of accessibility, flexibility and ease of access were rated positively. Respondents indicated that the course structure was 'clear and easy to understand' (I6, I7, I8, I11, I12, I13, I15). In addition, the provision of additional materials and links contributed to enriching the learning experience. One interviewee highlighted that 'every single part of it could be easily reached' and that the course presented a good combination of videos, interactive resources and assessments (I9).

Content Dimension

The evaluation of course content reflects, in general terms, a positive perception among the respondents (I) and the focus groups (FG).

The majority of respondents assessed the course content as balanced, innovative and consistent with the learning objectives. It was highlighted that the resources were 'visible, well balanced and coherent with the activities and learning objectives' (I2), and

that the course design and materials were 'very well designed' (I3). In addition, several participants underlined the quality and relevance of the materials, considering them suitable for university teachers: 'The materials are innovative and interactive and are visible and applicable to the universities' (I10).

The focus groups reinforced this positive assessment, highlighting the diversity and quality of the resources, as well as the scientific relevance of the content. The multilingual option and the availability of optional resources were positively valued, although some shortcomings in the translation of certain materials were pointed out: 'a presentation that is all in English... maybe for some people, it could make it difficult' (FG1). Despite this, the general perception was that the resources were 'adequate and in the sense of gamification' (FG2), which contributed to an engaging and interactive learning experience.

However, some criticism emerged regarding the simplicity of certain interactive resources, considered 'very basic and even in some cases very childish' (FG1). This criticism focused on two of the courses. In this regard, the need to improve the depth and sophistication of some of the materials was identified. It was stated that one of the courses had limitations in terms of depth of content due to its length: 'it was a small course.... the essentials are there' (FG3).

The videos, quizzes and supplementary materials were well received and considered 'all well connected' (FG3).

In terms of applicability, the interviewees expressed their intention to incorporate the presented models and strategies in their pedagogical practice: 'I will apply the presented models, strategies and approaches in my pedagogical practice' (I11). The relationship between the resources and the course objectives was rated as solid, with an adequate level of complexity for teachers: 'The complexity level of the NOOC is adequate' (I12, I13, I14, I15).

Methodology

The evaluation of the methodology of the course reflects generally positive opinions regarding the clarity of the instructions, the applicability of the concepts and the adequacy of the assessment system. However, areas for improvement related to interaction,

collaboration and the level of interactivity of the resources were identified in two of the courses analysed.

The interviewees (I) highlighted that the concepts and approaches presented are relevant and applicable to her pedagogical practice: 'The concepts, models and approaches presented in this NOOC are appropriate and applicable to her pedagogical practice' (I2). The clarity of the instructions was also positively assessed: 'The instructions are clear and appropriate to the content' (I10). However, some opinions indicated that the instructions could have been more detailed: 'it needed to be more detailed' (I1, I7, I12, I15).

The evaluation system was rated as clear, transparent and adequate for the expected level of difficulty: 'The evaluation system is adequate in terms of difficulty' (I3, I5, I10). In addition, progress monitoring was rated as 'well visually presented' (I6, I14). The importance of teacher support was highlighted, being considered 'important and well provided' (I2, I3, I5, I10).

However, the focus groups (FG) expressed some criticism, especially in relation to the lack of collaborative activities and the limited interactivity of the course in one of the courses. Some participants noted that 'the interactivity... was very weak' and that the course was expected to foster more collaboration: 'the objective of this course and the theme is collaboration, it was also expected that the activities would foster a little collaboration' (FG1).

Limitations were also identified in the forums and communication between participants, which reduced the possibility of meaningful exchange: 'You live this course more individually. Without this present and interactive communication' (FG2). The implementation of a more active moderator was suggested to stimulate participation and enhance the learning experience: 'the presence of a more active moderator to stimulate discussions and interactions' (FG2).

The lack of interaction with other participants and the scarce feedback in the peer review activities were pointed out as aspects to improve: 'the assessment... is well done, but I don't think it collects its full scope. Because of the issue of peer review' (FG2). This criticism focused on one of the courses that had used this assessment alternative offered by the platform with limited functionalities.

In conclusion, although the methodology of the courses was highly rated in terms of clarity, applicability and evaluation, there is a perception that interactivity and collaborative activities could be improved, especially in two courses that did not have social networks. The incorporation of tools that facilitate communication and teamwork could enrich the learning experience and better respond to students' expectations.

Technology Dimension

Most of the people interviewed stated that they had not encountered any technical difficulties during the development of the course. It was highlighted that resources and links 'were easily accessible' (I2, I9) and that there were no problems with the platform (I1, I5, I6, I8, I10, I11, I13). Some participants attributed this smooth experience to their previous skills in handling technology: 'my skills in using the computer and applications helped me' (I3, I10). Furthermore, it was underlined that the interactive materials and videos worked properly and did not require additional assistance: 'no technical problems had been faced and special assistance was not needed' (I10).

However, participants in the focus groups offered a more nuanced view. While some highlighted the visual clarity and ease of navigation, significant challenges related to the usability of the platform were also noted. The platform was described as 'not very intuitive' and it was mentioned that 'nothing is very integrated and makes it very difficult' (FG1). Difficulty in navigation was a recurring concern, especially on mobile devices, where problems were experienced with menus and content visibility: 'I felt a difficulty in navigation, especially with the side menu... if you access the side menu, the menu is blank' (FG2).

It was also noted that some activities required accessing external platforms, which added a layer of complexity to the training process: 'we are always leaving the platform, and we are somehow registering on other platforms' (FG3). Difficulties with registering on the platform were also mentioned: 'I feel some difficulty since the registration' (FG2).

Despite these limitations, some positive aspects were identified, such as the visual quality and structure of the content: 'the whole structure of the course, looks good to me, works well'

(FG2). However, the lack of integration of forums and other tools was perceived as a shortcoming affecting the overall experience: 'the platform was supposed to be the last thing we would be here talking about today, but it was a bit disappointing' (FG3).

Cohesion and affiliation

The interviews show a generally positive perception of the communication and collaboration opportunities available. Discussion forums, social networking channels and collaborative groups were valued as adequate tools to interact with other participants: 'The communication system and the opportunities to communicate and cooperate with other participants are considered sufficient' (I6, I7, I8, I11, I12, I13, I14, I15). In addition, it was noted that these spaces allowed connecting with people with similar professional interests, facilitating the exchange of experiences: 'he has used the provided collaboration platforms and channels to make contacts with other participants' (I4).

However, the participants in the focus groups expressed a more critical view, as was the case in the analysis of other dimensions. The groups highlight a lack of cohesion and sense of community in the course. There was an absence of collaborative work and a learning experience perceived as individualised and isolated: 'I don't know if it was just me, but we couldn't work on that connection, [I] didn't feel that connection or was there really no opportunity for that' (FG1). The lack of interactivity and joint activities generated frustration among some participants, who expected more collaboration and peer evaluation: 'I think it fell far short that we didn't have any kind of collaborative work' (FG1). Criticism focused mainly on one of the courses.

The format of the course was pointed out as a factor that favoured autonomous learning, but did not foster a sense of belonging: 'The course itself does not appeal to great interaction... more conducive to individualized learning' (FG2). The implementation of an integrated chat on the platform was suggested to improve communication: 'The chat integrated on the NOOC site was proposed as additional way for communication' (I8).

Some participants expressed confusion about the structure of the course and the group they belonged to, which affected their perception of affiliation: 'Some participants expressed uncertain-

ty about which group they belonged to' (FG3). A recommendation was made to strengthen the platform to make it more attractive and encourage more interaction, as well as to form working groups to generate a sense of community: 'if groups were formed and there was belonging' (FG3).

Discussion

The overall evaluation of the courses reflects high satisfaction among the interviewees (I), although the focus groups (FG) pointed out significant areas for improvement, especially in relation to interactivity, cohesion and usability of the platform.

The interviews reveal that participants found the courses innovative, well-structured and useful for their pedagogical practice. The applicability of the resources and strategies presented was highlighted: 'The NOOC presents different methods and approaches as well as innovative resources which could significantly improve her pedagogical practice' (I1). In addition, the majority expressed a positive readiness to participate in future courses of similar format: 'She expressed the readiness to participate in other nano open online courses like this one' (I3, I10, I11). The organisation, design and interactivity of the resources were key aspects: 'The interactive resources and educational games were pointed out as the most impressive elements of this NOOC' (I8).

However, several interviewees identified the need to improve participation in the forums and encourage more interaction: 'to motivate participants to more actively participate in the forum discussions' (I3, I10). Greater personalisation through additional tasks and knowledge summaries was also suggested: 'integration of more exercises for summarizing the knowledge and reflection after each nugget' (I13).

On the other hand, the focus groups expressed more divided opinions. Although they acknowledged the quality of the content and the thematic structure, they pointed out shortcomings in the usability of the platform and the lack of collaborative activities: 'the platform's lack of intuitiveness, limited interactivity, and the basic nature of some interactive resources' (FG1). Participants stressed the need for greater cohesion and sense of community, criticising that the course was perceived as an individual learning

experience: 'the course did not effectively cultivate a sense of belonging or a collaborative learning environment' (FG1).

The lack of interaction in forums and the scarce presence of active moderators were recurrent aspects: 'the presence of a more active moderator to stimulate discussions' (FG2). In addition, it was mentioned that the separation of forums and content affected the browsing experience: 'The separation of forums from the main pages was noted as confusing' (FG3).

Despite these criticisms, the course content was rated positively, with emphasis on the diversity of tools and resources: 'The course content received positive feedback for its diversity of external tools, curated articles, and suitability for educators' (FG2).

In the following, the potentials of the NOOCs are indicated, as well as the potentials of the courses and improvements to be implemented:

- Course Structure and Organisation
  - Potentialities:
    - NOOCs stand out for their clear and well-structured organisation. The participants appreciated the ease of navigation and the logical arrangement of the contents.
    - The microlearning approach is highly valued, allowing flexibility and autonomous access.
  - Challenges:
    - In some cases, participants noted a lack of clarity in the structure of the modules, leading to confusion during navigation.
    - The length of certain courses was perceived as excessive, limiting interaction.
- Content
  - Potentialities:
    - The content of the NOOCs is well received for its relevance, innovation and appropriateness to the needs of the faculty. Its balance and alignment with learning objectives was highlighted.
    - The diversity of digital tools and interactive resources adds value and dynamism to learning.
  - Challenges:
    - Some participants perceived certain resources as basic or childish, especially with regard to interactive elements.

    - The lack of translation in some materials made learning difficult for some participants.
- Methodology
  - Potentialities:
    - The concepts and approaches presented are considered applicable to educational practice and suitable for teachers. The clarity of the instructions is a strength.
    - The evaluation system is transparent and appropriate to the expected level of difficulty.
  - Challenges:
    - There is a perceived lack of collaborative activities and meaningful interaction, which affects the learning experience.
    - The peer assessment did not meet the expectations of fostering collaboration.
- 4. Technology and Platform
  - Potentialities:
    - Overall, no serious technical or technological problems were reported in most NOOCs. The platform is described as stable and functional.
    - The visual clarity and navigability of the platform were rated positively by some participants.
  - Challenges:
    - Usability issues and lack of intuitiveness in navigating the platform were identified, leading to frustration in certain cases.
    - Navigation on mobile devices presented challenges, especially with the side menu and access to certain sections.
- Cohesion and Membership
  - Potentialities:
    - Communication tools (forums, social media channels) enable interaction and collaboration in certain NOOCs.
    - Participation in discussions and forums facilitates connection between participants with similar interests.
  - Challenges:
    - Lack of cohesion and sense of community was a recurring complaint, with participants feeling isolated and with little interaction.
    - The absence of active moderators limited the creation of links between participants and participation in forums.

Conclusions

Firstly, it is concluded that the analysis of the five NOOCs reveals a positive assessment in general terms, especially from an individual perspective. The interviews highlight a high level of satisfaction with the structure, content and applicability of the courses, underlining the quality and innovation of the resources and the clarity of the organisation. Participants appreciate the flexibility of the format, the ease of navigation and the appropriateness of the activities to the learning objectives. However, the focus groups reflect a more critical experience, pointing out key areas for improvement. Although the course structure is perceived as clear and intuitive, concerns arise about the length of the course and the need to leave the platform to use external tools. This aspect negatively affects continuity and user experience, highlighting the importance of integrating all resources into a single, cohesive environment.

Secondly, it is concluded that the **content** of the NOOCs is highly valued for its quality, innovation and alignment with the learning objectives. However, opportunities for improvement are highlighted in aspects related to the translation of materials and the level of complexity of some interactive resources. The inclusion of interactive elements and gamification tools is welcome, but it is recommended to reinforce the depth of certain resources to maximise their impact on learning in two of the courses analysed.

Secondly, the evaluation of the NOOC **methodology** reveals a generally positive assessment of the applicability of the concepts, the clarity of the instructions and the adequacy of the assessment systems. However, criticisms emerge related to the lack of interactivity, the scarcity of collaborative activities and the need for greater involvement of instructors, especially in one of the courses. It is advisable to increase the opportunities for interaction between participants, implement peer evaluation activities and ensure a greater presence of moderators or instructors during the course.

On the other hand, the **technological** dimension of the NOOCs shows a duality in the participants' experience. While a large part did not encounter technical difficulties, those who faced problems pointed out important deficiencies in usability,

navigation and registration on the platform. Recommendations suggest improving the user interface, integrating forums and activities more seamlessly, as well as optimising adaptability for mobile devices.

Finally, the analysis of cohesion and affiliation shows a clear divide between those who found sufficient opportunities for interaction and those who experienced isolation. The lack of collaboration in certain areas and the perception of individualised learning suggest that more integration of collaborative tools and a more intuitive platform that encourages active participation and a sense of community is required. While the NOOCs are perceived as valuable and well-designed resources, feedback suggests that greater attention to interactivity, social cohesion and usability of the platform can further enhance the learner experience. Recommendations include integrating more active moderators, strengthening collaborative tools and ensuring that resources are accessible in multiple languages, thus ensuring an inclusive and enriching experience for all participants.

In a nutshell, its main potentials are:

- The overall level of satisfaction with the NOOCs is high. Participants value the usefulness of the contents and the applicability to their educational practice.
- There is a general willingness to participate in future courses of this format.

Challenges include:

- Greater interactivity: implementing tools and activities that encourage active collaboration.
- Platform usability: improving navigation and making the interface more intuitive.
- Cohesion and community: promote activities that generate a sense of belonging and reinforce participation through moderators.
- Translation and accessibility: ensure that materials are available in multiple languages to widen global access.

Ultimately, the design of courses based on microlearning and digital content should focus on providing flexibility, interactivity and meaningful learning experiences. Integrating collaborative tools, ensuring intuitive platforms and promoting a sense of community will enhance the quality of courses and maximise learning impact.

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9

Collaboration and research: the case of Italian teachers

Colaboración e investigación: el caso de los profesores italianos

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Abstract
Introduction: This study evaluates the effectiveness of a Nano Open Online Course (NOOC) on Collaborative Learning and Research Methodologies (CLRM) developed by the Italian Partner of the ENID-Teach Erasmus+ project. The course aims to enhance digital competences and foster student-centered learning in higher education. **Methodology**: The NOOC is designed for adult education, incorporating constructivist, cognitive, and sociocultural theories. It consists of four main parts covering collaborative learning, digital environments, and evaluation strategies. Data collection involved surveys and interviews. **Results**: Participants praised the course content, with 66.7% rating it as excellent. However, 50% expressed dissatisfaction with social cohesion aspects. Technological experiences were generally positive, with 83.3% evaluating them favorably. **Discussion**: The findings highlight the need for clearer definitions of interactivity and enhanced social interaction components. The study puts in evidence the resistance of Italian university teachers to take part in online courses concerning didactic innovation and digital tools and underscores the importance of policy adjustments to recognize pedagogical innovations in career evaluations, particularly in Italy.

Keywords: Collaborative Learning, Research Methodologies, Nano Open Online Course (NOOC), Digital Education, Distributed Cognition, Computer-Supported Collaborative Learning (CSCL), Inquiry-Based Learning (IBL), Innovation in Italian Higher Education, Digital Transition in Italy.

Resumen

Introducción: Este estudio evalúa la eficacia de un curso en línea abierto y masivo (NOOC, por sus siglas en inglés) sobre metodologías de investigación y aprendizaje colaborativo (CLRM, por sus siglas en inglés) desarrollado por el socio italiano del proyecto ENID-Teach Erasmus+. El curso tiene como objetivo mejorar las competencias digitales y fomentar el aprendizaje centrado en el estudiante en la educación superior. **Metodología**: El NOOC está diseñado para la educación de adultos e incorpora teorías constructivistas, cognitivas y socioculturales. Consta de cuatro partes principales que abarcan el aprendizaje colaborativo, los entornos digitales y las estrategias de evaluación. La recopilación de datos incluyó encuestas y entrevistas. **Resultados**: Los participantes elogiaron el contenido del curso, y el 66,7 % lo calificó como excelente. Sin embargo, el 50 % expresó su insatisfacción con los aspectos de cohesión social. Las experiencias tecnológicas fueron en general positivas, con un 83,3 % de evaluaciones favorables. **Discusión**: Los resultados ponen de manifiesto la necesidad de definir con mayor claridad la interactividad y de mejorar los componentes de interacción social. El estudio pone de manifiesto la resistencia de los profesores universitarios italianos a participar en cursos en línea sobre innovación didáctica y herramientas digitales, y subraya la importancia de ajustar las políticas para reconocer las innovaciones pedagógicas en las evaluaciones de carrera, especialmente en Italia.

