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ARTICLE / ARTÍCULO

Open Educational Practices for Critical Digital Competence: design characteristics and impact within the Spanish Higher Education Context

Prácticas Educativas Abiertas para una Competencia Digital Crítica: características de diseño e impacto en el contexto universitario español

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Abstract: Open Educational Practices (OEP) connected to both student agency and social justice enable the development of Critical Digital Competence (CDC). However, these have not been explored in depth for these purposes, nor have they been studied specifically in our context. This study aims to analyze the characteristics and impact of OEP in the Spanish university context, especially those that work primarily or secondarily with CDC. Semi-structured interviews were conducted with 12 university educators in the Spanish context. The analysis consisted of two consecutive phases: 1) the systematization of the main data from the 24 OEP identified in the interviews and 2) content analysis of the 12 educator interviews. The results show that most OEP focus on elements of CDC related to information search, analysis, processing and communication and critical evaluation of content, with other elements being less represented. Critical thinking about the digital world is presented as a cross-cutting element. Various impacts from the OEP related to competencies development can be observed, such as learning-to-learn or network collaboration. The study suggests that the open nature of OEP is not sufficient to foster critical thinking, but rather design is key to incorporating elements that promote CDC.

Keywords: Critical Digital Competence, Open Educational Practices, Higher Education, Student Agency, Open Educational Resources, Design for Learning.

Abstract: Las Prácticas Educativas Abiertas (PEA) vinculadas tanto a la actividad agéntica del estudiantado como a la justicia social permiten el desarrollo de la Competencia Digital Crítica (CDC). Sin embargo, estas no han tenido una exploración profunda para estos propósitos, ni se han estudiado de forma concreta en nuestro contexto. Este estudio tiene por objetivo el análisis de las características e impacto de las PEA en el contexto universitario español, especialmente aquellas que trabajan de forma principal o secundaria la CDC. Se emplearon entrevistas semiestructuradas, con 12 docentes universitarios del contexto español. El análisis constó de dos fases consecutivas: 1) la sistematización de datos principales de las 24 PEA identificadas en las entrevistas y 2) análisis de contenido de las 12 entrevistas docentes. Los resultados evidencian que la mayor parte de las PEA se enfocan en elementos de la CDC que tienen que ver con la búsqueda, análisis, procesamiento y comunicación de la información y la evaluación crítica de contenido, con menor representación de otros elementos. El pensamiento crítico sobre el mundo digital se presenta como elemento transversal. Se observan impactos diversos de las PEA relacionados con el desarrollo de competencias, como aprender a aprender o la colaboración en red. Del estudio se deriva que la condición abierta de una PEA no es suficiente para fomentar un espíritu crítico, sino que el diseño es clave para incorporar elementos que fomenten la CDC.

Palabras-clave: Competencia Digital Crítica, Prácticas Educativas Abiertas, Educación Superior, Agencia del estudiantado, Recursos Educativos Abiertos, Diseño para el aprendizaje.

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1. Introduction

Open education has emerged as a global movement that strives to democratize access to knowledge while reshaping teaching and learning practices in Higher Education. The basis of Open Educational Practices (hereinafter, OEP) is interdisciplinary and multifaceted alike; generally understood through two core ideas: the use of Open Educational Resources (hereinafter, OERs) and the implementation of pedagogical strategies grounded in the principles of open education. Cronin (2017) integrated these two perspectives into a definition of OEPs, characterizing them as pedagogical approaches that leverage OERs to foster collaborative, participatory, empowering, and transformative learning experiences. Both OEPs and Higher Education are situated within specific sociocultural contexts, where reflection acts as a mediating process between structural influences and agency (Cronin, 2017). However, the adoption of OEPs in Higher Education institutions depends not only on the availability of open content, but also on a range of institutional, cultural, and strategic factors that significantly influence the integration thereof into the university system (Luo et al., 2019). Studies such as Morgan et al. (2021) suggest that successful initiatives call for a holistic approach integrating leadership, clear policies, institutional culture, and support mechanisms.

Furthermore, the relationship between the use of OERs and the adoption of OEPs has not been examined in sufficient depth. A study conducted by Nascimbeni and Burgos (2019) involving 724 university educators from 36 countries, found that greater use of OERs is associated with a higher likelihood of adopting OEPs. However, research on this relationship remains limited and has often focused solely on content availability, overlooking the pedagogical, organizational, and design aspects of OEPs. The academic community acknowledges the need to adopt more comprehensive approaches that examine the impact of OEPs on educational innovation and the development of sustainable ecosystems, including its relationship with student agency. In this regard, in their systematic review of student agency in Higher Education, Marín, Tur et al. (2025) conclude that the adoption of OEPs can significantly boost student autonomy and strengthen their capacity to take action. This is achieved through a range of strategies, including involving students in designing OERs, creating online content, and using technologies that give them greater control over the learning process. OEPs have the potential to transform the power dynamics around knowledge, shifting from a model in which the educator is the sole source of knowledge to one in which the educator acts as a facilitator, while students become co-producers of knowledge throughout their learning process (Andrade et al., 2011; Axe et al., 2020).

There is a need to further expand research focused on analyzing and documenting practical experiences, particularly with regard to how OEPs can contribute to fostering agency among educators and students alike. As OEP initiatives evolve and mature within educational institutions, frameworks and tools that support the design and evaluation thereof become increasingly valuable. For example, Bali et al. (2020) examine OEPs through the lens of social justice and define them based on their focus beyond OERs, including processes and students, ultimately identifying three aspects that can be combined into typologies: a) content- or process-centered, b) teacher- or learner-centered, and c) pedagogical practice- or social justice-oriented.