Palabras clave: Aprendizaje colaborativo, metodologías de investigación, curso en línea abierto nano (NOOC), educación digital, cognición distribuida, aprendizaje colaborativo asistido por ordenador (CSCL), aprendizaje basado en la investigación (IBL), innovación en la educación superior italiana, transición digital en Italia.

Introduction[1]

Within the European Network in D-flexible Teaching (ENID-Teach) Erasmus+ project, the University Catania (UNICT) was in charge of the development of the Nano Open Online Course (NOOC) about Collaborative Learning and Research Methodologies (CLRM). The NOOC specifically targets adult education, particularly within the university context.

1. Each author has undersigned with her initials the part of the article she wrote.

Different European and international documents recommend that states and organizations involved in higher education implement effective measures to support universities and higher educational institutions in adapting their teaching and learning competencies, promoting student-centered teaching practices, encouraging research in the field of education, and fostering new digital approaches to teaching professionalism. This issue is gradually emerging in the Italian landscape, where, despite the limited recognition of the teaching practice compared to that of the research, some experiences are beginning to take shape, laying the groundwork for identifying an Italian specific approach to university teaching improvement (Felisatti et. al, 2022). The COVID-19 health crisis evidenced the need for innovation not only at the theoretical level but also in practical terms. The Italian Ministry of University and Research (MUR) promoted the establishment of Teaching and Learning Centres (TLC) and Digital Education Hubs (DEH) at Italian university (https://www.mur.gov.it/it/pnrr/misure-e-componenti/m4c1/investimento-34-didattica-e-competenze-universitarie), and during the last three years the discussion about didactic tools and pedagogical innovation has gained momentum as shown during the CRUI Conference (conference of all Heads of Italian Universities) in 2024 (https://ict.crui.it/forum-pa-2024/digital-education-hub-linnovazione-digitale-per-il-sistema-universitario-italiano/)

Despite these actions, in Italy, career advancement and regular merit evaluations (e.g., VQR) for university teachers have traditionally focused solely on research achievements and not on specific pedagogical training or merits. Until the last round of National Qualification (ASN), any qualification or research conducted in pedagogy within each field of research was not recognized as scientifically valid. As a consequence, in the last decades, didactics has been considered a sort of "Cinderella science" and innovation in this field has lost interest. Moreover, the perception that online universities in Italy represent unfair competition to state universities has not helped in raising a positive interest towards the use of digital tools. In addition to this and in contrast to the fact that digital teaching methods and tools were abruptly introduced during the COVID-19 pandemics, the majority of university teachers (at least in the humanities field) declare lack of computer literacy.

Given the specific choice of maintaining mainly non-distance learning environments in Italy (the 84 Italian public Universities have decided to allow only 10-20% of the course lessons online), the UNICT research team decided to structure its course on Collaborative Learning and Research Methodology through a series of sequential objectives supported by scientific evidence and statistical data, in order to make the research quality evident.

Theoretical framework

During the last decades, CLRM has been recognized as a twenty-first-century educational trend (OECD, 2019) in the educational sciences, both as a teaching approach and as a transversal skill set—general, essential competencies that students are expected to develop across various stages of their education, spanning the curriculum in a longitudinal manner (Binkley et al., 2012). Rooted on the main tenets of constructivists (Vygotsky, 1978; Smith & MacGregor, 1992), cognitive (Stahl, 2013), and sociocultural theories (Vygotsky & Kozulin, 1989), the NOOC about CLRM is built upon four key principles: learning is active, immersive, multimodal, and fundamentally social. These key principles emphasize the value of hands-on participation and shared experiences in constructing knowledge.

Each objective of the NOOC in CLRM is encapsulated in a unit designed around the microlearning principles of the Nano Open Online Courses (NOOCs). This approach organizes content into concise modules, supplemented with extensive materials for further exploration, facilitating agile, efficient, and inclusive learning while allowing participants to choose how much time they dedicate to deeper study (Benavídez et al., 2019). The interconnection among content Nuggets promotes dynamic acquisition of digital skills, intertwining theory and practice through self-assessment activities, discussions, and a final evaluation presented in various interactive formats (Basantes-Andrade et. al., 2020). Recognizing the challenges faced in engaging a broad audience of participants, the Italian team has committed significant resources to dissemination efforts, especially since

the NOOCs will remain available for potential participants even after the project's conclusion.

In order to embrace the challenge of this important and necessary transition to student-centered learning environments, the Catania unit has developed the course introducing the main scientific issues supporting the change as necessary with respect to the cognitive functioning of learners in general. A key concept of the NOOC is therefore Distributed Cognition theory (Hutchins, 2020), which posits that cognition extends across social interactions, physical tools, and digital environments. By integrating these elements, distributed cognition offers opportunities for richer learning experiences (Karasavvidis, 2002). Moreover the NOOC in CLRM promotes the creation of multimodal learning environments that incorporate digital tools to support collaboration, analysis and learning styles.

For this reason, an attempt was made to bring out the links between collaborative learning methodology, the use of digital tools within teaching and cognitive science studies. In the course design, an effort was undertaken to create content that would prompt learners

- To develop the critical and reflective capacity about the need of transforming digital educational practices into accessible online learning environments for the participation and learning of all people.
- To discover the Collaborative Learning and Research Methodologies with their main roles, rules and limits.
- To explore the most useful digital environments and tools to favor the creation of learning environments according to the criteria of Universal Accessibility and Universal Design for Learning.
- To advance in the development of university courses based on collaborative and research activities, which conform to the principles of "Distributed cognition" and "Computer Supported Collaborative learning".
- To deepen the process of collaborative design of digital learning programs introducing diverse forms of evaluation (peer to peer, summative, etc.).

The CLRM Nano-course is rooted in the concept of *learning by doing*, in the sense that all units are created as practical examples of what university teachers can reproduce for their own disciplines. As already said, the main core of the course was the Collaborative Learning (CL) methodology, which is a valuable strategy for higher education, moving away from conventional teacher-focused methods to prioritize joint intellectual engagement among participants. CL promotes group collaboration by embracing the unique skills and viewpoints of individual learners. This approach fosters a more inclusive, democratic and dynamic learning environment, enabling participants to exchange ideas via forum, engage critically, and take ownership of their own learning process (Laal et al., 2012).

The course was set up with the intention of responding to the educational needs of the future, which require teachers of all levels to have good skills in the use of digital tools, for the creation of learning environments that respond to the capabilities and needs of the new generations. Moreover, the European Digital Education Action Plan emphasises the transformative impact of digital technologies on society, asking education to shift to personalized, adaptable, student-centered, collaborative, and innovative learning (European Commission, 2021). Research indicates that technology is primarily used to support existing educational approaches (García del Dujo and Martín-Lucas, 2020; Lillejord et al., 2018). Therefore, the creation of blended learning courses which integrate digital tools with active in-person learning appear to be a possible solution to achieve the goals of digital education outlined in the EC plan. (Røe et al., 2022). For this reason, a specific part of the course was dedicated to the exploration of digital tools considered useful within academic courses.

In this context, the NOOC highlights Computer-Supported Collaborative Learning (CSCL) (Dillenbourg & Fischer, 2007) as a critical component, leveraging digital tools and platforms to facilitate both synchronous and asynchronous collaboration. Examples include discussion forums, interactive videos, and shared workspaces. By incorporating multimodal resources—such as text, images, videos, and animations—CSCL accommodates diverse learning styles (auditory, kinesthetic, and visual) and addresses modern educational demands for accessibility, interactivity, and personalization. This flexibility allows learners to

choose preferred engagement modes, deepening understanding and sustaining interest.

The NOOC also introduces Research and Inquiry-Based Learning (IBL) as complementary methods to design specific tasks and activities within CL and CSCL environments. These student-centered methods promote active student engagement through the process of questioning and connecting real-life experiences. These methodologies prove to have a great impact on students' cognitive development, by improving their involvement in autonomous learning processes. They nurture critical thinking, problem-solving, and self-directed learning—skills that align with the evolving demands of the workforce and lifelong learning (Spronken-Smith & Walker, 2010; Spronken-Smith, 2012; Pedaste et al., 2015). The cognitive 5E Model (Engage, Explore, Explain, Elaborate, Evaluate) (Bybee et al., 2006) is presented as a framework associated with IBL (Pedaste et al., 2015) and employed to scaffold learning and encourage reflective practice.

By integrating collaborative and inquiry-based learning strategies, the NOOC seeks to cultivate a culture of innovation and lifelong learning. It underscores the transformative role of technology in enhancing education while prioritizing democratization, inclusivity and sustainability through digital learning tools and collaborative pedagogical environments.

Objectives

The ENID-Teach project started in the first quarter of 2022 and ended in the first quarter of 2025. The Catania team, in designing the NOOC dedicated to Collaborative Learning and Research Methodology, tailored the proposed content for online learning to foster the development of digital competences, one of the eight key competences for lifelong learning (UNESCO, 2006; European Commission, 2019). The initiative was further aligned with the priorities of the European Agenda 2021–2027 (European Commission, 2023). The digital model was enriched with open and interactive educational resources (OERs), developed in accordance with the universal value of "leaving no one behind," as emphasized in the United Nations' 2030 Agenda for Sustainable Development Goals. This has been achieved by dividing the

NOOC into a series of four main and independent NUGGETS, i.e very brief units provided with activities and materials, focused on specific topics:

- Collaborative Learning
- Pillars of Collaborative Learning
- Digital Environments
- Evaluation and Research

The first NUGGET presents the theoretical assumptions, basic conditions and the basic roles and rules of Collaborative Learning and Inquiry Based Learning Methodologies. It also presents the necessary changes in perspective attaining to the role of the teacher, who is no more regarded as an expert sharing knowledge with students, but as an expert designer of intellectual experiences for students. General aim of the Nugget is to guide towards the design of more emergent and autonomous learning environments (Smith, B. L. & MacGregor, J. T., 1992).

The second NUGGET introduces some basic issues of recent cognitive studies claiming that the learning subject has to be considered as a brain-body unit and cognition as dependent on what our bodies are capable of perceiving and doing when interacting with the world, shaping knowledge about it through the possibilities of action (Ferreira, 2021).

The CL methodology proposed in this NOOC bases on the 4E Cognition theory claiming:

- Cognition is always embedded, embodied, enacted and extended.
- The learning process greatly depends on positive social interactions, and on the construction of multimodal, accessible, digital environments.

By leveraging the interplay of these elements, keeping in mind distributed cognition theory while developing lessons and courses, the opportunities for richer learning experiences has been proven to increase (Karasavvidis, 2002). Keeping these basic issues in mind and to promote the construction of interactive, flexible, multimodal and accessible learning environments, the

NOOC suggests applying Computer-Supported Collaborative Learning (CSCL) methodologies.

The third NUGGET introduces the use of specific digital tools to create effective digital learning environments. Here the creation of digital environments and online courses is also discussed in terms of their limitations, with attendant guidelines and quality checklists. It includes two specific sections:

- One dedicated to Netiquette—essential etiquette for respectful and constructive communication within digital spaces—addresses the expectations of both instructors and students.
- One section dedicated to the different learning styles (see. VARK Test: https://vark-learn.com/), and to the creation of accessible and flexible digital learning environments.

The fourth NUGGET introduces different assessment possibilities, proposing a combination of digital formative and summative evaluations tests. Indeed, we suggest that the design of courses modelled on CL and Research Methodologies should consider the quality and contents of the assessments keeping in mind that:

- Formative assessments, such as peer reviews and reflective exercises, help participants refine their skills in real-time.
- Summative assessments provide a comprehensive evaluation of their learning outcomes.

These assessments are aligned with collaborative goals, ensuring that individual contributions and group dynamics are both considered.

This NUGGET also aims to emphasize the importance of adapting learning courses to real-world contexts, so for instance, participants are encouraged to explore how collaborative and inquiry-based methods can address interdisciplinary challenges in STEM and non-STEM fields. By applying these strategies to practical scenarios, such as solving real-life problems or designing innovative research projects, educators develop transferable skills that can be used to enhance students' soft skills and prepare them for their future life at work.

All the contents, videos, materials, in-depth sheets, digital resources, and interactive tools are provided in five languages: English, Italian, Spanish, French, and Portuguese, with the aim of facilitating the training by limiting any language barrier. All the materials for the NOOC have been developed also considering all the tools to enhance inclusivity and the construction of a European teacher's network, **ReCOinTad**, in order to support the transmission of ideas and good practices. (RG).

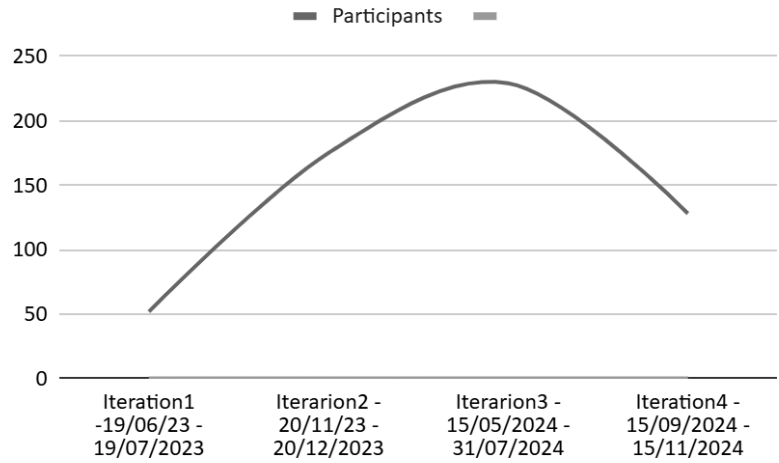
Sample

Four online, open (free of charge iterations) of the NOOC on CLRM were conducted between 2023 and 2024. The first iteration (June-July 2023) put in evidence the need for a massive dissemination effort to implement the number of participants. The dissemination was conducted in a joint effort through the organization of online events (Multiplier Events) and sponsorship of activities via personal channels (e-mail addresses) and online platforms (social media). In order to actively contribute to the dissemination in Italy, the Catania team activated a dissemination campaign, participating in various national and international meetings (Didacta Italia Fair 2024, Florence, 2024; Conference "Modelli organizzativi e ruolo dei Teaching and Learning Centre nelle Università", Palermo, April 2024; Conference "New Trends in English Studies: Evolving Paradigms", Enna, April 2024; 12th Mediterranean Interdisciplinary Forum on Social Sciences and Humanities - MIFS, Catania, May 2024; International Conference Cognitive Futures in the Humanities, Catania, June 2024). A total of 1,814 email addresses of Italian and European professors were collected and used to invite participants to the following iteration spans. In agreement with other partners, the Catania team also launched dissemination campaigns on social networks (Facebook, LinkedIn, X) and platforms dedicated to university professors (EPALE).

Table 9.1. Number of enrolled participants for each iteration

Period	Participants	
Iteration1 -19/06/23 - 19/07/2023	52	21%
Iterarion2 - 20/11/23 - 20/12/2023	175	19%
Iterarion3 - 15/05/2024 - 31/07/2024	229	20%
Iteration4 - 15/09/2024 - 15/11/2024	128	18%

This dissemination policy soon yielded results, as shown in the following diagram and, starting from the second iteration, the number of participants increased and decreased sligtly during the last iteration (see Graphic 9.1).



Graphic 9.1. Diagram showing the trend of participants' enrollment during the four iterations

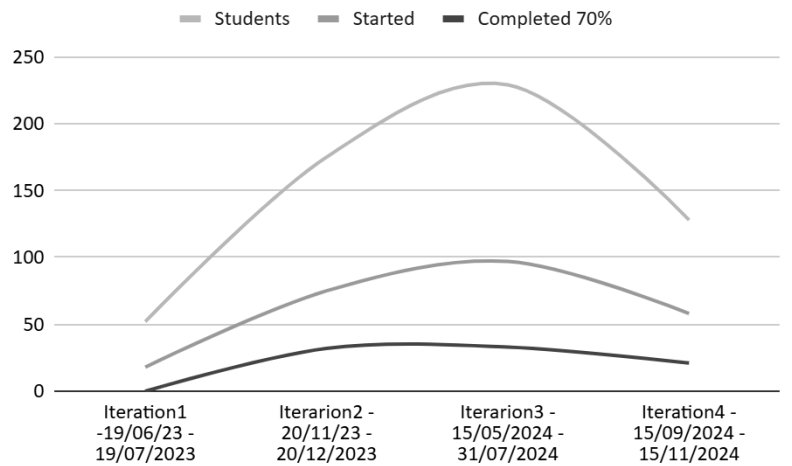
Across the four iterations of the course, a total of 584 participants enrolled. Unfortunately, a significant proportion of these participants did not fully complete the demographic survey, which limited the availability of detailed demographic data. Among those who did provide demographic information, a notable trend emerged: the majority of participants identified as female (see Table 9.2). This observation highlights the importance

of encouraging participants to complete demographic surveys to ensure more comprehensive data analysis in future studies.

Table 9.2. Gender distribution among enrolled participants.