This view of OEPs, which links learner agency with social justice, supports the development of critical digital competence. In fact, the critical aspect of digital competence has been identified as being of utmost importance to achieve transformative change in educational practices (Gutiérrez-Ujaque, 2024) and for fostering participation and engagement in social transformation (Prinsloo, 2022). Although digital competence has been defined by the European Commission (2019) as a set of varied skills that include various nuances from a critical perspective, it is still one of the least elaborated aspects of digital competence (Gouseti et al., 2024). As a result of a systematic literature review and expert validation of a conceptual framework on Critical Digital Competence (CDC) (Marín, Esteve-Mon et al., 2026; Marín, Orellana-Hernández et al., in press), CDC is defined as the «understanding and confident, analytical, ethical, safe, and responsible use of digital technologies as value-laden tools for learning, working, and participating in society, rather than neutral entities» (Marín, Esteve-Mon et al., 2026, p. 2).

This framework also led to the identification of six interrelated aspects of CDC. The first refers to critical thinking about the digital world, encompassing an understanding of online production and consumption processes, awareness of one's own digital literacy, and recognition of the sociocultural contexts in which technologies are used, as well as the ability to participate critically in digital ecosystems. This first aspect involves paying attention to the social, political, and ethical implications of how technologies are designed and used. It also includes aspects relating to the critical reflection on AI, data-driven innovation, the ideologies underpinning digital platforms, and the power of digital media, to name but a few aspects. The second aspect addresses searching for, analyzing, processing and communicating information, including interpreting multimodal texts, synthesizing information from different sources, and recognizing power dynamics. The third aspect concerns digital citizenship and responsibilities, encompassing the critical, safe, and ethical use of technologies, including safeguarding privacy, identity management, and responsible participation in digital environments across educational, professional, and social contexts. The fourth aspect, data literacy, concerns how personal data are collected, processed, and used, as well as the development of strategies to increase data subjects' control over their data and to enable more conscious and secure information management. The fifth aspect relates to critical media production, understood as the creation of digital content (including OERs) from a transformative perspective, using multimodal forms of expression that can challenge dominant narratives and foster civic engagement. The final aspect, critical content evaluation, refers to the ability to assess the credibility, reliability, and validity of digital information.

This study presents an analysis of selected OEPs in Spanish Higher Education, according to their contribution to developing CDC and examining their characteristics and pedagogical strategies within the framework of open education. We understand that the instructional design of OEPs is a relevant and complex task for educators, as it calls for understanding the complex interrelationships between the elements that go into planning a learning activity (Buils et al., 2023; Goodyear et al., 2021; Laurillard, 2012). Design for learning, which originated in the Anglo-Saxon context, is a relatively recent concept in the literature that focuses on developing conceptual strategies and meaningful ideas for understanding how to design emergent teaching and learning activities (Carvalho & Yeoman, 2019). Through this process, educators can improve their analytical capacity and make informed pedagogical decisions regarding the design of

learning activities, including the selection of appropriate tools and materials, making it a valuable educator-training resource (Goodyear & Dimitriadis, 2013).

The Activity-Centered Analysis and Design (ACAD) framework is based on the premise that learning activity should be situated and takes into account the physical, social, and epistemic elements that shape educational situations (Goodyear, 2015). To do so, it identifies four main aspects of design. Firstly, the learning scenario: designing elements in learning spaces (hybrid, online, and face-to-face), including digital tools and materials (resources, artifacts, and furniture), as well as the positioning thereof within a given space. Secondly, social interaction: refers to the design of social arrangements among students, such as groups or dyads, predefined roles, division of labor, the nature of collaboration, and students' roles in group work or assessment. Thirdly, epistemic or knowledge tasks refer to the design of learning activities, including the organization of knowledge, considerations of ways of knowing, and the selection, sequencing, and pacing of information for meaning-making. Finally, the goals: this aspect is included only when ACAD is used to plan learning objectives. In most cases, particularly in formal education, it is less likely to change.

The established, social, and epistemic components are the «designable elements» of a learning situation, meaning those elements that are open to modification or change. However, within this framework, the learning activity is not considered designable, as it is not possible to fully predict or control what students will do in advance; therefore, it is seen as emergent.

In the context of this research, the analysis of OEPs was conducted using an adapted version of the well-established ACAD framework developed by Goodyear et al. (2021) called the «ACAD CoDiCri Toolkit», developed within the framework of the project «Critical Digital Competence: towards agency for learning through open educational practices» (CoDiCri)[1]. Using a system of cards on a physical or digital canvas, this adapted instrument is designed to help educators analyze existing practices or come up with new teaching and learning proposals from the perspectives of openness, critical engagement, and student agency (Castañeda et al., 2026).

Striving to contribute to research on OEPs and its impact on CDC and agency in Higher Education, this study sets the following objectives:

a) To characterize OEPs in the Spanish context in relation to the CDC elements they incorporate.

b) To identify the impact that, according to educators, these OEPs have on developing students' CDC.

c) To take a deeper look into the relationship between the CDC elements and the ACAD-based design of OEPs.

Overall, this study strives to address the following research question: What are the characteristics and impacts of CDC-related OEPs in the Spanish university system?

[1] https://recercacompetecs.udl.cat/codicri

2. Method

This study is part of a larger design-based research (DBR) project (Easterday et al., 2018; McKenney & Reeves, 2012) (CoDiCri) focused on designing, implementing, and validating a pedagogical framework for developing OEPs in Higher Education that fosters CDC and student agency. This qualitative study draws on two prior tasks from the Analysis/Understanding phase of this DBR (reported in other publications), which are briefly described below.

On the one hand, a systematic literature review was conducted on the three central concepts of the project, of which this study highlights the relationship between two of them: OEPs and CDC. On the other hand, and concurrently, a systematic search was conducted using web scraping techniques to explore the websites of Spanish universities and assess the state of CDC, student agency, and open education in this context (Esteve-Mon et al., 2026). Among the results, 35 OEPs implemented by university educators in the Spanish context were identified.

Following this initial identification, the present study got underway. This was based on the objective of analyzing OEPs in the Spanish university system that addressed CDC and student agency. These university educators were contacted via email to request their participation in a semi-structured interview with a view to exploring how they developed OEPs in their classes and the institutional factors involved. In some cases, these educators put us in touch with colleagues who implemented OEPs that were more aligned with the project criteria. Twelve educators from eight universities (six public and two private), located in different regions of Spain, provided voluntary consent to participate in this study. The Research and Knowledge Transfer Ethics Committee of the University of Lleida issued a favorable opinion regarding the study.

The interviews were conducted between November and December 2024 and lasted approximately 30 to 45 minutes each. Prior to the interviews, the researchers shared an infographic with participating educators outlining the study's objectives and the key aspects that would guide data collection:

- Educator profile (e.g., years of teaching experience, educational level, initial training, etc.).
- Examples of OEPs (e.g., the design and use of OERs; student learning, impact of OEPs on transforming teaching practices, etc.). This is the focus of the present study.
- Institutional context (e.g., institutional policies supporting the implementation of OEPs, as well as factors that facilitate or hinder the adoption thereof within the university and its departments).

The interviews were conducted online via *Microsoft Teams*, audio-recorded, automatically transcribed, and subsequently reviewed by the research team.

Data analysis was conducted in two consecutive stages:

- Systematization of the main OEP data by drawing up descriptive sheets for each OEP. Each sheet included the following information (available on the project website): a) CDC elements (Marín, Esteve-Mon et al., 2026); b) learning scenario design (adapted from the ACAD CoDiCri Toolkit, Castañeda et al., 2026); c) OEP type according to the classification proposed by Bali et al. (2020); and d) implementation characteristics. These fact sheets were published in the institutional repository and on the project website following member checking and approval by the participating educators.

- Content analysis of the interviews supported by MAXQDA. The researchers agreed on a coding system comprising five aspects (e.g., teaching profile, ACAD, impact on learning, and the relationship between innovation, change, and institutional practices), 14 categories, and 48 codes. Four of the five researchers who conducted the interviews also participated in the collaborative analysis thereof. This second phase of the study focuses on two of the identified aspects: a) impact on learning (with the following sub-codes: impact on the development of CDC across its six elements of the conceptual framework, the development of the learning-to-learn competence, and other impacts/learning outcomes) and b) aspects of the ACAD framework that constitute the ACAD CoDiCri toolkit. To visualize relationships among these codes and sub-codes, a visual map and several co-occurrence tables were generated using the same analysis software.

This study presents the main findings derived from analyzing 24 OEPs in terms of the CDC elements identified and the types of OEPs, as well as the results of the content analysis of 12 interviews related to these OEPs. The latter focused, on the one hand, on the relationships between the CDC elements identified in the OEPs and the impact on learning perceived by educators as a result of the implementation thereof. On the other hand, it examined the relationships between the CDC elements identified in the OEPs and the design aspects according to the ACAD framework.

3. Results

3.1. EO1: Characterizing OEPs in relation to CDC in the Spanish university system

Regarding the first phase of data analysis, based on the systematization of key data from the 24 OEPs, the information on the study programs involved, the CDC elements identified (there may be more than one), and the type of OEPs are presented below.

The identified OEPs are distributed across a range of university programs (see Figure 1): 41% are in master's programs related to educational technology or digital education; 23% in initial teacher training; and 4% in continuing teacher education. Furthermore, 14% correspond to transversal practices not tied to a single course. The remaining OEPs are found in other degree programs, including Psychology (5%), Social Education (4%), and Multimedia Engineering (9%).

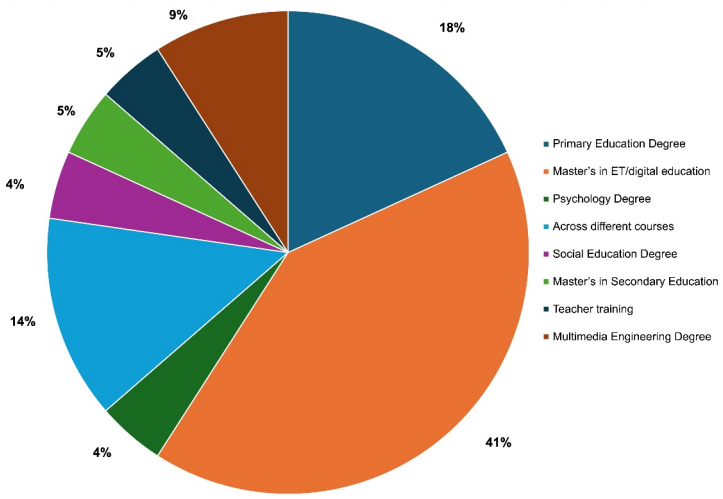

Figure 1. Location of the analyzed OEPs within Spanish Higher Education.