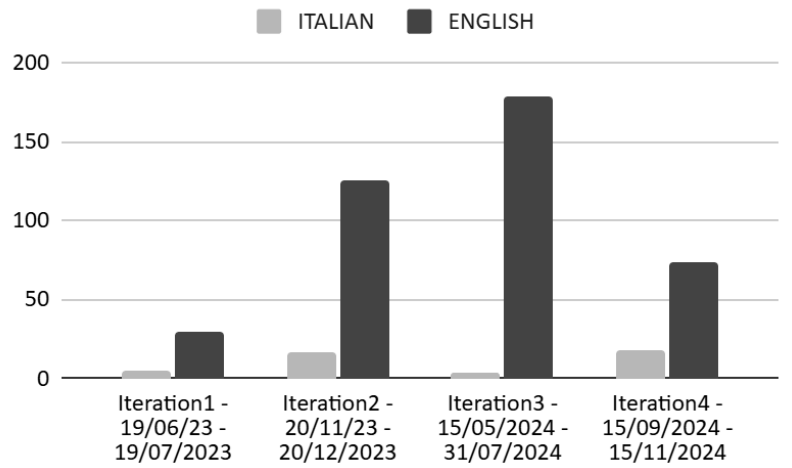
Period	MEN		WOMEN		ND	
Iteration1 -19/06/23 - 19/07/23	11	21%	14	27%	27	52%
Iteration2 - 20/11/23 - 20/12/23	13	7%	35	20%	127	73%
Iteration3 - 15/05/24 - 31/07/24	18	8%	37	16%	176	76%
Iterarion4 - 15/09/24 - 15/11/24	24	18%	34	25%	76	57%

A consistent part of the enrolled participants did not complete the course. This was interpreted as negative feedback and the Catania team decided to shift some contents of the instruction to the in-deep sections, in order to shorten the reading time of instructions and encourage participation. The changes gave good results, as the increase in the number of participants who completed the course in later iterations attest (see Graphic 9.2).



Graphic 9.2. Diagram showing the trend of participants who enrolled and completed the course.

The main part of the 584 students attending the course chose to follow it in the English version, while those who chose to follow the Italian version kept under the threshold of 20% as shown in the Diagram below (see Graphic 9.3).



Graphic 9.3. Diagram showing the proportion of participants who enrolled in NOOC CLRM using the English version vs. those using the Italian version.

Considering that all enrolled participants are not native english speakers, the fact that they were able to engage with the course in English is a positive outcome, as it suggests that an increasing number of university teachers feel confident in their English language skills. This achievement should be tempered by the realization that the multilingual offering required a significant investment of the team's time, without yielding a substantial benefit for the users.

Despite all disseminating efforts, among all 584 enrolled participants to the NOOC about CLRM, the Italian participants were fewer (less than 20 per iteration) and only between 5-10% completed 70% of the course (see Table 9.3). The number of Italian teachers who enrolled was disappointing and also the feedback collection phase from Italian participants produced few results.

Table 9.3. Total participants and percentage of Italian ones who completed 70% of the course.

Period	Participants		Italian		IT Completed 70%	
Iteration1 - 19/06/23-19/07/23	52	21%	5	10%	0	0%
Iterarion2 - 20/11/23 - 20/12/23	175	19%	17	33%	18	10%
Iterarion3 - 15/05/24 - 31/07/24	229	20%	4	8%	3	2%
Iteration4 - 15/09/24 - 15/11/24	128	18%	18	35%	9	5%

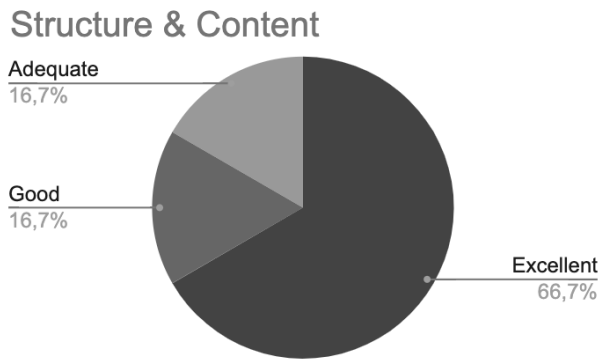
Despite numerous requests sent via e-mail to each participant and the prominent inclusion of a Satisfaction Questionnaire in all NOOCs across all iterations, as well as a dedicated feedback section in the final Nugget of the last iteration, a small number (only 18 participants) of Italian participants were willing to fill in the questionnaire or participate to the research phase and data collection through recorded interviews or focus groups. In consensus with the international staff, the Italian Team decided to implement an alternative strategy to collect feedback by preparing an online form in multiple languages. All the enrolled participants were invited via e-mail to fill in the form. This approach made it possible to collect some more data (6 forms in total).

Results

All the data of the recorded interviews, focus groups, and forms, which were collected by the italian team will be analyzed together. All results reported below refer exclusively to the Italian teachers who participated in the course CLRM and joined the final research phase. The questions in all feedback forms concerned 5 core issues: Structure, Content, Methodology, Technology, Cohesion and Affiliation and gave mainly positive results.

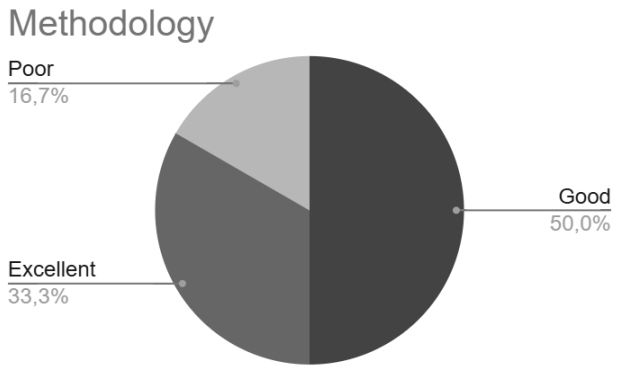
Regarding the structure and content of the NOOC on CLRM, specifically the distribution of topics in the NUGGETS and the in-depth learning materials (as shown in Graphic 9.4), participants demonstrated high satisfaction, with 66.7% rating it as excellent, 16.7% as good, and 16.7% as adequate. In interviews, participants generally praised the course length and timing, finding it manageable despite their busy schedules, particularly

for professors juggling teaching and research responsibilities. Notably, no negative evaluations were reported.



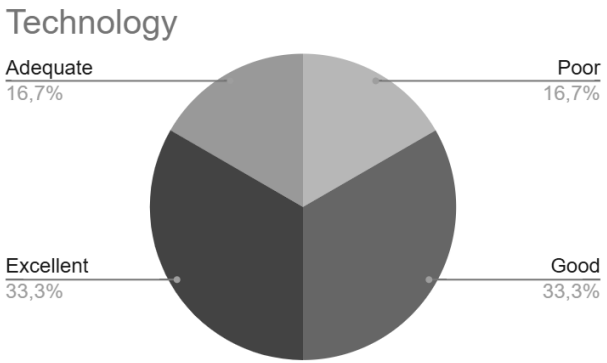
Graphic 9.4. Diagram concerning the evaluation of Structure and Content.

The methodology employed by the NOOC, encompassing communication and interaction processes, the assessment system, teaching staff performance, and the overall learning experience (as detailed in Graphic 9.5), received evaluations of excellent from 33.3% of participants, good from 50%, and poor from 16.7%. In interviews, participants generally praised the methodologies as innovative and engaging. However, one participant raised concerns about adapting these methodologies to courses more closely aligned with construction engineering.



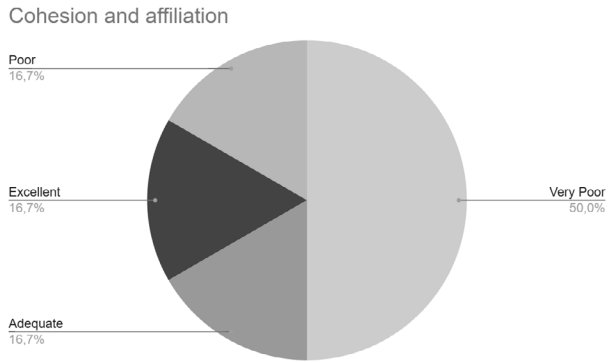
Graphic 9.5. Diagram showing the evaluation percentage concerning the process of communication and interaction among participants, the assessment system, the teaching staff performance, and the general learning experience.

Participants' experiences with technology, specifically their interactions with the Eco Platform hosting the NOOC and the course resources (as outlined in Graphic 9.6), were positively evaluated by 83.3%, while 16.7% considered it poor. In interviews, participants found the content highly engaging, clearly presented, and valuable for enhancing their knowledge in the subject area. However, some participants reported difficulties with the platform's interface, noting that navigation and readability were less intuitive compared to platforms like Moodle. Additionally, technical errors on the platform negatively impacted the experience for some users.



Graphic 9.6. Diagram showing the results of the questions about the experience with the technology of the course.

Fifty percent of the participants provided negative evaluations regarding cohesion and affiliation, specifically in terms of feeling part of a group during the course, collaborating with peers, engaging in discussions on the forum, and networking for future collaborations (as detailed in Graphic 9.7).



Graphic 9.7. Evaluation in percentage about Cohesion and Affiliation.

The negative feedback regarding cohesion and affiliation is largely attributed to participants' limited engagement with forum activities and a misunderstanding of the concept of "interactivity" in the resources. Many participants expressed a desire for more collaborative activities and interactions among peers and between tutors and participants in a NOOC focused on CLRM. Although the Open Educational Resources (OERs) require active user participation to be considered interactive, this nuance was not fully appreciated. Consequently, there is a need for future clarification on the definition of "interactivity" to align expectations with the actual interactive nature of the resources.

Conclusions

What has been shown so far leads us to two main conclusions. From an international perspective, the NOOC developed by the Catania team achieved good results as the number of participants who completed the training is within the statistical percentages for courses delivered online on a large scale. The NOOC is in fact a reduced form of the MOOC (Massive Online Open Courses), and statistics from literature on these kinds of courses reported that no more than 40–50% of students who enroll in MOOCs actually start the course, and of those, only 5–15% complete it (Jordan, 2015). Therefore, the number of participants

who completed the course is perfectly in line with the KPI rate of Nano/Massive Online Open Courses.

Our findings indicate a contrasting perspective regarding the participation of Italian teachers in digital courses and their readiness for a digital transition. Despite efforts by the Catania team, the results show significant resistance to the changes in teaching delivery demanded by both the European Community and the Italian Ministry of Research and Education. This resistance may be attributed to the Ministry's assessment criteria for career advancement in universities, which do not recognize self-training and didactic research as valid scientific contributions for qualification purposes. This paradox creates a situation where Italian lecturers are caught between bureaucratic and scientific demands that do not value their efforts to improve teaching quality. This dynamic highlight a need for policy adjustments to align recognition of teaching innovations with broader educational goals. (FA)

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10

Gamified and ActiveLearning: Portuguese university teachers experience

Gamified and ActiveLearning: experiencia de profesores universitarios portugueses

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Abstract

The *NOOC 3 - Active and Gamified Learning*[2], developed by the Universidade Aberta (Portugal) as part of the ENID-Teach project, aims to enhance faculty skills in active learning and gamification. This study evaluates participants' satisfaction with the course's structure, content, methodology, technology, and overall learning experience. The chapter describe the preliminary results from the feedback from 21 Portuguese-speaking NOOC 3 participants,

1. The research team is from the R&D unit, the Laboratory of Distance Education and eLearning, Universidade Aberta, Portugal, funded by National Funds through the FCT, within the scope of the projects UIDB/04372/2020 and UIDP/04372/2020 - https://lead.uab.pt/en/lead

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primarily higher education professionals, who completed structured or written interviews. Data were analyzed using descriptive statistics to identify trends in satisfaction and, areas for improvement in the future. Participants rated the course highly, with 90% rating the structure and content as "Excellent". Didactic resources, coherence, and teacher performance received similarly high marks. However, some challenges were noted, including platform usability issues, limited interaction, and course length limitations. Most respondents expressed a strong sense of belonging and willingness to participate in future NOOCs from the ENID-teach program. Results indicate that NOOC 3 effectively supports professional development through well-structured, engaging, and relevant content and microlearning design. However, improving platform functionality, interaction opportunities, and course length could enhance the learning experience. These findings contribute to the refinement of future NOOC offerings and the advancement of digital faculty development methodologies.

Keywords: gamification, active learning, quality satisfaction, learning desig, Nano Open Online Course, flexible learning methodologies, microlearning.

Resumen

El NOOC 3 - Aprendizaje Activo y Gamificado, desarrollado por la Universidade Aberta (Portugal) como parte del proyecto ENID-Teach, tiene como objetivo mejorar las habilidades del profesorado en aprendizaje activo y gamificación. Este estudio evalúa la satisfacción de los participantes con la estructura, el contenido, la metodología, la tecnología y la experiencia general de aprendizaje del curso.

En este capítulo se describen los resultados preliminares de las entrevistas de 21 participantes de habla portuguesa de NOOC 3, principalmente profesionales de la educación superior, que completaron entrevistas estructuradas o escritas. Los datos se analizaron mediante estadísticas descriptivas para identificar tendencias en la satisfacción y áreas de mejora.

Los participantes valoraron muy positivamente el curso, con un 90% que calificó de «Excelente» la estructura y el contenido. Los recursos didácticos, la coherencia y la actuación de los profesores recibieron puntuaciones igualmente altas. Sin embargo, se señalaron algunos problemas, como la facilidad de uso de la plataforma, la escasa interacción y la duración limitada del curso. La mayoría de los encuestados expresaron un fuerte sentimiento de pertenencia y su deseo de participar en futuros NOOC del programa ENID-teach.

Los resultados indican que el NOOC 3 apoya eficazmente el desarrollo profesional a través de un contenido bien estructurado, atractivo y relevante

y un diseño de microaprendizaje. Sin embargo, la mejora de la funcionalidad de la plataforma, las oportunidades de interacción y la duración del curso podrían mejorar la experiencia de aprendizaje. Estos resultados contribuyen al perfeccionamiento de futuras ofertas de NOOC y al avance de las metodologías digitales de desarrollo del profesorado.

Palabras clave: gamificación, aprendizaje activo, satisfacción de la calidad, diseño del aprendizaje, Nano Open Online Course, metodologías de aprendizaje flexibles, microlearning.

Introduction

The European Network in D-flexible Teaching (ENID-Teach) programme, implemented by a consortium of seven European institutions, represents a significant response to the transformation of higher education in the post-pandemic era. This Erasmus+ funded initiative emerged from the urgent need to address two fundamental challenges revealed by the COVID-19 crisis: the fragmentation of academic networks and the inadequate adaptation of traditional teaching methods to digital environments.

The project's foundational element is a comprehensive Training Programme on Digital Competences in Flexible and Innovative Methodologies, which introduces a pioneering approach to faculty development. The ENID-Teach project implements an innovative training approach through five multilingual and accessible NOOCs (Nano Open, Massive, and Online Courses) focusing on flexible methodologies (D-Flexible Teaching, 2022). These courses emerge as a strategic response to the necessity for specialized faculty training in digital pedagogy, integrating theoretical frameworks with practical applications in a microlearning format.

Each NOOC is designed as a 25-hour learning experience, with successful completion earning participants an ECO Digital Learning certificate and 1 ECTS credit from UNED (Universidad Nacional de Educacion a Distancia), subject to university requirements. The pedagogical framework integrates three innovative elements (Gómez et al., 2022):

- A distributed pedagogical model emphasizing critical and social teaching practices
- A mixed and flexible delivery approach
- A microlearning structure delivered through NOOCs

The courses employ a microlearning strategy based on "learning nuggets" - small, interconnected content units that combine theoretical knowledge with practical applications, self-assessment activities, discussions, and evaluations across multiple formats. This approach enables faculty to integrate learning into their daily teaching practice while maintaining time and space flexibility.

The ENID-Teach programme structure encompasses five key courses: 1. Connected and critical teaching; 2. Collaborative and research-based approaches; 3. Active and gamified learning; 4. Inverted or Flipped methodologies and 5. Design of flexible learning digital programs. This chapter focuses on NOOC3-Active and Gamified Learning. NOOC3 was developed by the Portuguese Open University (Universidade Aberta) and ran three editions from June 2023 to November 2024.

After presenting the theoretical framework of NOOC 3, the chapter analyzes the global satisfaction with NOOC3 by the students who registered in the Portuguese language option and consented to participate in a face-to-face or written interview.

Theoretical framework

Microlearning design approach

Microlearning represents a transformative pedagogical paradigm that has emerged as a response to evolving learning needs in the digital age. At its core, microlearning embodies the principle of cognitive chunking, delivering educational content through concise, targeted units that align with learners' cognitive processing capabilities and attention spans. This instructional approach transcends traditional temporal constraints by presenting knowledge in small segments ranging from 5 to 20 minutes. However, the length ultimately depends on the learning objectives and content complexity (Major & Calandrino, 2018).

The theoretical foundation of microlearning draws from cognitive load theory and information processing models, recognizing that human working memory has limited capacity and functions optimally when processing smaller chunks of information. By segmenting content into focused units, microlearning reduces cognitive overload while maximizing retention and knowledge transfer. This approach particularly resonates with contemporary learners who navigate an information-rich environment characterized by frequent task-switching and multiple demands on attention. (Tufan, 2021)

Microlearning design constitutes a systematic framework for developing these focused learning experiences. It encompasses structural and pedagogical considerations, integrating multimedia elements, interactive components, and assessment mechanisms within a coherent learning pathway. The design process begins with careful content analysis and segmentation, followed by learning activities that promote active engagement and knowledge construction. Microlearning design prioritizes precision and relevance, ensuring each learning unit serves a specific, measurable objective (Tipton, 2020; Hamilton et al., 2021)

A distinguishing characteristic of microlearning design is its emphasis on context-awareness and adaptivity. Learning units are crafted to be self-contained yet interconnected, allowing learners to access content in flexible sequences based on their needs and prior knowledge. This adaptability extends to the delivery medium, with microlearning resources optimized for various devices and platforms, reflecting the increasingly mobile nature of contemporary learning environments.

Furthermore, microlearning design incorporates gamification elements and social learning, recognizing that engagement and motivation play crucial roles in learning effectiveness. Interactive elements, peer collaboration opportunities, and achievement recognition mechanisms are strategically integrated to maintain learner interest and promote active participation. This multifaceted approach ensures that learning experiences remain engaging while meeting specific educational objectives.

The effectiveness of microlearning design relies heavily on balancing content, technology, and pedagogical strategies. Successful implementation requires attention to various elements, including content sequencing, multimedia integration, assess-

ment design, and learner engagement mechanisms. This holistic approach ensures that microlearning experiences contribute meaningfully to knowledge construction and skill development while accommodating the constraints and preferences of modern learners.

NOOC3 - Active and gamified learning

NOOC3 - Active and Gamified Learning is an innovative educational initiative that fosters active participation and engagement in learning through active methodologies and gamification. NOOC3 introduces participants to active learning principles, contrasts it with traditional transmissive teaching, and explores gamified learning to enhance interaction and collaboration in higher education contexts.

At its core, NOOC3 emphasizes active learning, a pedagogical approach characterized by student-centered activities promoting engagement and deep knowledge processing. This contrasts with transmissive teaching models, which focus on unidirectional knowledge delivery. A key component of active learning is interaction and interactivity between students, instructors, and content and benefits from the team's in-depth knowledge of the UAb pedagogical model which applies these principles (Pereira et al, 2008). Building on this foundation, NOOC3 integrates gamification to create dynamic and engaging learning experiences, where elements such as challenges, goals, rewards, and collaboration contribute to increased motivation and learning outcomes.

Transactional distance and control

The theoretical framework of NOOC3 is informed by Moore's (1993) concept of transactional distance, which emerges in distance education due to the absence of physical co-presence between learners and educators. Transactional distance is defined by two variables: structure (course design) and dialogue (interaction). The balance of these variables significantly influences the learner's perception of support and autonomy. For example, when structure and dialogue are lacking, students may experience higher transactional distance and lower satisfaction.

Building on Moore's work, Dron (2007) introduced the concept of transactional control, emphasizing the need for negotiation between teacher and student in determining the locus of control in the learning process. This negotiation influences interaction, autonomy, and communication dynamics, critical aspects in gamified and active learning scenarios.

Gamification as a catalyst for engagement

Gamification, the application of game-like elements in non-game contexts, is a powerful mechanism for active learning. Research demonstrates that gamification can enhance learner motivation, foster collaboration, and improve knowledge retention (Hamari & Koivisto, 2015). In NOOC3, gamification principles encourage teamwork, creativity, and personalized learning through interactive and rewarding experiences. By simulating real-world scenarios and providing instant feedback, gamification aligns learning outcomes with practical, real-world applications.

Pedagogical principles of NOOC3

NOOC3 design adheres to microlearning principles, offering participants modular, bite-sized learning content. Its pedagogical framework includes the following key principles:

- *Increased engagement*: Gamified elements make learning enjoyable and interactive, leading to higher student involvement.
- *Enhanced retention*: Enjoyable and meaningful activities help learners retain information more effectively.
- *Personalized learning*: Learners progress at their own pace, tailoring their educational experience to individual needs.
- *Collaboration and teamwork*: Gamification fosters community-building through shared challenges and collaborative tasks.
- *Real-world application*: Simulated scenarios allow learners to apply theoretical knowledge to practical situations.
- *Reduced anxiety*: Gamified environments offer low-stakes settings for experimentation and error, reducing learning-related stress.
- *Long-term motivation*: Clear goals and incremental achievements sustain learners' motivation over time.

Objectives

This analysis aims to provide a global view of Portuguese language participants' satisfaction with *NOOC3 - Active and gamified learning*, highlighting the main improvement suggestions. The data was collected through structured interviews or written structured interviews, and responses were analyzed using descriptive statistics. The interview covered various aspects of the course, including structure, content, methodology, technology, cohesion, and overall satisfaction.

Sample

The sample consists of 21 participants[3] enrolled as students in *NOOC3 - Active and gamified learning* in Portuguese who accepted to complete an online written interview or participate in a structured interview about the NOOC. For this study, 21 responses were analyzed, and participants were predominantly female (71.4%) higher education professors (71.42%) from Portugal (80.95%), with an average of 25.92 years of teaching experience.

Results

This chapter examines participants' satisfaction with NOOC3 by analyzing participant feedback, statistical data, and thematic insights. The results reveal significant trends in satisfaction, underscoring the course's strengths and areas for refinement.

Structure and organization of NOOC3

The structure and organization of NOOC3 were highly valued, with 90% of participants rating this aspect as "Excellent" and 10% as "Good". Participants consistently highlighted the logical progression and linear course content arrangement, facilitating

3. The number of interviews presented in this chapter is still provisional (21) as the collection process has not yet been finalized. For this chapter, only this number has been considered for analysis.

seamless learning. This rigorous organization enhanced the user experience and contributed to the intuitive navigation of the course material. Overall, the course structure and organization were well-received, particularly by those with more teaching experience who rated the course structure as "Excellent," indicating a generally positive perception. For example, participants commented: *"The content is of a very high standard and the course is very well organized for 25 hours."* [Participant 6]

Content of NOOC3

Didactic resources quality

The didactic resources in NOOC3 were praised for their quality, interactivity, and alignment with course objectives; 85% of participants rated these resources "Excellent" and 15% "Good." The high level of satisfaction underscores the pivotal role of well-designed educational materials in enhancing engagement and comprehension. For example, participants commented: *"The course is good, it mixes theory and practice, offering resources that we can implement directly in the classroom or Virtual Learning Environments"* [Participant 10].

Content and learning activities quality

The coherence and quality of the course content received a 90% "Excellent" rating, while the appropriateness of the learning activities was rated as "Excellent" by 85% of the respondents. Content quality emerged as a hallmark of NOOC3 with feedback highlighting the coherence, scientific rigor, and alignment with learning objectives. Learning activities also garnered strong approval, with respondents describing learning activities as engaging and well-balanced with course content and 85% rating them as "Excellent". For example, participants commented: *"They were complete, had all the necessary information, which we had to notice to do the course. It was perfect for me."* (Participant 17) and *"Content suited to my needs and the chance to put it into practice and evaluate it"* [Participant 20].

The methodology of NOOC3

The course methodology received positive feedback, especially concerning teaching staff performance and evaluation.

Communication and interaction

The course's communication mechanisms were highly valued; 80% of participants rated this aspect "Excellent." Teachers expressed slightly greater satisfaction (80%) compared to students (70%), highlighting the potential for further enhancing student engagement. However, some comments suggest the need for improvement in this domain. For example, participants commented: *"As it's a NOOC, there's less interaction, less sharing of experiences, less evaluation - these are the points I missed the most."* [Participant 21].

Learning activities and teaching staff performance

The evaluation of the learning activities and the performance of the teaching staff were both rated as "Excellent" by 85% and 90% of the respondents, respectively. Evaluation methodologies were commended for their clarity and alignment with learning objectives and described as fair and well-balanced to measure learning outcomes effectively. Teaching staff performance was a standout feature of NOOC3, receiving an "Excellent" rating from 85% of participants. Respondents with a teaching profile rated teaching staff performance particularly highly (90%), emphasizing the support provided throughout the course. For example, participants commented: *"It is important to note that feedback and interactive activities are very important in this type of learning."* [Participant 10].

Technology and learning experience of NOOC3

Concerning the technical experience 80% of the respondents reported having no technological issues indicating a generally smooth user experience with the platform and resources. However, isolated instances of platform rigidity and minor technical issues were noted (20% of the respondents) and, a recurring critique involved the platform's mixed-language forums, which some users found confusing or inconvenient. Data suggests that while the technical experience was mostly positive, there is room for targeted improvements. For example, participants commented: *"The platform is opaque and the forums are very bad because all the languages are mixed up, making communication difficult."* (participant 6); *"The platform is not very user-friendly."* (participant 8); *"There came a time when I did the activities but the platform wasn't counting/registering them."* [Participant 13].

The overall learning experience, including satisfaction, the effort required to pass the course, and the practical application of the learned content was positive for most respondents (95%).

In the comments received on an open question in the interview participants expressed high satisfaction (overall satisfaction) with the course, appreciating the content, structure, and overall experience (for example, Participant 21 commented: *"I was very pleased with the course. In just a few units, it introduced me to technologies and methodologies that I already used in my daily teaching practice quickly and easily."*); some participants noted the challenge (effort required) of balancing personal and professional commitments with the course requirements but considered that the workload in NOOC3 was adequate and manageable (for example, participant 1 and 20, commented respectively: *"I really enjoyed taking part in this course. My only regret is that my personal and professional life didn't allow me to devote more time to the process."* and *"It was enriching and the proposals were adjusted to the complexity and time required.")* and, valued the practical application of what they learned, highlighting the relevance of gamification and active methodologies in teaching (for example, participant 10, commented: *"In terms of learning, the course provides a balance between theory and practice in active methodologies and gamification in real teaching contexts."*). These aspects are visually represented in a word cloud (Figure 10.1).

Figure 10.1. overall learning experience with NOOC3 (source: the authors, 2024).

Cohesion and affiliation in NOOC3

Sense of belonging and group cohesion

The respondents were asked to indicate the extent to which they felt like a member of the course group, including their sense of belonging, connection with other members, and whether the group had similar needs and goals. Most respondents (70%) considered that a high sense of belonging to the group was developed in NOOC3. For example, Participants 3 and 16, commented respectively: *"Fellowship"* and *"Bonding and sharing"*. Respondents were also asked to indicate the degree of cohesion they developed within the group, including their intention to continue participating in the course and their willingness to participate in future virtual courses. The responses reveal the majority (70%) of respondents rated cohesion within the course group as high. For example, Participant 17 commented: *"The assumption is that the course members have similar needs and it is great to be part of an education that meets the needs of the participants"*. Though results indicate a strong sense of belonging and cohesion within the course group, a small percentage of respondents (10% each) did not feel as connected or cohesive.

Most positive and negative aspects of NOOC3

Respondents were asked to indicate both positive and negative aspects of the NOOC3, which were organized into categories in Tables 10.1 and 10.2.

Table 10.1. Positive aspects

Category	Positive Aspects
Practical tools, content and resources	Participants value the availability of various platforms and tools that can be directly applied in their teaching practice. The content is well-organized and cohesive, making it easy to understand and use. The themes and contents are interesting and align well with the competencies to be developed. Participants find the content relevant to their needs and appreciate the ease of access. For example: *"Available tools and content covered."* [Participant 1]; *"Really interesting topic. Content in line with the skills to be developed."* [Participant 5]; *"The content is very well organized and cohesive. The resources very well chosen to be presented and addressed."* [Participant 21].
Structure and format	The course is well-structured and effectively implemented within a 25-hour length. The systematic approach to learning helps participants follow the course content easily and retain information better. For example: *"... the course is very well organized for 25 hours."* [Participant 6]; *"Well-structured course and interesting examples."* [Participant 7]; *"Systematized learning."* [Participant 12].
Fellowship	The course fosters a sense of bonding and sharing among participants, enhancing the overall learning experience through collaboration and mutual support. For example: *"Fellowship."* (participant 3); *"Bonding and sharing."* [Participant 16].
Multilingual materials	Materials in different languages make the course accessible to a broader audience, ensuring language barriers do not hinder learning. For example: *"The use of materials in different languages."* [Participant 9].
Learning methodology	The course provides high-quality training and learning experiences, focusing on active methodologies that engage participants and enhance their knowledge, by connecting theory with practice. For example: *"Connecting theory and practice by offering resources for the classroom or VLE"* (participant 10); *"Quality learning. Active methodology."* [Participant 15].
Institutional credibility	The course is offered by reputable institutions, adding to its credibility and making it more appealing to participants. For example: *"...value the fact that the course is offered by several renowned institutions."* [Participant 17].

Overall, the course is highly regarded for its practical tools, effective structure, engaging content, and active learning methodologies. Participants appreciate the sense of community, accessibility, and credibility of the institutions offering the course. These elements contribute to a positive and valuable learning experience.

Table 10.2. Negative aspects

Theme	Negative aspects
Platform issues	Participants experienced dissatisfaction with the course platform, citing issues with its organization and overall user experience. For example: *"The platform is outdated and interactions are lost as the forums are very bad because all the languages are mixed up. I took a course on this platform a few years ago."* [Participant 6].
Lack of interaction and collaboration	The NOOC format resulted in less interaction and collaboration among participants. For example: *"A lack of collaborative work."* [Participant 9].
Time constraints	Time limitations prevented participants from fully engaging in community activities and exploring the course content in-depth. For example: *"Little time available to go into depth."* [Participant 20].
Certification issues	Concerns were raised about not receiving certificates of participation. For example: "The fact that I completed the course and still haven't received my certificate of attendance. The same situation happened with another colleague who attended the course". [Participant 13].
Course duration	Some participants felt the course was too short and suggested extending it for more interaction and deeper learning. For example: *"I'd like the training to be longer."* [Participant 17].
Initial complexity	The initial complexity of the course left some participants feeling lost and overwhelmed. For example: *"I felt lost."* [Participant 19].

This analysis highlights the areas where participants consider the NOOC could improve, such as enhancing the platform experience, increasing interaction and collaboration, addressing time constraints, ensuring timely certification, and simplifying the initial complexity of the course procedures.

Conclusion

The analysis of participant satisfaction (mainly higher education teachers with extensive experience) with *NOOC3-Active and Gamified Learning* reveals a predominantly positive response to the course, underscoring its innovative methodologies, high-quality resources, and effective pedagogical framework. However, some areas for improvement emerged, particularly concerning technological infrastructure, interaction opportunities, and structural enhancements.

Main insights from NOOC3

Participants expressed high satisfaction with the course structure, content, and methodology. This is consistent with research showing that microlearning promotes engagement by providing concise, focused, and practical knowledge (Buchem & Hamelmann, 2010). The course's microlearning design and gamification strategies were particularly well received, increasing participant motivation and engagement. Studies suggest that gamified learning design can improve motivation, participation, and learning outcomes (Deterding et al., 2011; Kapp, 2012). Participants highlighted the immediate applicability of the content, tools, and methods presented, confirming the practical value of the course. This supports the findings of Schunk (2012), who emphasized that practical, contextualized learning enhances transferability to real-world situations.

Despite its pedagogical strengths, the platform used for the course presented significant usability challenges, such as poor navigation, multilingual barriers in forums, and an outdated interface. Usability issues are a well-known deterrent in online learning environments, with research suggesting that poor user experience can negatively impact learning outcomes (Sun et al., 2008).

While the NOOC format allowed for flexibility and scalability, participants noted a lack of real-time interaction, echoing Garrison, Anderson, and Archer's (1999) findings on the importance of social presence in online learning environments. Participants found time constraints challenging as they sought to

balance work and personal commitments with course requirements. In addition, delays in certification reduced satisfaction for some participants. These challenges are consistent with broader findings in online education regarding time management and administrative processes (Anderson, 2008). Despite limited interaction, many participants reported a strong sense of belonging and collaboration within the course community. This echoes research by Rovai (2002), who emphasized the importance of community building in online education for increasing learner satisfaction and retention.

Final remarks

NOOC3-Active and Gamified Learning delivered a high-quality, innovative learning experience customized to contemporary educational needs. While participants consistently appreciated the course design, content, and applicability, addressing the challenges identified can further enhance its impact and sustainability. Through improvements in technology infrastructure, greater interaction, and enhanced administrative processes, NOOC3 can continue to represent an innovative model for flexible teacher training in digital environments.

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11

Enhancing Learning Experiences with Innovative Open Educational Resources

Mejorar las experiencias de aprendizaje con recursos educativos abiertos innovadores

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Abstract

Introduction: This work explores the potential of innovative and interactive Open Educational Resources (OERs) to enhance the learning experience, with a focus on interactive tools developed within the ENID-TEACH project. Through a combination of interactive images, immersive videos, online quizzes, educational games, collaborative whiteboards, and dynamic presentations, the chapter illustrates how these resources can make learning more engaging, personalized and inclusive.

Methodology: The ENID-TEACH OER gallery includes a variety of interactive and innovative teaching tools, classified into categories such as interactive images, presentations, videos, quizzes, games, and collaborative boards. The implementation and benefits of each type of resource are discussed, along with the challenges related to accessibility.

Results: The use of these interactive OERs has been shown to improve student engagement, understanding, and knowledge retention. Providing teachers with the necessary skills to effectively design and utilize OERs is essential to bridge the digital divide and ensure equitable and sustainable education.

Discussion and Conclusion: Emerging technologies like augmented reality, virtual reality, and artificial intelligence hold great potential for the future development of accessible and personalized interactive OERs. Addressing accessibility issues at both the platform and individual resource levels is crucial to ensure inclusive learning experiences.

Keywords: Open Educational Resources, Interactive Learning, Immersive Videos, Accessibility, Gamification, Educational Innovation, Digital Learning, Collaboration Tools.

Resumen

Introducción: Este trabajo explora el potencial de los Recursos Educativos Abiertos (REA) innovadores e interactivos para mejorar la experiencia de aprendizaje, centrándose en las herramientas interactivas desarrolladas dentro del proyecto ENID-TEACH. A través de una combinación de imágenes interactivas, vídeos inmersivos, cuestionarios en línea, juegos educativos, pizarras colaborativas y presentaciones dinámicas, el capítulo ilustra cómo estos recursos pueden hacer que el aprendizaje sea más atractivo, personalizado e inclusivo.