Regarding the 24 OEPs analyzed through semi-structured interviews with 12 educators from Spanish universities, the following CDC elements were identified in the records (first analysis): Information search, analysis, processing, and communication were identified in 16 OEPs; Critical content evaluation in 13 OEPs; Critical thinking about the digital world (awareness and reflection) and Digital citizenship and responsibility in 10 OEPs; Media production (critical perspective) in 7 OEPs; and Data literacy in 2 of the 24 OEPs.

On the other hand, regarding the types of OEPs, according to the classification proposed by Bali et al. (2020), among the 24 OEPs analyzed, the following are identified (see Figure 2): 14 were identified as Pedagogical practices focused on the learner and the content, 13 as Pedagogical practices focused on the learner and the process, 8 as Pedagogical practices focused on the teacher and the content, 5 as Pedagogical practices focused on the teacher and the process, 3 as Social justice practices focused on the learner and the content and 1 as a Social justice practice focused on the teacher and the content and as a Social justice practice focused on the teacher and the process. However, no Social Justice OEPs focused on the learner and the learning process were identified.

For example, OEPs associated with the CDC and student agency were identified, such as collaboratively editing Wikipedia, searching for, analyzing, or creating OERs as part of students' learning processes. On the teaching side, examples include developing repositories of OERs or creating OpenCourseWare courses. A detailed description of this type of OEP is provided at https://hdl.handle.net/10459.1/468262 [2].

[2] Direct translation in web format here: https://recercacompetecs-udl-cat.translate.goog/codicri/resultados/coleccion-de-casos-pea-en-el-contexto-universitario-espanol?_x_tr_sl=auto&_x_tr_tl=en&_x_tr_hl=es&_x_tr_pto=wapp

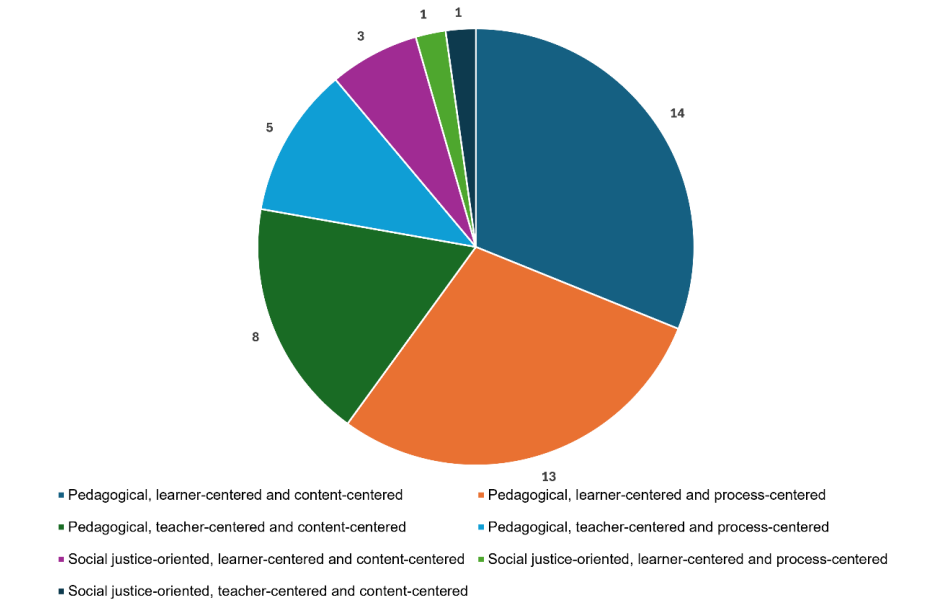

Figure 2. Types of OEPs Analyzed in Spanish Higher Education.

3.2. EO2: Identify the impact of OEPs on CDC and perceived learning

This objective was addressed through the second phase of data analysis, which consisted of the content analysis of the 12 interviews using MAXQDA. Figure 3 presents a code intersection map illustrating the relationship between the perceived impact of OEPs on CDC development (highlighting the three most frequently mentioned elements), the educators' perceived learning outcomes derived from OEPs, and the design of OEPs according to the ACAD aspects. Visualizing code co-occurrences within the same fragment provides a deeper understanding of the narratives put forward by the participating educators.

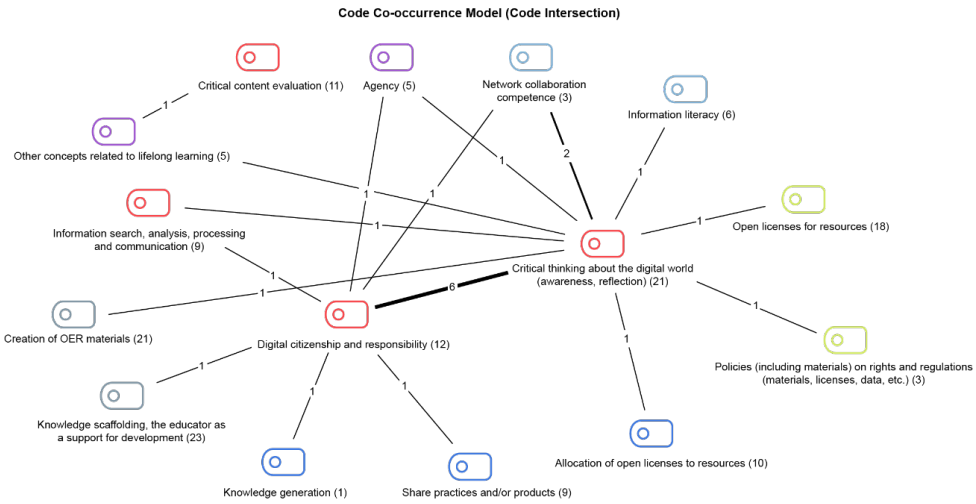

Figure 3. Code Intersection Map Linking CDC Elements, Perceived Learning Impact, and OEP Design According to the ACAD Framework

Note: Each element on the map represents a code, while the colors indicate membership in different code categories. The frequency with which each code appears across the 12 interviews is shown in parentheses. The lines connecting the codes indicate how often they co-occur in the interviews, reflecting the type of relationship.

Three CDC elements are most frequently positioned in the central and right areas of the map: digital citizenship and responsibility (n=12), critical content evaluation (n=11), and critical thinking about the digital world (awareness and reflection) (n=21). Some examples from the interviews include:

> «Open educational resources are not just materials that can be used, as in teaching practice, but also a topic of reflection and critical inquiry regarding what it means to access knowledge and how knowledge is produced. So, for me, its role is two-fold, it has a dual function.» (E12, Digital Citizenship and Responsibility)

> «The aim is to reflect on the use of this type of digital technology, its impact on people and professions, and the ethics of its use, as well as the development of materials, and, most importantly, without forgetting its technological characteristics, whether we take a step back from or make use of that technological potential, we inevitably influence the pedagogical features of the materials that are developed, and that guides us.» (E6, Critical Thinking about the Digital World)

> «Above all, it provides a starting point, an initial element developed within the university, an institution, or by an educator who is expected to have relevant knowledge. So, if we provide them with these initial, scientifically validated elements, we are giving them a high-quality starting point from which they can later navigate the vast amount of information available. It has to be evaluated critically, because there are millions that contribute very little, and some may even lead to incorrect beliefs.» (E2, Critical evaluation of the content)

The other three elements appear less frequently on the left side of the map, with fewer co-occurrences and weaker connections to other codes in the interviews. Connections are also observed among the CDC elements, with some appearing more closely related than others. The transversality of the Critical Thinking about the Digital World element is particularly noteworthy, given its high density of relationships and frequent co-occurrence with the other CDC elements.

With regard to critical thinking about the digital world, the codes linked to educators' perceived impact on learning derived from the implementation of OEPs include the development of network collaboration competence (social aspects) (5 connections), content creation (3 connections), information competence (3 connections), learning-to-learn competence (explicitly associated with the concept of agency, 4 connections), and other impacts (2 connections).

> «A sense of community, a sense of collaboration, and the idea that nobody knows everything, but everyone knows something. There is community intelligence, a form of collective intelligence. Its value is worth highlighting.» (E4, Networking Collaboration Competence)

> «I mean, we can add the 'digital' label if we want, given the environment we are in, but critical competence in general is only developed, in my opinion, when it is you who has to make decisions. That is one of the problems I consistently observe in students which I also consider needs to

> be urgently addressed. As time goes on, they become increasingly protected, in the sense of 'No, just tell me what you want and I'll do it for you. Don't ask me; I mean, you're playing a game, just decide. 'What if I make a mistake?' 'Well, if you make a mistake, you'll cope; it's not a big deal.'» (E11, Agency)

With regard to digital citizenship and responsibility, several learning outcomes are repeated, including the network collaboration competence and information literacy (three connections each), as well as the learning-to-learn competence (agency: 3 connections, autonomy: 2 connections) and other relationships with lifelong learning (4 connections).

> «And then learn the style of written communication, [...] there you analyze a lot of things. We were interested in students' critical thinking and analytical skills so that they could produce something, and that was very difficult for them. Understanding that we were not looking for text length, but for quality; text that contributes new knowledge to what already exists and that can be disseminated and presented rigorously, in line with the stylistic and ethical standards of Wikipedia itself.» (E7, Information Literacy)

> «When they design what we used to call teaching units, they consider how to adapt the syllabus and how to create and develop activities. In doing so, they must integrate methodologies, objectives, skills, and expectations.» (E12, Autonomy)

Finally, critical evaluation of content is mainly associated with the learning-to-learn competence (shown in purple in Figure 3), as well as with the development of autonomy (3 connections) and other concepts related to lifelong learning (4 connections).

> «We considered collaboration to be one of the key competencies of the program, and this activity supported it because contributions were not individual; […] participants agreed on what was published.» «But it was carried out in a rather collaborative, group-based way.» (E7, Other learning-related concepts)

3.3. EO3: To further explore the relationship between OEP design according to ACAD and CDC elements

In the second phase of data analysis, the relationships between OEP design according to the different aspects of ACAD and CDC elements were also explored, adopting a broad perspective, including identifying co-occurrences throughout the educators' narratives, thereby enabling a more in-depth examination of nuances of meaning.

Table 1 presents the co-occurrences between CDC elements and pedagogical approaches based on the ACAD-CoDiCri framework. Authentic learning (n=14) is the most frequently occurring educational framework, while critical thinking (n=19) is the most frequent CDC element. Broadly speaking, in terms of co-occurrences, it is worth highlighting that the interviewed educators' designs predominantly reflect conceptions of real and applicable (n=4), authentic (n=5), and active (n=5) learning in relation to activities addressing critical thinking. Similarly, these three learning perspectives also show the highest frequency of co-occurrence with the elements of digital citizenship and responsibility, and critical content evaluation.

Table 1. Table of co-occurrences between Pedagogical Approaches (ACAD) and CDC elements.