Metodología: La galería de REA de ENID-TEACH incluye una variedad de herramientas de enseñanza interactivas e innovadoras, clasificadas en categorías como imágenes interactivas, presentaciones, vídeos, cuestionarios, juegos y pizarras colaborativas. Se analizan la implementación y los beneficios de cada tipo de recurso, junto con los desafíos relacionados con la accesibilidad.

Resultados: Se ha demostrado que el uso de estos REA interactivos mejora la participación, la comprensión y la retención de conocimientos de los estudiantes. Proporcionar a los profesores las habilidades necesarias para diseñar y utilizar eficazmente los REA es esencial para salvar la brecha digital y garantizar una educación equitativa y sostenible.

Debate y conclusión: Las tecnologías emergentes como la realidad aumentada, la realidad virtual y la inteligencia artificial tienen un gran potencial para el desarrollo futuro de REA interactivas accesibles y personalizadas. Abordar las cuestiones de accesibilidad tanto a nivel de plataforma como de recursos individuales es crucial para garantizar experiencias de aprendizaje inclusivas.

Palabras clave: Recursos Educativos Abiertos, Aprendizaje Interactivo, Vídeos Inmersivos, Accesibilidad, Ludificación, Innovación Educativa, Aprendizaje Digital, Herramientas de Colaboración.

Introduction

In recent years, Open Educational Resources (OERs) have revolutionized the educational landscape, making learning more accessible, flexible and inclusive. These resources, which include whole courses, textbooks, videos and software, are designed to be used, modified and redistributed without restriction, promoting more equitable and inclusive education globally. OERs, freely available digital learning materials, not only break down the economic barriers associated with traditional educational tools but also offer new opportunities to create more dynamic and personalized learning paths.

In particular, in the context of online training, the importance of OERs has grown exponentially. Thanks to digital technologies, it is possible to develop innovative learning resources that integrate interactive videos, simulations, augmented reality and artificial intelligence. These tools not only improve the quality of teaching, but also make the learning process more engaging, encouraging the active participation of students and adapting to their specific needs.

However, in order to fully exploit the potential of these resources, it is crucial to invest in continuous teacher training. Technological evolution requires ever more advanced skills, and without proper updating, the risk is to widen the digital divide even further. Equipping teachers with the necessary skills to design and use OER effectively is essential not only to improve the learning experience, but also to ensure equitable and sustainable education.

The primary objective of the ENID-TEACH project was to develop training programmes for teachers to enable them to acquire new skills in online teaching methods. In this context, for the sake of consistency, it was decided not to use traditional teaching materials, but to develop innovative OERs in order to show their potential and provide teachers with new ideas for the development of different types of teaching materials. In this document, the main solutions adopted are illustrated, with pros and cons.

The ENID-TEACH OERs

The ENID-TEACH gallery of OERs represents a collection of interactive and innovative teaching tools, placing the project at the forefront of educational innovation. The implemented solutions may be classified in the following main categories.

Interactive images are a simple and innovative teaching tool that allow students to visually explore complex content in a dynamic and engaging way. These enriched images include interactive dots, links, descriptions, embedded videos and other multimedia resources that delve into details directly within the image itself. This type of resource is particularly useful for representing articulated information, such as maps, scientific diagrams, artwork or infographics. Students can navigate through the various elements at their own pace, discovering information step by step in a customised path. The main benefits of interactive images include the ability to simplify complex content, stimulate curiosity and make learning more visual and experiential. In addition, these resources foster visual memory and help develop critical analysis skills as they encourage students to connect concepts and details independently. It is important to note that such images can be either traditional 2D images or 360° images that provide the student with a much more immersive experience.

From the teacher's point of view, interactive images offer a versatile support to explain topics that may be difficult to understand through text or lectures, making teaching more effective and engaging. Several online tools allaw to create interactive images and deploy them online in a short time and very simple way. Among the available solutions it is worth to mention Thinglink, Flippity, Genial.ly, H5P, but many other solutions are available.

Interactive presentations

Interactive presentations represent an evolution from traditional static teaching materials. These resources combine multimedia content, such as videos, images and graphics, with interactive elements, such as quizzes, polls and hyperlinks, which actively engage students during the learning process. A great advantage of interactive presentations is that they can adapt to different learning styles, allowing students to explore content in a personalized

way and at their own pace. Furthermore, these tools encourage interaction and active participation, reinforcing understanding of concepts and improving the ability to recall information. Compared to interactive images, they are already more complex and versatile because they are structured in several slides, and therefore offer more content.

From the teacher's perspective, interactive presentations offer tools to monitor student engagement and progress, thanks to built-in tracking features. This makes it possible to identify any difficulties and adapt teaching in a targeted manner, making the learning experience more effective and inclusive. Today, there are several tools for developing interactive presentations, all of which are simple, intuitive, feature-rich and with reusable example galleries. They therefore represent a teaching solution for teachers even with not particularly advanced IT skills. In the project, the Genial.ly and H5P platforms were used for this purpose.

Interactive videos

Compared to images and interactive presentations, interactive videos are a further step forward in terms of complexity and interactivity. Interactive videos represent an advanced version of traditional educational videos, enriched with elements that actively engage the learner during viewing. This content incorporates features such as clickable hotspots, hyperlinks, quizzes, multiple-choice questions and choice scenarios, which transform the video into a dynamic and personalized learning experience. Due to their interactive nature, videos allow students to actively participate in the learning process, instead of just passively watching. For example, they can answer questions to check their understanding, explore alternative paths or explore specific topics in depth by clicking on links. This approach fosters greater engagement, deeper understanding and a better ability to remember information.

From the teacher's perspective, interactive videos offer tools to monitor student progress by collecting data on responses and interaction. This makes it possible to identify critical areas and adapt teaching to the needs of the group or individual. Furthermore, interactive videos are particularly effective for online and distance learning, as they combine flexibility with a high degree

of customization. Their implementation is already more complex: besides requiring the a priori availability of a video to be enriched, they require specific tools. In the project, the H5P platform was used, which allows interactive videos to be realized relatively easily.

Online quizzes and games

Online quizzes and games are interactive educational tools that combine learning and entertainment, making the learning process engaging and stimulating. These resources allow students to test their knowledge, apply learned concepts and develop skills in a fun and motivating way. Online quizzes can include multiple-choice questions, open-ended answers, drag-and-drop and instant feedback, which help students understand mistakes and improve. But they can include even more complex games like crosswords, word search, etc. Educational games are designed to use playful dynamics to teach complex content through simulations, interactive scenarios or challenges that require problem solving and critical thinking. The main advantages of these tools are their ability to adapt to different learning levels, keeping students' interest high, and the possibility of receiving immediate feedback, which is crucial for self-assessment. In addition, quizzes and online games foster gamification, an approach that increases motivation and promotes active and collaborative learning.

For teachers, these resources are a powerful formative assessment tool, allowing them to monitor student progress and identify areas requiring further study. In online and hybrid contexts, quizzes and games offer a flexible and effective way to keep students engaged and connected to the educational process. Moreover, such resources can easily be incorporated into websites or more complex digital educational resources such as interactive presentations. From a practical point of view, there are several online platforms that make it possible to create very attractive games and quizzes in a very simple way: the EducaPlay and Flippity platforms are worth mentioning.

Online collaborative boards

Online collaborative boards are digital tools that allow students and teachers to work together in real time on a shared platform. These virtual whiteboards allow users to create, edit and organize content such as text, images, graphics, videos and drawings in an interactive visual space, accessible from any Internet-connected device. Thanks to their collaborative nature, these resources encourage group work, the sharing of ideas and the development of projects simultaneously, overcoming geographical and time barriers. Students can discuss, annotate and solve problems together, while teachers can guide activities, provide immediate feedback and monitor individual and collective contributions. The main benefits of online collaborative whiteboards include fostering creativity, improving problem solving skills and enhancing teamwork. In addition, these platforms encourage a participative and interactive approach, which increases student engagement and fosters deeper learning.

For teachers, collaborative whiteboards are a versatile tool, useful both for synchronous activities, such as brainstorming and virtual workshops, and for asynchronous projects, where students can contribute at their own pace. In an online or hybrid training context, these resources prove essential for building an active and collaborative learning environment. There are both solutions that work synchronously, such as Microsoft Whiteboard or Google JamBoard, and asynchronous solutions such as Padlet or AnswerGarden, all of which are easy to use.

Escape Rooms

Educational Escape Rooms are interactive and engaging learning experiences that turn teaching into a problem-solving adventure. Inspired by the concept of traditional escape rooms, these activities challenge students to solve puzzles, crack codes and pass tests to reach an end goal, often linked to an educational theme. These experiences, customizable for different subjects and learning levels, combine playful and educational elements, encouraging active participation and the development of transversal skills such as critical thinking, collaboration, creativity and time management. The main advantages of educational escape rooms lie

in their ability to make learning fun and memorable, while stimulating students' intrinsic motivation. Thanks to the engaging format, students are encouraged to put their acquired knowledge into practice in a concrete way, reinforcing their understanding of the content and developing practical skills.

From the teacher's point of view, escape rooms represent an innovative teaching tool, ideal for face-to-face, online or hybrid activities. They can be used to introduce new topics, consolidate knowledge or assess skills in an alternative way. In addition, the variety of digital tools available, such as interactive design platforms, allows for the creation of customized and accessible experiences, adapting them to the specific needs of the class. From an implementation point of view, they can be developed as a particular type of interactive presentation, where a series of question-and-answer constraints must be configured in order to move from one slide to the next. For this reason, they can, for instance, be created with Genial.ly, where there are also many examples of educational escape rooms.

360° immersive interactive videos

The 360° immersive interactive videos represent one of the most innovative resources in the OERs landscape and are certainly the most complex type of resource developed within the ENID-TEACH project. These videos allow students to explore 360° virtual environments, offering an immersive and engaging view that places them at the center of the learning experience. Thanks to interactivity, students can interact with specific elements in the virtual environment, such as clickable objects, information hotspots, quizzes and links to in-depth information. This combination of immersion and interaction transforms the learning process into an exploratory experience, stimulating curiosity and active participation. The main advantages of this technology include the possibility of simulating real experiences that are difficult to access, such as virtual visits to museums, explorations of natural environments, science labs or professional scenarios. Students can learn in a realistic and practical context, improving conceptual understanding and developing applied skills.

From an educational perspective, 360° immersive videos are versatile tools, particularly effective for online or blended learning. They enable teachers to create memorable and high-impact learning experiences while maintaining a high level of engagement and motivation. Moreover, by collecting data on student interaction, they offer valuable information to monitor teaching effectiveness and personalize learning. On the other hand, their implementation is quite complex. At present, we are not aware of any online tools that can easily create such solutions. There are a number of software tools developed to create 360° virtual tours, which can be used for this purpose, but they require time and a certain level of expertise. In the context of this project, 3DVista, one of the most powerful professional software packages currently available, was used.

Results and discussion

The ENID-TEACH project represented a significant step in educational innovation through the implementation of interactive OERs. The developed resources have proven to enhance the learning experience, making education more engaging and personalized. The results obtained indicate that interactive OERs, such as dynamic images and immersive videos, have increased the level of student participation, facilitating deeper and longer-lasting learning. The variety of tools available allows educators to tailor instruction to individual needs, thus improving understanding and retention of information.

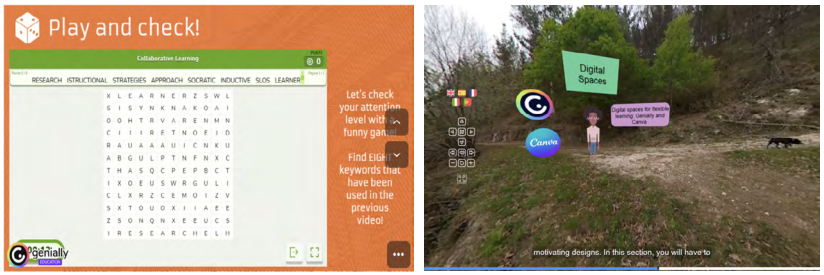

Figure 11.1 Example of ENID-TEACH OERs: interactive presentation integrating an interactive game (left) and 360° interactive video (right)

In the ENID-TEACH project, a total of 31 interactive OERs have been produced, each of them available in 5 languages (English, Spanish, French, Italian and Portuguese). They represent a relevant collection of examples for teachers and educators, and want to be a source of inspiration for the creation of new ones. In the following table, we provide a sample of interactive resource for each category.

Interactive resource	URL
Interactive images	https://www.enidteach.eu/oers/nooc1-modeles-dapprentissage/
Interactive presentations	https://www.enidteach.eu/oers/nooc2-collaborative-and-research-methodology/
Interactive videos	https://www.enidteach.eu/oers/nooc2-the-idea-collaboration-theory/
Online quizzes and games	https://www.enidteach.eu/oers/nooc5-active-learning-methodologies/
Online collaborative boards	https://www.enidteach.eu/oers/nooc1-padlet-connected-and-critical-methodologies/
Escape Rooms	https://www.enidteach.eu/oers/nooc4-addie-methodology/
360° immersive interactive videos	https://www.enidteach.eu/oers/nooc5-topic-1/

When choosing the interactive resource, the teacher must take several aspects into account: the learning objectives to be achieved, the method in which he or she wants to deliver the resource, the level of interactivity and involvement to be achieved, and the complexity of implementation.

Prospective technologies for the creation of interactive OERs

The technological tools used in the ENID-TEACH project for the development of OERs place it at the forefront of the development of interactive and innovative learning materials and a step ahead of most existing training programmes. This was made possible by exploiting a number of newly available technological solutions. However, there are additional technologies that are likely to establish themselves on the educational landscape in the coming years, which are worth mentioning.

One very promising emerging technology for the creation of educational content is augmented reality (AR). As AR hardware and software become more advanced and accessible, educators may be able to incorporate virtual elements seamlessly into physical learning environments, allowing students to interact with information and digital visualisations in intuitive and engaging ways. This could enable the creation of engaging, hands-on learning experiences that bring abstract concepts to life. Technologies already exist that can integrate images and information into text or books, leading to the creation of augmented books. However, although there are vast galleries of 3D objects already available, the design of new objects is still quite complex and requires skilled personnel.

The growing popularity of virtual and mixed reality (VR/MR) technologies also holds potential for the future of interactive OERs. As VR/MR headsets become more affordable and easy to use, educators may be able to develop virtual learning environments that allow students to explore simulated scenarios, conduct experiments and collaborate with peers in ways that are not possible in the physical world. These immersive learning environments can recreate living or working contexts that are very close to reality, where students can operate in complete safety and without a time limit. There are already several companies proposing similar solutions in the medical or engineering fields with excellent results. However, once again, these are very technologically advanced solutions, the development of which must be entrusted to experts.

Another area of interest is the ongoing development of artificial intelligence (AI) and machine learning (ML) algorithms.

These technologies could be used to power adaptive learning systems, in which the educational content and pace of instruction are adapted to the individual needs and progress of each student. This could lead to the creation of highly personalised OERs that adapt in real time according to the learner's performance and preferences. Although generative AI is developing very rapidly, its applications in education still need to be carefully evaluated, also in view of the potential risks and ethical implications.

Furthermore, advances in natural language processing (NLP) and speech recognition could enable the creation of interactive OERs with voice-based interfaces, allowing students to engage with learning content through voice commands and conversational interactions.

Accessibility challenges in interactive OERs

An increasingly important aspect in the creation of open educational resources is the accessibility of content, as the topic of inclusivity is increasingly relevant in education today. Paradoxically, traditional teaching materials such as texts, slides and even videos can be made accessible quite easily with different solutions. Conversely, this aspect is particularly challenging in the creation of interactive OERs, as technological solutions for accessibility often clash with those used for interactivity. However, this is also a critical issue, as interactivity is particularly challenging for people with sensory disabilities.

The issue of accessibility can be addressed at two levels: at the level of the web platform and at the level of the individual OER.

At the website level, there are several plugins that improve the overall accessibility of a site with different functionalities, according to the international WCAG (Web Content Accessibility Guidelines) standard. They are able to offer different functionalities to respond to different sensory disabilities, which can range from simple adjustments (e.g. changing site colours or enlarging text size) to more advanced tools (e.g. highlighting interactive elements, text-to-speach, audio interpretations of content). AI-enabled plug-ins capable of interpreting the content of websites and proposing it to the disabled via audio or video are still being studied. The great advantage of this solution is that it

works globally, i.e. it requires only one installation for the whole site: the plug-in will then perform different tasks on the different pages. And even the plug-in updates will be carried out just once for the whole website. Another great advantage of this solution is that there is nowadays a large community working on this issue, so updates and improvements occur very quickly. On the other hand, the main criticism is that these are generalist solutions, whose effectiveness depends on their ability to adapt to the content of the site. Consequently, this generally works well with static content, much less efficiently with interactive content.

In order to achieve more precise and effective accessibility features, it is possible to work on individual OERs. First of all, it must be made clear that this approach is not always available, as it depends on the accessibility functions implemented by the individual OERs development platforms. To give a concrete example, the Genial.ly platform has implemented several accessibility functions for its resources. Among the accessibility functions, it is possible to add alternative text to visual elements, insert text labels and categories, add metadata and additional information to links, keyboard navigation, SCORM format conformity and even a guide to accessibility best practices. All this makes it possible to develop OERs that are natively interactive and accessible, regardless of the website where they are released. This approach, although more effective, has several limitations. First of all, it depends on the platform used to develop the OERs: if it does not have accessibility features, it will not be possible to create natively accessible material. It is true, however, that the problem of accessibility is very much felt, so even platforms that do not have these features are working to have them. Another major limitation is the high workload: in fact, this approach requires modifications at the level of individual teaching materials rather than of the entire website, multiplying the workload disproportionately. Moreover, any subsequent updates or modifications also require repeated work on each material.