	PjBL	RAL	SCL	PBL	IBRL	AUL	ACL	Total
Critical thinking about the digital world	1	4	1	2	1	5	5	19
Information search, analysis, processing, and communication	0	1	1	1	0	1	1	5
Digital Citizenship and Responsibility	1	3	1	1	0	3	3	12
Data literacy	0	0	1	0	0	1	1	3
Media production (critical)	0	1	0	1	0	1	1	4
Critical content evaluation	0	3	1	1	1	3	2	11
Total	2	12	5	6	2	14	13	54

PBL = Project-based learning; RAL = Real and applicable learning; SCL = Student-centered learning; PBL = Problem-based learning; IBRL = Inquiry-based/research-based learning; AUL = Authentic learning; ACL = Active learning.

Table 2 presents the co-occurrences between the ACAD aspect of Material Resources and the CDC elements. Overall, OERs (n=21) were the most frequently identified material resource, while critical thinking was the most prevalent CDC element (n=62). Regarding co-occurrences, the association between these two elements was the most frequent (n=8), followed by co-occurrences with digital citizenship and responsibility (n=4), and critical content evaluation (n=4). Subsequently, other significant co-occurrences are those that occur between material resources such as such as Generative AI (n=5), open licenses (n=5), online platforms (n=4), and videos (n=4) for critical thinking. Also noteworthy are open licenses (n=4), online platforms (n=3) and OERs (n=4) for digital citizenship and responsibility, and the latter two for critical evaluation, along with Generative AI with n=4 repetitions each.

Table 2. Co-occurrences Between Material Resources (ACAD) and CDC Elements.

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Blog, platform diary	3	3	3	1	0	3	13
Diverse/international/intercultural context	1	0	0	0	0	1	2
Open courses/online courses	3	1	2	1	0	1	8
Asynchronous environments	2	1	1	0	1	1	6
Physical spaces on campus/university thought for teaching and learning	1	0	0	0	0	1	2
The institution's online spaces	1	1	1	0	1	0	4
Online discussion forums	1	0	1	0	1	0	3
Sources of information – Readings – Documents of primary sources	1	1	1	1	0	1	5
Online collaborative tools	0	1	0	0	0	0	1
Online communication tools	1	0	1	0	1	0	3
Synchronous tools/environments	1	0	0	0	0	1	2
Tools for creating multimodal materials	1	0	0	0	0	1	2
Generative AI (tools)	5	2	2	1	1	4	15
Network games	1	0	1	0	0	0	2
Open textbooks	2	1	2	1	0	1	7
Open licenses for resources	5	3	4	1	1	2	16
VLE - Online Platforms	4	2	3	1	0	4	14
Multimodal materials	2	1	2	0	1	0	6
Open Educational Resources (OERs)	8	3	4	1	1	4	21
Rights and regulations policies (materials)	2	1	2	1	1	1	8

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Digital portfolios	1	1	1	1	0	1	5
Mixed reality resources	1	0	0	0	0	1	2
Social networks	3	2	2	1	1	2	11
Material repositories	2	3	2	1	0	3	11
Specific software	2	0	1	0	1	1	5
Online bulletin boards	0	1	0	0	0	0	1
Open Universities	1	0	0	0	0	1	2
Videos	4	0	2	0	1	2	9
Wikipedia	0	1	1	0	0	1	3
YouTube	3	1	2	0	0	1	7
Total	62	30	41	12	12	39	196

CTDW = Critical thinking about the digital world; ISAPC = Information search, analysis, processing, and communication; DCR = Digital Citizenship and Responsibility; DL = Data literacy; MPC = Media production (critical); CCE = Critical content evaluation.

Table 3 presents the co-occurrences between the social design aspect of ACAD and the CDC elements, revealing a predominance of participatory designs. Nevertheless, the designs aimed at fostering critical thinking about the digital world and critical content evaluation were evenly distributed between individual work and teamwork involving three or more participants (n=5). Furthermore, collaborative work and the involvement of educators from external contexts were notable in the development of critical thinking (n=3) and critical evaluation (n=4 and n=3, respectively). Another noteworthy co-occurrence involves collaborative groups, particularly in relation to information search and analysis (n=3), digital citizenship and responsibility (n=2), and, to a lesser extent, data literacy (n=1). Consistently, teamwork also stands out in relation to digital citizenship and responsibility (n=3) and critical content evaluation (n=2).

Table 3. Table of co-occurrences between Social Aspects (ACAD) with the elements of the CDC.

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Collaborative groups	3	3	2	1	0	4	13
Learning community	1	0	0	0	0	1	2
Community-contextual reference group	0	1	1	0	0	1	3
Educators from other or external contexts	3	1	2	0	0	3	9
Educators within the institution/subject/course	2	1	1	0	0	1	5
Joint teams of educators and students	1	0	0	0	0	1	2
Student exercising autonomy	1	0	0	0	0	1	2
Pairs - groups of 2 people	1	0	0	0	0	0	1
External person	1	0	0	0	0	1	2
Support person - for students or faculty	0	1	1	0	0	1	3
Interviewees	1	0	0	0	0	1	2
Predefined roles	1	0	1	0	1	0	3
Teamwork - groups of 3 or more people	5	1	3	1	1	2	13
Individual work	5	2	2	0	1	2	12
Total	25	10	13	2	3	19	72

CTDW = Critical thinking about the digital world; ISAPC = Information search, analysis, processing, and communication; DCR = Digital Citizenship and Responsibility; DL = Data literacy; MPC = Media production (critical); CCE = Critical content evaluation.