Conclusions

The ENID-TEACH project demonstrates how innovative OERs can transform education, making it more interactive, inclusive and in line with the needs of the digital society. The adoption of tools such as interactive videos, immersive images and gamified quizzes improves student engagement while promoting critical and transversal skills. A crucial element that emerged is the need for continuous training for teachers. For OER to be used to their full potential, it is crucial that educators acquire appropriate skills in the use of digital technologies. This training not only increases teaching effectiveness but also promotes a collaborative and innovative learning environment.

However, the project is not without its challenges. Accessibility issues remain significant, requiring special attention to ensure that all OER are usable by learners with different abilities. It is essential to develop strategies that ensure equitable access to these resources, contributing to inclusive education.

Looking ahead, the integration of emerging technologies such as augmented reality and artificial intelligence offers exciting opportunities to further enhance OER. These technologies can make learning even more interactive and personalised but require careful consideration of the ethical and practical impacts.

The future of OER lies in the ability to combine technological innovation, inclusiveness and educational sustainability, preparing teachers and students for a rapidly changing world.

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12

Evaluation of the training programme: impact, satisfaction and perceived usefulness

Evaluación del programa de formación: impacto, satisfacción y utilidad percibida

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Abstract

This chapter describes the study on the satisfaction of participants in the NOOC courses of the ENID-teach[2] program implemented between 2022-2024, in 3 editions. The courses were developed and implemented by European teams of experts in various fields with the aim of training teachers at European universities. Based on its own pedagogical model and in line with MOOC philosophy courses, the program adopted the NOOC format: *Nano, Open, Online, Course* and a microlearning approach. The aim of this research is to assess satisfaction with the ENID-teach program and its resources. The methodological design involved the application of a questionnaire developed

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for the purpose with closed questions based on a scale, and four open-ended questions. The data was processed using simple descriptive statistics and a content analysis of the open questions. The results show a high level of satisfaction (above 80%) in twenty four questions and in all dimensions, except for the perceived *Interaction/Communication*. This result may be explained and in connection with the perception of what a collaborative online course should be, which is not the case. We can conclude that the assessment of satisfaction with the NOOC is extremely positive, with most of the dimensions being evaluated above 80%, with the exception of two of them, which deserve further study with additional data.

Keywords: ENID-teach program, Higher Education Professors Training. NOOC quality, Satisfaction Evaluation.

Resumen

Este capítulo describe el estudio sobre la satisfacción de los participantes en los cursos NOOC del programa ENID-teach implementado entre 2022-2024, en 3 ediciones. Los cursos fueron desarrollados e implementados por equipos europeos de expertos en diversos campos con el objetivo de formar profesores en universidades europeas. Basado en un modelo pedagógico propio y en línea con los cursos de filosofía MOOC, el programa adoptó el formato NOOC: Nano, Open, Online, Course y un enfoque de microaprendizaje. El objetivo de esta investigación es evaluar la satisfacción con el programa ENID-teach y sus recursos. El diseño metodológico consistió en la aplicación de un cuestionario elaborado al efecto con preguntas cerradas basadas en una escala, y cuatro preguntas abiertas. Los datos se procesaron mediante estadística descriptiva simple y un análisis de contenido de las preguntas abiertas. Los resultados muestran un alto nivel de satisfacción (superior al 80%) en veinticuatro preguntas y en todas las dimensiones, excepto en la de Interacción/Comunicación percibida. Este resultado puede explicarse y en relación con la percepción de lo que debería ser un curso colaborativo en línea, que no es el caso. Podemos concluir que la evaluación de la satisfacción con el NOOC es extremadamente positiva, con la mayoría de las dimensiones evaluadas por encima del 80%, a excepción de dos de ellas, que merecen un estudio más profundo con datos adicionales.

Palabras clave: programa ENID-teach, formación del profesorado de enseñanza superior, calidad de los NOOC, evaluación de la satisfacción.

Introduction

ENID-Teach is a pedagogical design proposal aimed at university teachers, professors, trainers, and teacher educators. The major goal consists to help educators master D-Flexible Learning methodologies, apply microlearning techniques, and enhance their digital competence in digital pedagogies.

Aligned with four important educational strategies: the DiCompEdu - European Framework for the Digital Competence of Educators (Punie, Redecker (2017); the UNESCO ICT – Competency Framework for Teachers; the SDG - Sustainable Development Goals and finally, and finally, the OEP and OER - Open Education Practices and Resources (Inamorato dos Santos, Punie, Castaño-Muñoz (2016).

The NOOCs - *NANO Open, Massive and Online Courses* in flexible methodologies evaluated by the teachers are designed by five partner istitutions and are the following: NOOC 1. *Connected and critical Methodologies*; NOOC 2. *Collaborative and research Methodologies*; NOOC 3. *Active and gamified learning*; NOOC 4. *Inverted Methodologies* and NOOC 5. *Design of flexible learning digital programs*.

Study Objectives

The aim of this study was to evaluate the ENID Teach program, made up of 5 NOOCs developed specifically for the training of European higher education teachers according to their own pedagogical model, during its 3 iterations, which ran from 2023-2024.

The main objectives are: 1) to determine the level of satisfaction of university teachers who have attended the NOOCs in relation to Contents, methodology, technology; 2) to identify areas for improvement in the courses implemented in each iteration; 3) to contribute to the overall quality feedback of NOOC´s evaluation by participants at least, 80% positive.

Research Design

A mixed methods approach was used. Data was collected through a online questionnaire to faculty in all the NOOCs from the partner institutions. The quantitative and qualitative data were analyzed through simple descriptive statistics and content analysis of the open-ended responses.

A questionnaire was developed in five languages – English, French, Italian, Portuguese and Spanish - giving opportunity to participants response in their native language or in English. The questionnaire has several dimensions to be assessed by the participants attending the NOOCs and a total of thirty nine close multiple-choice questions employing a four-level Likert scale - Inadequate, To be improved, Suitable, and Excellent - and four open-ended questions. The tool proposed to answer the questionnaire was Google forms since it is accessible and free, probably for the majority of the NOOCs participants. It was considered that it is a very widespread and easy-to-answer format.

The questionnaire is comprised of fifteen (15) dimensions and 42 questions. The following dimensions were defined: 1) Demographics (five questions); 2) NOOCs Attendence (four questions); 3) Previous knowledge (one question); 4) Learning objectives (two questions); 5) Course Organization (four questions; 6) Resources (three questions); 7) Content (three questions; 8) Learning activities (three questions; 9) Interaction (three questions); 10) Assessment (three questions); 11) Support (one question; 12) General Experience (four questions); 14) Applicability (three questions); 15) Open questions (four questions).

The questionnaire is addressed to the teachers participating in the NOOCs, It is expected to take around 15 minutes to complete. Participation in this questionnaire is voluntary, ensuring anonymity and confidentiality of data, although the respondent can identify him/herself if he/she so wishes and with a informed consent. It is also guaranteed that the data collected will be used exclusively within the scope of this project. Responding to this questionnaire does not imply any losses or displacements and access was available via an open link until the end of each NOOC course.

Participants

The total of respondents of the questionnaire were 438 participants from the five NOOCs during the three iterations. They are distribute by each NOOC as follow: NOOC 1, from France with 72 responses; NOOC 2, from Italy, with 73 responses; NOOC 3, from Portugal, with126, NOOC 4 from Bulgary, with a total of 81 responses and NOOC 5 from Spain, with 86 contributions.

In terms of *age*, the respondents are distributed as follows: 27.9% are in the 45-54 age group, followed by the 35-44 age group with 26.3%. It is interesting to note that 25.8% of respondents were from the age group of those entering the profession.

With regard to *level of education*, the majority of participants have a doctorate (42.7%), followed by those with a master's degree (24.9%). In terms of *gender*, our respondents were mainly female (67.8%). With regard to *employability*, the majority of respondents are employed (61.9%), although there was a percentage of self-employment (17.6%).

When we asked for the *country of residence*, we got the following distribution: 38.1% lived in Spain, followed by 35.4% in Italy, 8.9% in Bulgaria, 7.1% from Portugal and 0.5% from France.

In order to get to know our respondents, we asked them a question about their *previous level of knowledge*, the majority of them were at a basic level (39.3%), followed by an intermediate level (33.3%), although 18% were in the No prior knowledge category. This item allows us to keep in mind the starting point of the teachers who have taken the NOOCs.

Results

We present the results for each dimension of the questionnaire, aggregating the level of satisfaction achieved in the 3 editions of the NOOCs over this period of time. We have grouped the categories of the scale so that we can distinguish the results between *inadequate*, *to be improved* and *the positive category* (with suitable and excellent). The average for each item has been calculated (Table 12.1).

NOOC´s Learning Objectives

With regard to the *Learning objectives*, 91,1% of the participants considered their *Appropriateness to each NOOC* e 90.6% classified them as presenting *Clarity.*

NOOC Organization

The dimension of *Course Organization* included the *Adequacy of the duration* (87%) *Timeline of the NOOC* (89, 3%), *Organization of the NOOC* (81, 5%) and *Structure of Course Space* (75,8%). This last question is may be related to the organization of the course on the platform achieving a rating below the rest.

Resources

One of the relevant dimension is about *Resources* because is mandatory the implementation of interactive and descriptive resources (OERs) defined in the pedagogical model of the ENID-teach programme (Ruben et al. 2022). In this respect, both the *Learning Guide* and the *Resources Quality*, the participants rated 85,8 % e 76,6% respectively. However, participants are less satisfied with *Resources Interactivity*, rating it slightly below but nevertheless positive.

Contents

Another key aspect of the evaluation related to is about the *Contents* dimension. The results are very good and are distributed as follows: *Coherence content* (93,4%), *Contents Scientific rigour* (91,6%), *Relevance of Contents* (83,8%).

Methodologies (pedagogical)

Several dimensions were related to *Methodologies: Activities, Interaction, and Assessment* covering various questions as mentioned above.

Thus, with regard to the *Learning activities*, the *Complexity of the activities* (87,4 %), the *Experience of the Activities* (84,9 %), and

the Activities proposed (83,8 %) obtained a very good evaluation from the participants, and therefore a high degree of satisfaction.

The *Interaction* dimension was the one that obtained the lowest results in terms of the degree of satisfaction in the NOOCs. This was followed by *Interaction with the Platform* (64,6%), *Collaboration between Participants* (60,7%) and *Interaction/Communication* between participants (64,4%). These figures could perhaps be explained by the fact that the participants perceived it to be a collaborative course and not so much self-learning. That's why they rated their level of satisfaction in this way, as it didn't correspond to their perspective.

The Evaluation dimension was assessed with the question on the Evaluation Method, the Clarity of the Evaluation Criteria, and also the Certification of the NOOCs.

In general, the teachers who attended the NOOCs were satisfied with the results, with the following percentages respectively: 82,9% for the chosen method, and the clarity of the defined criteria (83,6%). With regard to *Certification*, there was a consensus of high satisfaction (85,4%). This is interesting because, despite the diversity of the NOOCs and their teaching options, they all used automatic quizzes.

Support

One dimension that saw a slight decrease in satisfaction, but still a very positive one, was *Support*, with a question about the support of the facilitation team that reached 79 %. This indicator may be related to the perception that it would be a course with a high teaching presence, which is not the case.

Learning Experience

One of the most important aspects for the coordinators of each NOOC in the ENID-Teach program was the *learning experience* provided to the teachers. Knowing that the prior knowledge of each NOOC is very diverse, as well as the levels of teaching experience, knowing the level of satisfaction of the experience was very important, enabling the transformation of teaching practices.

Thus, in this regard, it was concluded that: teachers were highly satisfied with the *Awareness of innovation* provided by NOOCs

for their educational practices (90,9%) being one of the aspects valued above 90%. This was followed by the *Educational Context proposed* (89.35), and the appreciation of the *Learning Experience* as a whole with 86.1% of the responses. Finally, respondents considered the *Investment needed to complete the NOOC* to be excellent, i.e. very adequate (84,5%).

Applicability

Finally, when asked about the applicability of their learning, i.e. the transfer to their pedagogical and institutional reality, the satisfaction results were excellent: Both the Perception of the Applicability of the learning undertaken and the *Usefulness of the skills* developed were valued at 87,2%. It is important to point out that in addition to the competences of each NOOC, the digital competences to be developed were transversal to all of them. On the other hand, they also considered that the NOOCs confirmed their *Initial Expectations* (84,9%).

Table 12.1 Results in the Questionnaire

Dimension	Question	%
NOOC Learning Objetives	2. Appropriateness of learning objectives	91,2
	3. Clarity NOOC´s learning objectives	90,6
Course Organization	4. Adequacy of the duration	87,0
	7.Timeline of the NOOC	89,3
	5. Structure of Course Space	75,8
	6. Organization of the NOOC	81,5
Resources	8. Learning Guide Quality	85,8
	9. Resources Quality	85,6
	10. Resources Interactivity	76,6
Contents	11. Coherence content	93,4
	12. Relevance of Content	83,8
	13. Scientific rigour of Content	91,6
Learning Activities	14. Learning activities proposed	83,8
	15. Activities Experience	84,9
	16. Complexity of activities	87,4

Dimension	Question	%
Interaction	17.Interaction/Communication	64,4
	18. Collaboration participants	60,7
	19. Interaction with Platform	64,6
Assessment	20. Assessment method	82,9
	21. Clarity assessment criteria	83,6
	22. NOOC Certification	85,4
Support	25. Support of the facilitator team	79,0
Learning Experience	23. Educational context proposed	89,3
	24. Awareness of innovation	90,9
	26. Learning experience	86,1
	27. Investment required complete NOOC	84,5
Applicability	28. Applicability of learning	87,2
	29. Meeting initial expectation	84,9
	30. Usefulness of skills	87,2

Some other items came close to the established target (80%), but there is still room for improvement. The *Structure of the Course Space* and *Resource interactivity* both scored an impressive 75,8% and 76,6% respectively. The NOOC conceptors and instructional designers teams should address three other items relating to *Communication*, as the satisfaction level fell below 70%, as Table 12.1 clearly shows.

Open Ended- Questions

In order to qualify and clarify the responses assigned to the items regarding the satisfaction of the NOOCs, the responses obtained in the five open-ended questions of the questionnaire were analyzed. Below are word clouds presented to summarize the main themes of the analyzed responses, as well as the examples of the participants declarations about the NOOCs. The analyze comprise Main Strengths and the Main Weaknesses (table 12.2).

Table 12.2. Main Strengths and Main Weaknesses

Main strengths	Word cloud Main strengths
Quality of learning activities and course organization. Appreciation of multimedia content and connections offered. Possibility of distance learning. Richness of multimedia content and available resources. Specificity and descriptive simplicity of the course. Presence of subtitles and material organization. Quality of content and activities. Topics covered and brevity of lessons. Attention to program schedule.	
Main weaknesses	**Word cloud Main weaknesses**
Slow website performance. Lack of clarity and engagement. Lack of immediate peer interaction. Inadequate platform design and speed. Accessibility issues for visually impaired users. Lack of clarity in platform navigation and communication Forum and platform access issues. Translator malfunction and lack of suitability for visually impaired users. Lack of participant interaction and collaboration. Slow loading times and web design issues.	

In addition to the previously raised issues about missing aspects and potential improvements in the NOOCs, the final comments from participants highlighted some important nuances. Furthermore, there was an additional emphasis on the perceived need for interaction among participants, that are consistent with the results from the close questions. These observations indicate specific aspects that may benefit from organizers' attention to enhance the overall participant experience in the NOOCs.

Conclusions

The overall analysis of the questionnaire responses indicated high levels of satisfaction with various aspects of the NOOCs with some areas that could be improved, in particular interaction with participants and the usability of the platform. In addition, the final comments underlined the importance of addressing specific concerns, highlighting areas that organizers should pay attention to in order to further improve the NOOC experience.

The results show a high level of satisfaction (above 80%) in twenty four (24) of the questions and in all dimensions, except for the perceived Interaction/Communication. But that may have a connection with the perception of what a collaborative online course should be, which is not the case with this one, revealing a very positive experience. We can conclude that the assessment of satisfaction with the NOOC is extremely positive, with most of the dimensions being above 80%, with the exception of two of them, which deserve further study with additional data. Some aspectst could be improved, in particular interaction with participants and the usability of the platform. In addition, the final comments underlined the importance of addressing specific concerns, highlighting areas that organizers should pay attention to in order to further improve the NOOC experience in the future.

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Conclusions

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This book analyses the effectiveness of microlearning and flexible digital methodologies in the training of university teachers in Europe. Throughout its chapters, it examines both the achievements and the challenges identified in the implementation of NOOCs (Nano Open Online Courses) within the ENID-Teach project.

One of the main results has been the consolidation of a wide participation network, with 827 teachers enrolled in the training courses, of which 578 belong to universities in the European Union, more than 100 to other educational levels within the EU and 60 come from countries outside Europe (chapter 1). In total, 3,044 people have participated in the courses, which reflects a growing interest in the adoption of digital methodologies in higher education.

From a methodological perspective, NOOCs have been well received for their structure, content and applicability, which confirms the interest of university teachers in integrating innovative strategies into their teaching practice. In this sense, it is worth noting that participants especially valued the clarity and organisation of the course, as well as the applicability of the content in their teaching (chapter 3). However, the need to reinforce the interaction between participants and the presence of instructors during the training process has been identified, which would allow for greater appropriation of the content and a more collaborative learning experience.

The flexibility and accessibility of the courses have been key aspects, as they have allowed teachers to organise their study time according to their needs. This element has been essential

in facilitating their participation, as many teachers face time constraints that make continuous training difficult. As noted in chapter 4, the courses have managed to adapt to the rhythms and schedules of the participants, allowing them to combine their training with their teaching activity.

The results obtained in the evaluation of the methodologies confirm that strategies such as gamification and active learning generate a high level of interest and commitment among teachers. In particular, it has been observed that gamified learning design can reinforce motivation, participation and learning outcomes (chapter 10). However, some participants indicated that these methods could be better contextualised in specific classroom situations to maximise their applicability.

From a technological point of view, the platform used was generally well received, although some participants pointed out navigation and usability difficulties, suggesting the need to optimise its functioning. The importance of better integrating forums and other collaborative tools within the platform to improve group interaction and cohesion was also identified. As mentioned in chapter 5, although the platform was considered intuitive in general terms, some users reported technical problems that affected the learning experience.

The sense of community and cohesion among participants has been an aspect with room for improvement, as in many cases the learning experience was perceived as individual and with little interaction with other participants. As indicated in chapter 6, the lack of group interaction reduced the feeling of belonging to the group. To improve this aspect, it is recommended to increase participation in forums, collaborative activities and real-time sessions that foster the construction of a more active learning community.

The analysis of satisfaction with the courses has shown that flexible training based on innovative methodologies is a necessity in the university environment. However, the results also reveal resistance to digitalisation in certain academic contexts, as in the case of Italian teachers, where a lack of institutional recognition of digital teaching training has been identified, which limits its adoption (chapter 9). This highlights the need for policies that favour the integration of digital approaches and value pedagogical training in the professional development of teachers.

Another of the project's most notable achievements has been the creation of the International Cooperation Network for Knowledge Transfer and Digital Learning (ReCoIn-TaD), which has managed to consolidate its position with 578 members, including 300 university professors from the EU. This network has allowed the project's impact to be extended, promoting academic collaboration and the exchange of good pedagogical practices at an international level.

In the field of open educational resources (OER), the study has demonstrated their potential to transform education and make it more inclusive and interactive. As mentioned in chapter 11, the adoption of tools such as interactive videos, immersive images and fun quizzes improves student participation and encourages the development of critical and transversal skills. However, challenges remain in terms of accessibility and teacher training for optimal use of these resources.

Likewise, the study has highlighted the need to improve the pedagogical training of university teachers. As pointed out in chapter 7, at university level, teachers do not receive any compulsory pedagogical training throughout their careers, which translates into a lack of up-to-date and effective teaching strategies. This problem reinforces the relevance of the ENID-Teach project in promoting flexible and digital methodologies in higher education.

In terms of overall impact, satisfaction levels have been high, with more than 80% of participants rating the courses positively in aspects such as the clarity of the content, the structure of the course and the usefulness of the materials. However, as concluded in chapter 12, there are areas for improvement, especially in the interaction with participants and the usability of the platform.

Finally, the analysis of the different methodologies implemented highlights the importance of continuing to evolve in the design and delivery of these courses. As mentioned in chapter 8, greater attention to interactivity, social cohesion and platform usability could further improve the student experience.

In conclusion, the project has demonstrated the potential of microlearning and flexible digital methodologies to transform teacher training in higher education. However, key challenges remain, such as improving interaction between participants, opti-

mising technology and integrating methodologies that reinforce collaborative learning. The consolidation of the cooperation network and the adoption of more inclusive and adaptive strategies will enable further progress towards a more flexible, innovative and accessible university education.

Conclusiones

El presente libro analiza la efectividad del microaprendizaje y las metodologías digitales flexibles en la formación del profesorado universitario en Europa. A lo largo de sus capítulos, se examinan tanto los logros alcanzados como los desafíos identificados en la implementación de los NOOCs (Nano Open Online Courses) dentro del proyecto ENID-Teach.

Uno de los principales resultados ha sido la consolidación de una amplia red de participación, con 827 profesores inscritos en los cursos de formación, de los cuales 578 pertenecen a universidades de la Unión Europea, más de 100 a otros niveles educativos dentro de la UE y 60 provienen de países fuera de Europa (capítulo 1). En total, 3,044 personas han participado en los cursos, lo que refleja un creciente interés en la adopción de metodologías digitales en la enseñanza superior.

Desde una perspectiva metodológica, los NOOCs han sido bien valorados por su estructura, contenido y aplicabilidad, lo que confirma el interés del profesorado universitario en integrar estrategias innovadoras en su práctica docente. En este sentido, se destaca que los participantes valoraron especialmente la claridad y la organización del curso, así como la aplicabilidad del contenido en su enseñanza (capítulo 3). Sin embargo, se ha identificado la necesidad de reforzar la interacción entre los participantes y la presencia de los instructores durante el proceso formativo, lo que permitiría una mayor apropiación de los contenidos y una experiencia de aprendizaje más colaborativa.

La flexibilidad y accesibilidad de los cursos han sido aspectos clave, ya que han permitido a los docentes organizar su tiempo de estudio de acuerdo con sus necesidades. Este elemento ha sido

esencial para facilitar su participación, ya que muchos docentes enfrentan restricciones de tiempo que dificultan su formación continua. Como se señala en el capítulo 4, los cursos han logrado adaptarse a los ritmos y horarios de los participantes, lo que les ha permitido compaginar su formación con la actividad docente.

Los resultados obtenidos en la evaluación de las metodologías confirman que estrategias como la gamificación y el aprendizaje activo generan un alto nivel de interés y compromiso entre el profesorado. En particular, se ha observado que el diseño de aprendizaje gamificado puede reforzar la motivación, la participación y los resultados del aprendizaje (capítulo 10). No obstante, algunos participantes indicaron que estos métodos podrían contextualizarse mejor en situaciones concretas de aula para maximizar su aplicabilidad.

Desde el punto de vista tecnológico, la plataforma utilizada ha sido bien valorada en términos generales, aunque algunos participantes señalaron dificultades de navegación y usabilidad, lo que sugiere la necesidad de optimizar su funcionamiento. También se ha identificado la importancia de integrar mejor los foros y otras herramientas colaborativas dentro de la plataforma para mejorar la interacción y la cohesión del grupo. Como se menciona en el capítulo 5, aunque la plataforma ha sido considerada intuitiva en términos generales, algunos usuarios informaron de problemas técnicos que afectaron la experiencia de aprendizaje.

El sentido de comunidad y la cohesión entre los participantes han sido aspectos con margen de mejora, ya que en muchos casos la experiencia de aprendizaje ha sido percibida como individual y con escasa interacción con otros participantes. Como se indica en el capítulo 6, la falta de interacción grupal redujo el sentimiento de pertenencia al grupo. Para mejorar este aspecto, se recomienda incrementar la participación en foros, actividades colaborativas y sesiones en tiempo real que fomenten la construcción de una comunidad de aprendizaje más activa.

El análisis de la satisfacción con los cursos ha mostrado que la formación flexible y basada en metodologías innovadoras es una necesidad en el ámbito universitario. No obstante, los resultados también revelan resistencias a la digitalización en ciertos contextos académicos, como en el caso del profesorado italiano, donde se ha identificado una falta de reconocimiento institucional de la

formación didáctica digital, lo que limita su adopción (capítulo 9). Esto pone de manifiesto la necesidad de políticas que favorezcan la integración de enfoques digitales y valoren la capacitación pedagógica en el desarrollo profesional del profesorado.

Otro de los logros más destacados del proyecto ha sido la creación de la Red de Cooperación Internacional para la Transferencia de Conocimientos y el Aprendizaje Digital (ReCoIn-TaD), que ha logrado consolidarse con 578 miembros, incluidos 300 profesores universitarios de la UE. Esta red ha permitido ampliar el impacto del proyecto, promoviendo la colaboración académica y el intercambio de buenas prácticas pedagógicas a nivel internacional.

En el ámbito de los recursos educativos abiertos (REA), el estudio ha demostrado su potencial para transformar la educación y hacerla más inclusiva e interactiva. Como se menciona en el capítulo 11, la adopción de herramientas como vídeos interactivos, imágenes inmersivas y cuestionarios lúdicos mejora la participación de los estudiantes y fomenta el desarrollo de habilidades críticas y transversales. No obstante, persisten desafíos en términos de accesibilidad y formación docente para un uso óptimo de estos recursos.

Asimismo, el estudio ha evidenciado la necesidad de mejorar la formación pedagógica del profesorado universitario. Como se señala en el capítulo 7, a nivel universitario, los profesores no reciben ninguna formación pedagógica obligatoria a lo largo de su carrera, lo que se traduce en una carencia de estrategias didácticas actualizadas y eficaces. Este problema refuerza la relevancia del proyecto ENID-Teach en la promoción de metodologías flexibles y digitales en la educación superior.

En términos de impacto general, los niveles de satisfacción han sido elevados, con más del 80 % de los participantes valorando positivamente los cursos en aspectos como la claridad de los contenidos, la estructura del curso y la utilidad de los materiales. Sin embargo, como se concluye en el capítulo 12, existen áreas de mejora, especialmente en la interacción con los participantes y la usabilidad de la plataforma.

Por último, el análisis de las diferentes metodologías implementadas resalta la importancia de seguir evolucionando en el diseño e impartición de estos cursos. Como se menciona en el capítulo 8, una mayor atención a la interactividad, la cohesión

social y la usabilidad de la plataforma podría mejorar aún más la experiencia del alumnado.

En conclusión, el proyecto ha demostrado el potencial del microaprendizaje y las metodologías digitales flexibles para transformar la formación docente en la educación superior. Sin embargo, persisten desafíos clave, como la mejora de la interacción entre participantes, la optimización tecnológica y la integración de metodologías que refuercen el aprendizaje colaborativo. La consolidación de la red de cooperación y la adopción de estrategias más inclusivas y adaptativas permitirán seguir avanzando hacia una educación universitaria más flexible, innovadora y accesible.

Conclusões

Este livro analisa a eficácia da microaprendizagem e das metodologias digitais flexíveis na formação de professores universitários na Europa. Ao longo dos seus capítulos, examina tanto as realizações como os desafios identificados na implementação dos NOOCs (Nano Open Online Courses) no âmbito do projeto ENID-Teach.

Um dos principais resultados foi a consolidação de uma ampla rede de participação, com 827 professores inscritos nos cursos de formação, dos quais 578 são de universidades da União Europeia, mais de 100 de outros níveis de ensino da UE e 60 de países fora da Europa (capítulo 1). No total, 3.044 pessoas participaram nos cursos, o que reflecte um interesse crescente na adoção de metodologias digitais no ensino superior.

Do ponto de vista metodológico, os NOOC foram bem apreciados pela sua estrutura, conteúdo e aplicabilidade, o que confirma o interesse do pessoal docente universitário em integrar estratégias inovadoras na sua prática pedagógica. Neste sentido, é de salientar que os participantes valorizaram particularmente a clareza e a organização do curso, bem como a aplicabilidade do conteúdo no seu ensino (capítulo 3). No entanto, foi identificada a necessidade de reforçar a interação entre os participantes e a presença dos formadores durante o processo de formação, o que permitiria uma maior apropriação dos conteúdos e uma experiência de aprendizagem mais colaborativa.

A flexibilidade e a acessibilidade dos cursos foram aspectos fundamentais, pois permitiram que os professores organizassem o seu tempo de estudo de acordo com as suas necessidades. Este elemento foi essencial para facilitar a sua participação, uma

vez que muitos professores enfrentam restrições de tempo que dificultam a sua aprendizagem contínua. Tal como referido no Capítulo 4, os cursos foram capazes de se adaptar aos ritmos e horários dos participantes, permitindo-lhes combinar a sua formação com a sua atividade docente.

Os resultados obtidos na avaliação das metodologias confirmam que estratégias como a gamificação e a aprendizagem ativa geram um elevado nível de interesse e empenho entre o pessoal docente. Em particular, foi observado que a conceção de aprendizagem gamificada pode aumentar a motivação, a participação e os resultados da aprendizagem (Capítulo 10). No entanto, alguns participantes indicaram que estes métodos poderiam ser mais bem contextualizados em situações específicas de sala de aula para maximizar a sua aplicabilidade.

Do ponto de vista tecnológico, a plataforma utilizada foi, em geral, bem avaliada, embora alguns participantes tenham apontado dificuldades de navegação e de utilização, sugerindo a necessidade de otimizar o seu funcionamento. Foi também identificada a importância de integrar melhor os fóruns e outras ferramentas de colaboração na plataforma para melhorar a interação e a coesão do grupo. Tal como referido no capítulo 5, embora a plataforma tenha sido considerada intuitiva em termos gerais, alguns utilizadores referiram problemas técnicos que afectaram a experiência de aprendizagem.

O sentido de comunidade e a coesão entre os participantes foram áreas a melhorar, uma vez que, em muitos casos, a experiência de aprendizagem foi considerada individual e com pouca interação com outros participantes. Tal como indicado no capítulo 6, a falta de interação do grupo reduziu o sentimento de pertença ao grupo. Para melhorar este aspeto, recomenda-se o aumento da participação em fóruns, actividades colaborativas e sessões em tempo real que promovam a construção de uma comunidade de aprendizagem mais ativa.

A análise da satisfação com os cursos mostrou que a formação flexível baseada em metodologias inovadoras é uma necessidade no meio universitário. No entanto, os resultados também revelam resistência à digitalização em certos contextos académicos, como no caso dos professores italianos, onde foi identificada uma falta de reconhecimento institucional da formação didática digital, limitando a sua adoção (Capítulo 9). Este facto realça a

necessidade de políticas que favoreçam a integração de abordagens digitais e valorizem a formação pedagógica no desenvolvimento profissional dos professores.

Outra grande conquista do projeto foi a criação da Rede de Cooperação Internacional para a Transferência de Conhecimentos e Aprendizagem Digital (ReCoIn-TaD), que foi consolidada com sucesso com 565 membros, incluindo 300 professores universitários da UE e 53 de fora da Europa (Capítulo 1). Esta rede permitiu alargar o impacto do projeto, promovendo a colaboração académica e o intercâmbio de boas práticas pedagógicas a nível internacional.

No domínio dos recursos educativos abertos (REA), o estudo demonstrou o seu potencial para transformar a educação e torná-la mais inclusiva e interactiva. Tal como referido no capítulo 11, a adoção de ferramentas como vídeos interactivos, imagens imersivas e questionários lúdicos melhora a participação dos alunos e promove o desenvolvimento de competências críticas e transversais. No entanto, subsistem desafios em termos de acessibilidade e de formação dos professores para uma utilização óptima destes recursos.

O estudo também salientou a necessidade de melhorar a formação pedagógica dos professores universitários. Tal como referido no capítulo 7, a nível universitário, os professores não recebem qualquer formação pedagógica obrigatória ao longo das suas carreiras, o que resulta numa falta de estratégias de ensino actualizadas e eficazes. Este problema reforça a relevância do projeto ENID-Teach na promoção de metodologias flexíveis e digitais no ensino superior.

Em termos de impacto global, os níveis de satisfação foram elevados, com mais de 80% dos participantes a classificarem positivamente os cursos em aspectos como a clareza dos conteúdos, a estrutura do curso e a utilidade dos materiais. No entanto, como se conclui no capítulo 12, há áreas a melhorar, especialmente na interação com os participantes e na usabilidade da plataforma.

Por último, a análise das diferentes metodologias implementadas realça a importância de continuar a desenvolver a conceção e a realização destes cursos. Tal como referido no capítulo 8, uma maior atenção à interatividade, à coesão social e à facilidade de

utilização da plataforma poderia melhorar ainda mais a experiência do formando.

Em conclusão, o projeto demonstrou o potencial da microaprendizagem e das metodologias digitais flexíveis para transformar a formação de professores no ensino superior. No entanto, subsistem desafios fundamentais, como a melhoria da interação entre os participantes, a otimização tecnológica e a integração de metodologias que reforcem a aprendizagem colaborativa. A consolidação da rede de cooperação e a adoção de estratégias mais inclusivas e adaptativas permitirão novos progressos no sentido de um ensino superior mais flexível, inovador e acessível.

Conclusioni

Questo libro analizza l'efficacia del microapprendimento e delle metodologie digitali flessibili nella formazione universitaria degli insegnanti in Europa. Nei suoi capitoli, esamina sia i risultati che le sfide identificate nell'implementazione dei NOOC (Nano Open Online Courses) nell'ambito del progetto ENID-Teach.

Uno dei risultati principali è stato il consolidamento di un'ampia rete di partecipazione, con 827 insegnanti iscritti ai corsi di formazione, di cui 578 provenienti da università dell'Unione Europea, più di 100 da altri livelli educativi all'interno dell'UE e 60 da Paesi extraeuropei (capitolo 1). In totale, 3.044 persone hanno partecipato ai corsi, a testimonianza del crescente interesse per l'adozione di metodologie digitali nell'istruzione superiore.

Da un punto di vista metodologico, i NOOC sono stati ben apprezzati per la loro struttura, i contenuti e l'applicabilità, il che conferma l'interesse del personale docente universitario a integrare strategie innovative nella propria pratica didattica. In questo senso, va notato che i partecipanti hanno apprezzato particolarmente la chiarezza e l'organizzazione del corso, nonché l'applicabilità dei contenuti nel loro insegnamento (capitolo 3). Tuttavia, è stata individuata la necessità di rafforzare l'interazione tra i partecipanti e la presenza dei docenti durante il processo di formazione, che consentirebbe una maggiore appropriazione dei contenuti e un'esperienza di apprendimento più collaborativa.