Table 4 presents the broader ACAD aspect, showing a wide variety of designs and a highly distributed frequency, which reflects the diversity of tasks students engage in when working on CDC elements. Practical activities (n=16) are the most common tasks, followed by sharing practices and products (n=13), assigning free licenses (n=11), and peer collaboration (n=10), while critical thinking about the digital world (n=62), and critical content evaluation (n=48) are the most frequently occurring CDC elements. It is therefore expected that the most frequent co-occurrence occurs between practical activities and critical thinking (n=6), closely followed by the co-occurrence of the same CDC element with sharing practices and products (n=4). Other co-occurrences with three repetitions (n=3) include those between critical thinking and authentic activities, the analysis/identification of inaccuracies, the allocation of free licenses, peer collaboration, the creation and production of digital objects, and evaluation and feedback. Among the other CDC elements, three co-occurrences were observed between digital citizenship and responsibility and practical activities, the sharing of processes and products, as well as between critical content evaluation and practical activities. Data literacy and media production each show only one co-occurrence in a task, with the lowest overall frequencies (n=13 and n=8, respectively).

Table 4. Co-occurrences Between Epistemological Aspects (Students) (ACAD) and CDC Elements.

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Real activities	3	0	1	0	1	2	7
Self-regulation and/or metacognitive activities	1	1	0	0	0	1	3
Knowledge creation activities	1	1	1	0	0	2	5
Practical activities, «doing», «creating»	6	2	3	1	1	3	16
Gamified activities	2	0	0	0	0	2	4
Activities to raise critical awareness about digital technology	1	1	1	0	0	0	3
Expression activities	1	0	0	0	0	1	2
Analysis	1	2	1	1	0	1	6
Analysis/observation of inaccuracies, biases, plagiarism, and fabricated citations	3	1	1	1	0	2	8
Allocation of open licenses to resources	3	2	2	1	1	2	11
Search and exploration of sources	2	1	1	1	0	2	7
Student-proposed activities	1	0	0	0	0	1	2
Choose topics/areas of interest	1	1	2	0	1	1	6
Decision-making capacity, curriculum, evaluation	1	1	1	1	0	1	5
Peer collaboration	3	2	2	1	0	2	10
Share practices and/or products	4	2	3	1	1	2	13
Creation and production of podcasts, artifacts, etc.	3	1	1	0	0	2	7
Knowledge curation	1	1	1	1	0	1	5
Debates, dialogues, discussions	1	1	0	0	0	1	3
Diary… portfolio, blog	1	1	1	0	0	2	5
Editing Wikipedia articles	0	1	1	0	0	1	3
Writing, drafting, narrative compositions	2	1	1	1	0	2	7
Tool evaluation	1	2	1	1	0	1	6
Self-assessment and feedback (self- or peer-to-peer)	3	2	2	0	1	1	9
Knowledge generation	1	1	1	1	0	1	5
Interaction with other agents outside the classroom	2	0	0	0	0	2	4
Virtual/face-to-face exchanges	1	0	0	0	0	1	2
Games	1	0	1	0	1	0	3
Multimodal reading	1	0	0	0	0	1	2

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Active participation	1	0	1	0	1	0	3
Open presentation of results	2	1	2	1	0	1	7
Digital activism	1	0	0	0	0	1	2
Critical thinking	1	2	1	0	0	2	6
Flipped classroom tasks	1	0	1	0	0	0	2
Technical skills development tasks	2	0	0	0	0	1	3
Tasks for developing the own PLE	0	1	1	0	0	1	3
Informed decision-making	2	0	1	0	0	1	4
Total	62	32	36	13	8	48	199

CTDW = Critical thinking about the digital world; ISAPC = Information search, analysis, processing, and communication; DCR = Digital Citizenship and Responsibility; DL = Data literacy; MPC = Media production (critical); CCE = Critical content evaluation.

Table 5 presents the epistemic tasks defined by the ACAD-CoDiCri framework for teaching staff in relation to the six CDC elements. In this case, it is noteworthy that co-creation and co-design are scarcely mentioned by the interviewees. Undoubtedly, the most frequent activity is the creation of OER materials across all CDC elements, particularly for critical thinking about the digital world (n=7), followed by search and analysis (n=3), digital citizenship and responsibility (n=3), and critical content evaluation (n=4). It is particularly noteworthy that scaffolding knowledge-related tasks rank just behind creating OERs, showing up across critical thinking (n=4), information search and analysis (n=3), digital citizenship and responsibility (n=4), and content evaluation (n=3), along with formative assessment (n=5, 3, 4, and 4, respectively) and dialogic feedback (n=4, 2, 3, and 3, respectively).

Table 5. Co-occurrences Between Epistemological Aspects (Educators) (ACAD) and CDC Elements.

	CTDW	ISAPC	DCR	DL	MPC	CCE	Total
Knowledge scaffolding	4	3	4	1	1	3	16
Student support	1	0	0	0	0	1	2
Co-creation and co-design	0	1	0	0	0	0	1
Creation of OER materials	7	3	3	1	1	4	19
Formative assessment	5	3	4	1	1	4	18
Dialogic feedback	4	2	3	0	1	3	13
Customization	2	0	2	0	1	0	5
Receive support to understand how to develop their own OERs and the 4Rs of OERs	2	1	1	1	0	2	7
Fostering participation	3	1	1	0	1	2	8
Content curation	1	1	1	0	0	2	5
Total	29	15	19	4	6	21	94

CTDW = Critical thinking about the digital world; ISAPC = Information search, analysis, processing, and communication; DCR = Digital Citizenship and Responsibility; DL = Data literacy; MPC = Media production (critical); CCE = Critical content evaluation.

4. Discusión y conclusión

OEPs in Higher Education are recognized for their potential to improve participation, foster equitable access, and democratize learning opportunities (Murphy, 2013), while also contributing to social justice (Bali et al., 2020). Despite widespread awareness and interest, the adoption of OEPs in Higher Education remains variable. Many institutions face significant challenges, including the lack of sustainable policies, limited institutional support, and insufficient awareness among educators and students alike (Stagg et al., 2023). This is also the context in Spanish Higher Education (Santos-

Hermosa et al., 2020), where there is limited recognition and few incentives to create and use OERs, meaning they are rarely considered in teaching evaluations, which in turn discourages educator engagement. Despite these challenges, OEPs provide an ideal framework for fostering the development of CDC, which is of utmost importance for citizens to navigate complex environments and participate actively in modern society.

The convergence of the different frameworks in this study contributes to educational research and raises new challenges for future work aimed at further exploring the lines of inquiry initiated here. On the one hand, while open education has been associated with greater opportunities for students to engage critically with educational proposals and resources (Nascimbeni and Burgos, 2019), the use of the Bali et al. (2020) three-axis conceptualization, together with the six CDC elements, allows for a more detailed understanding of this relationship. Broadly speaking, the interplay between these two frameworks has made it possible to highlight the alignment between a learner-centered pedagogical approach, both in terms of content and process, and a critical perspective, encompassing the search, analysis, processing, and communication of information, as well as the evaluation thereof, along with broader aspects related to awareness of the digital society and responsible, engaged citizenship. Hereafter, the challenge lies in understanding the students' perspectives in these experiences with a view to assessing the actual impact of CDC development based on the core principles of the implemented OEPs.

Furthermore, the pedagogical analysis based on the adaptation for CoDiCri of the ACAD model provides rich insights into the design elements used, from which new challenges for educational practice and research may emerge. Firstly, the strong presence of OERs across two aspects of the ACAD framework stands out, confirming the conceptual tensions identified in relation to OEPs (Paskevicius et al., 2018), and, although OERs are often criticized for their limited impact on educational improvement (Irvine et al., 2021), they also constitute a key element in the transition towards OEPs (Koseoglu and Bozkurt, 2018). In this transition from OERs to OEPs, it is observed that, when understood as material resources, they are often used as the basis for developing awareness of the digital world and critical evaluation skills. When OERs are associated with teaching tasks, their role in fostering reflection on the digital world and responsibility is reinforced, while also highlighting their value as tools for critical information search and evaluation, thereby contributing to informational digital teaching skills. This is particularly relevant when it comes to transferring these findings to the professional development of educators across other educational levels. OERs as an object of epistemic tasks for students shows a wide diversity of designs across all CDC elements, suggesting strong alignment between student OER creation and the development of CDC competencies.

Broadening the perspective, it is important to highlight other key elements of the ACAD design framework used to analyze OEPs in relation to the CDC. In this case, it is worth noting that educators' epistemic role is shifting towards an open educator profile (Nascimbeni and Burgos, 2016), not only through the openness of teaching and learning processes but also through open assessment practices, including student co-evaluation and the provision of feedback and scaffolding in knowledge construction. It highlights that, in content creation, educators are primarily focused on developing OERs as rich instructional materials that foster learner autonomy (Tur et al., 2025) and enable flexible, personalized educational approaches (Pérez-Garcías et al., 2022). This

open teaching role aligns with a particularly active and leading role for students, who exercise their autonomy and activate their agency by participating in developing the various tasks (Pérez-Garcías et al., 2022; Marín, Tur et al., 2025). Regarding the social design aspect, it is worth noting that it primarily comprises proposals with a strong social component, including pair work, small and medium groups, and highly collaborative formats. This suggests that CDC skills foster debate and exchange among agents and peers, and that, as a result, the open context of OEPs is well suited. This broadly social design is consistent with the presence of social media in the tools and designs, and the alignment thereof with all CDC elements. In this case, beyond the initial hypothesis of its suitability for the CDC, potential difficulties can also be foreseen, as suggested by the findings of Esteve-Mon et al. (2021) on the superficial level of critical reflection on social networks. Therefore, it would be particularly valuable in future implementations to assess the quality of students' critical perspectives when participating in networks within new OEP frameworks for CDC.

In conclusion, this study contributes to the literature on OEPs in the Spanish university system, while also offering insights into student learning, educational design, and the development of CDC. The analysis conducted allows for the identification of certain CDC elements present in educators' designs; however, the limited presence of practices fostering social justice suggests, in line with Bali et al. (2020), that openness alone is not enough to foster critical awareness. Instead, such practices must be intentionally designed to avoid neutrality and achieve a transformative impact.

As a limitation of this study, it should be noted that it is based on the analysis of 24 OEPs developed by 12 educators from Spanish universities. The results cannot be generalized and do not represent all universities or the broader Spanish university system. Nevertheless, the research has exploratory and descriptive value within the broader CoDiCri project. On the other hand, qualitative content analysis, although guided by a defined coding system, involves a degree of interpretation that may have led to the omission of relevant elements. However, the member-checking process with educators and the cross-researcher review of coding are highlighted.

The next phases of the project will focus on designing and analyzing new OEPs that look at CDC elements in Higher Education, as well as on educators' perceptions of their institutional impact. Future studies could entail collaborating with Higher Education professionals from other countries to obtain more generalizable data on OEPs focused on CDC development in universities.

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