La flessibilità e l'accessibilità dei corsi sono stati aspetti fondamentali, in quanto hanno permesso agli insegnanti di organizzare il tempo di studio in base alle proprie esigenze. Questo elemento è stato essenziale per facilitare la loro partecipazione, poiché molti insegnanti hanno vincoli di tempo che ostacolano

il loro apprendimento continuo. Come si è detto nel Capitolo 4, i corsi sono stati in grado di adattarsi ai ritmi e agli orari dei partecipanti, permettendo loro di combinare la formazione con l'attività didattica.

I risultati ottenuti nella valutazione delle metodologie confermano che strategie come la gamification e l'apprendimento attivo generano un alto livello di interesse e impegno tra il personale docente. In particolare, è stato osservato che il design dell'apprendimento gamificato può aumentare la motivazione, la partecipazione e i risultati dell'apprendimento (Capitolo 10). Tuttavia, alcuni partecipanti hanno indicato che questi metodi potrebbero essere meglio contestualizzati in situazioni d'aula specifiche per massimizzarne l'applicabilità.

Da un punto di vista tecnologico, la piattaforma utilizzata è stata generalmente valutata bene, anche se alcuni partecipanti hanno evidenziato difficoltà di navigazione e usabilità, suggerendo la necessità di ottimizzarne il funzionamento. È stata anche individuata l'importanza di integrare meglio i forum e altri strumenti di collaborazione all'interno della piattaforma per migliorare l'interazione e la coesione del gruppo. Come menzionato nel capitolo 5, sebbene la piattaforma sia stata considerata intuitiva in termini generali, alcuni utenti hanno segnalato problemi tecnici che hanno influito sull'esperienza di apprendimento.

Il senso di comunità e di coesione tra i partecipanti è stato oggetto di miglioramento, poiché in molti casi l'esperienza di apprendimento è stata percepita come individuale e con poca interazione con gli altri partecipanti. Come indicato nel capitolo 6, la mancanza di interazione di gruppo ha ridotto il senso di appartenenza al gruppo. Per migliorare questo aspetto, si raccomanda di aumentare la partecipazione a forum, attività collaborative e sessioni in tempo reale che favoriscano la costruzione di una comunità di apprendimento più attiva.

L'analisi della soddisfazione per i corsi ha dimostrato che la formazione flessibile basata su metodologie innovative è una necessità nell'ambiente universitario. Tuttavia, i risultati rivelano anche una resistenza alla digitalizzazione in alcuni contesti accademici, come nel caso dei docenti italiani, dove è stata individuata una mancanza di riconoscimento istituzionale della formazione didattica digitale, che ne limita l'adozione (Capitolo 9). Ciò evidenzia la necessità di politiche che favoriscano l'integrazione

degli approcci digitali e valorizzino la formazione pedagogica nello sviluppo professionale degli insegnanti.

Un altro dei risultati più importanti del progetto è stata la creazione della Rete di Cooperazione Internazionale per il Trasferimento di Conoscenze e l'Apprendimento Digitale (ReCoIn-TaD), che è riuscita a consolidare la sua posizione con 578 membri, tra cui più di 300 professori universitari dell'UE (capitolo 1). Questa rete ha permesso di estendere l'impatto del progetto, promuovendo la collaborazione accademica e lo scambio di buone pratiche pedagogiche a livello internazionale.

Nel campo delle risorse educative aperte (OER), lo studio ha dimostrato il loro potenziale per trasformare l'istruzione e renderla più inclusiva e interattiva. Come menzionato nel capitolo 11, l'adozione di strumenti come video interattivi, immagini coinvolgenti e quiz ludici migliora il coinvolgimento degli studenti e favorisce lo sviluppo di competenze critiche e trasversali. Tuttavia, rimangono delle sfide in termini di accessibilità e formazione degli insegnanti per un uso ottimale di queste risorse.

Lo studio ha anche evidenziato la necessità di migliorare la formazione pedagogica degli insegnanti universitari. Come si è detto nel Capitolo 7, a livello universitario gli insegnanti non ricevono alcuna formazione pedagogica obbligatoria nel corso della loro carriera, il che si traduce in una mancanza di strategie didattiche aggiornate ed efficaci. Questo problema rafforza la rilevanza del progetto ENID-Teach nella promozione di metodologie flessibili e digitali nell'istruzione superiore.

In termini di impatto complessivo, i livelli di soddisfazione sono stati elevati, con oltre l'80% dei partecipanti che ha valutato positivamente i corsi su aspetti quali la chiarezza dei contenuti, la struttura del corso e l'utilità dei materiali. Tuttavia, come concluso nel capitolo 12, ci sono aree di miglioramento, soprattutto per quanto riguarda l'interazione con i partecipanti e l'usabilità della piattaforma.

Infine, l'analisi delle diverse metodologie implementate evidenzia l'importanza di continuare a evolvere la progettazione e l'erogazione di questi corsi. Come menzionato nel capitolo 8, una maggiore attenzione all'interattività, alla coesione sociale e all'usabilità della piattaforma potrebbe migliorare ulteriormente l'esperienza dei discenti.

In conclusione, il progetto ha dimostrato il potenziale del microapprendimento e delle metodologie digitali flessibili per trasformare la formazione degli insegnanti nell'istruzione superiore. Rimangono tuttavia alcune sfide fondamentali, come il miglioramento dell'interazione tra i partecipanti, l'ottimizzazione tecnologica e l'integrazione di metodologie che rafforzino l'apprendimento collaborativo. Il consolidamento della rete di cooperazione e l'adozione di strategie più inclusive e adattive consentiranno ulteriori progressi verso un'istruzione superiore più flessibile, innovativa e accessibile.

Conclusions

Ce livre analyse l'efficacité du microapprentissage et des méthodologies numériques flexibles dans la formation universitaire des enseignants en Europe. Au fil des chapitres, il examine à la fois les réalisations et les défis identifiés dans la mise en œuvre des NOOC (Nano Open Online Courses) dans le cadre du projet ENID-Teach.

L'un des principaux résultats a été la consolidation d'un vaste réseau de participation, avec 827 enseignants inscrits aux cours de formation, dont 578 proviennent d'universités de l'Union européenne, plus de 100 d'autres niveaux d'enseignement au sein de l'UE et 60 de pays hors Europe (chapitre 1). Au total, 3 044 personnes ont participé aux cours, ce qui témoigne d'un intérêt croissant pour l'adoption de méthodologies numériques dans l'enseignement supérieur.

D'un point de vue méthodologique, les NOOC ont été bien appréciés pour leur structure, leur contenu et leur applicabilité, ce qui confirme l'intérêt du personnel enseignant des universités pour l'intégration de stratégies innovantes dans leur pratique d'enseignement. En ce sens, il convient de noter que les participants ont particulièrement apprécié la clarté et l'organisation du cours, ainsi que l'applicabilité du contenu dans leur enseignement (chapitre 3). Cependant, le besoin a été identifié de renforcer l'interaction entre les participants et la présence des instructeurs pendant le processus de formation, ce qui permettrait une plus grande appropriation des contenus et une expérience d'apprentissage plus collaborative.

La flexibilité et l'accessibilité des cours ont été des aspects clés, car ils ont permis aux enseignants d'organiser leur temps

d'étude en fonction de leurs besoins. Cet élément a été essentiel pour faciliter leur participation, car de nombreux enseignants sont confrontés à des contraintes de temps qui entravent leur apprentissage continu. Comme indiqué au chapitre 4, les cours ont pu s'adapter aux rythmes et aux horaires des participants, leur permettant de combiner leur formation avec leur activité d'enseignement.

Les résultats obtenus lors de l'évaluation des méthodologies confirment que des stratégies telles que la gamification et l'apprentissage actif suscitent un niveau élevé d'intérêt et d'engagement parmi le personnel enseignant. En particulier, il a été observé que la conception de l'apprentissage par le jeu peut renforcer la motivation, la participation et les résultats de l'apprentissage (chapitre 10). Toutefois, certains participants ont indiqué que ces méthodes pourraient être mieux contextualisées dans des situations de classe spécifiques afin de maximiser leur applicabilité.

D'un point de vue technologique, la plateforme utilisée a été généralement bien évaluée, bien que certains participants aient signalé des difficultés de navigation et d'utilisation, suggérant la nécessité d'optimiser son fonctionnement. L'importance d'une meilleure intégration des forums et autres outils de collaboration au sein de la plateforme pour améliorer l'interaction et la cohésion du groupe a également été identifiée. Comme mentionné au chapitre 5, bien que la plateforme ait été considérée comme intuitive en termes généraux, certains utilisateurs ont signalé des problèmes techniques qui ont affecté l'expérience d'apprentissage.

Le sens de la communauté et la cohésion entre les participants sont des domaines à améliorer, car dans de nombreux cas, l'expérience d'apprentissage a été perçue comme individuelle et avec peu d'interaction avec les autres participants. Comme indiqué au chapitre 6, le manque d'interaction au sein du groupe a réduit le sentiment d'appartenance au groupe. Pour améliorer cet aspect, il est recommandé d'augmenter la participation aux forums, aux activités de collaboration et aux sessions en temps réel qui favorisent la création d'une communauté d'apprentissage plus active.

L'analyse de la satisfaction à l'égard des cours a montré que la formation flexible basée sur des méthodologies innovantes est une nécessité dans l'environnement universitaire. Cependant, les résultats révèlent également une résistance à la numérisation

dans certains contextes académiques, comme dans le cas des enseignants italiens, où un manque de reconnaissance institutionnelle de la formation didactique numérique a été identifié, limitant son adoption (chapitre 9). Cela souligne la nécessité de politiques qui favorisent l'intégration des approches numériques et valorisent la formation pédagogique dans le développement professionnel des enseignants.

Une autre des réalisations les plus remarquables du projet a été la création du Réseau de coopération internationale pour le transfert de connaissances et l'apprentissage numérique (ReCoIn-TaD), qui a réussi à consolider sa position avec 578 membres, dont plus de 300 professeurs d'université de l'UE (chapitre 1). Ce réseau a permis d'étendre l'impact du projet, en promouvant la collaboration académique et l'échange de bonnes pratiques pédagogiques au niveau international.

Dans le domaine des ressources éducatives libres (REL), l'étude a démontré leur potentiel pour transformer l'éducation et la rendre plus inclusive et interactive. Comme mentionné au chapitre 11, l'adoption d'outils tels que les vidéos interactives, les images immersives et les quiz ludiques améliore l'engagement des étudiants et favorise le développement de compétences critiques et transversales. Cependant, des défis subsistent en termes d'accessibilité et de formation des enseignants pour une utilisation optimale de ces ressources.

L'étude a également mis en évidence la nécessité d'améliorer la formation pédagogique des enseignants universitaires. Comme indiqué au chapitre 7, au niveau universitaire, les enseignants ne reçoivent pas de formation pédagogique obligatoire tout au long de leur carrière, ce qui entraîne un manque de stratégies d'enseignement actualisées et efficaces. Ce problème renforce la pertinence du projet ENID-Teach dans la promotion de méthodologies flexibles et numériques dans l'enseignement supérieur.

En termes d'impact global, les niveaux de satisfaction ont été élevés, plus de 80 % des participants ayant évalué les cours de manière positive sur des aspects tels que la clarté du contenu, la structure du cours et l'utilité du matériel. Toutefois, comme le conclut le chapitre 12, des améliorations sont possibles, notamment en ce qui concerne l'interaction avec les participants et la facilité d'utilisation de la plateforme.

Enfin, l'analyse des différentes méthodologies mises en œuvre souligne l'importance de continuer à faire évoluer la conception et la prestation de ces cours. Comme mentionné au chapitre 8, une plus grande attention à l'interactivité, à la cohésion sociale et à la facilité d'utilisation de la plateforme pourrait encore améliorer l'expérience de l'apprenant.

En conclusion, le projet a démontré le potentiel du microapprentissage et des méthodologies numériques flexibles pour transformer la formation des enseignants dans l'enseignement supérieur. Cependant, des défis majeurs subsistent, tels que l'amélioration de l'interaction entre les participants, l'optimisation technologique et l'intégration de méthodologies qui renforcent l'apprentissage collaboratif. La consolidation du réseau de coopération et l'adoption de stratégies plus inclusives et adaptatives permettront de progresser davantage vers un enseignement supérieur plus flexible, innovant et accessible.

Coordination

Sonia Santoveña-Casal
University Professor in the Department of Teaching, School Organisation and Special Teaching at the National University of Distance Education (UNED), she has more than twenty-five years of experience in the university environment. She currently directs the University Institute of Distance Education (IUED) at the UNED. Her teaching and research work has focused on the critical analysis of digital society, social networks and their implications for educational processes. Her scientific output has contributed significantly to the study of digital methodologies, communication in virtual environments and interpersonal dynamics in the digital age.

Her most notable publications include *Cartografía de la sociedad y educación digital* (Tirant lo Blanch) among other books and research articles. She has also led high-impact projects such as the *European Network in D-flexible Teaching (ENID-Teach)*, funded by the KA220-HED programme (Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551).

She is currently the principal investigator of the project *Rural Women Facing Generative Artificial Intelligence (Humanist): Situational Analysis and Training Proposal (MujerRural-IAHu)*, funded by the Ministry of Science, Innovation and Universities, within the framework of Knowledge Generation Projects. This research is aimed at the critical analysis of the situation of women in rural environments in the face of the challenges of generative artificial intelligence, from a humanist perspective, with the aim of proposing adapted training responses with an inclusive approach.

Sonia Santoveña-Casal
Catedrática de Universidad en el Departamento de Didáctica, Organización Escolar y Didácticas Especiales de la Universidad Nacional de Educación a Distancia (UNED), cuenta con más de veinticinco años de trayectoria en el ámbito universitario. Actualmente, dirige el Instituto Universitario de Educación a Distancia (IUED) de la UNED. Su labor docente e investigadora se ha centrado en el análisis crítico de la sociedad digital, las redes sociales y sus implicaciones en los procesos educativos. Su producción científica ha contribuido significativamente al estudio de las metodologías digitales, la comunicación en entornos virtuales y las dinámicas interpersonales en la era digital.

Entre sus publicaciones más destacadas se encuentran *Cartografía de la sociedad y educación digital* (Tirant lo Blanch) entre otros libros y artículos de investigación. Asimismo, ha liderado proyectos de gran impacto como el *European Network in D-flexible Teaching (ENID-Teach)*, financiado por el programa KA220-HED (Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551).

En la actualidad, es investigadora principal del proyecto *Mujeres rurales frente a la inteligencia artificial generativa (humanista): análisis situacional y propuesta formativa (MujerRural-IAHu)*, financiado por el Ministerio de Ciencia, Innovación y Universidades, en el marco de los Proyectos de Generación de Conocimiento. Esta investigación se orienta al análisis crítico de la situación de las mujeres en entornos rurales ante los retos de la inteligencia artificial generativa, desde una perspectiva humanista, con el objetivo de proponer respuestas formativas adaptadas y con enfoque inclusivo.

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Effectiveness of microlearning in the digital training of European university faculty

Higher education is undergoing a profound digital transformation. This work presents the results of the **European Network in D-flexible Teaching (ENID-Teach)** project, funded by the **KA220-HED (Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551)** programme, coordinated by the **Universidad Nacional de Educación a Distancia (UNED)**. Through flexible and innovative digital methodologies, this initiative has made it possible to explore new forms of teaching adapted to current challenges. The analysis is based on interviews and discussion groups with European university professors, offering a practical perspective on the impact of hybrid learning, gamification and microlearning in higher education.

The book is structured in three parts. Firstly, it addresses the fundamentals and innovative methodologies that lay the foundations for flexible digital learning. Secondly, it presents the experiences of Spanish teachers, including real cases of the implementation of these strategies in the university classroom. Finally, it examines European practices in the process of digital transformation, highlighting different approaches adopted in different countries across the continent.

This work is, therefore, a valuable tool for those seeking to understand and apply innovative pedagogical models in the current context of higher education.

La educación superior atraviesa una profunda transformación digital. Esta obra presenta los resultados del proyecto **European Network in D-flexible Teaching (ENID-Teach)** project, funded by the **KA220-HED (Cooperation Partnerships in Higher Education, 2021-1-ES01-KA220-HED-000027551)** program, coordinated by the **Universidad Nacional de Educación a Distancia (UNED)**. A través de metodologías digitales flexibles e innovadoras, esta iniciativa ha permitido explorar nuevas formas de enseñanza adaptadas a los desafíos actuales. El análisis se fundamenta en entrevistas y grupos de discusión con profesorado universitario europeo, ofreciendo una perspectiva práctica sobre el impacto del aprendizaje híbrido, la gamificación y el microlearning en la educación superior.

La estructura de la obra se articula en tres partes. En primer lugar, se abordan los fundamentos y las metodologías innovadoras, que sientan las bases del aprendizaje digital flexible. En segundo lugar, se presentan experiencias de docentes españoles, en las que se exponen casos reales de implementación de estas estrategias en el aula universitaria. Finalmente, se examinan prácticas europeas en el proceso de transformación digital, destacando diversos enfoques adoptados en diferentes países del continente.

Esta obra constituye, por tanto, una herramienta valiosa para quienes buscan comprender y aplicar modelos pedagógicos innovadores en el contexto actual de la enseñanza superior.