Metadata Gaps and Interoperability Failures in OER Retrieval: A Competence-Based Search Experiment

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Background & Problem

Higher education is **siloed**: lecture slides, readings and quizzes rarely cross institutional walls — even where OER repositories exist.

EU policy demands graduates with **DigComp** and **SDG**-aligned sustainability skills for the twin green–digital transition.

Competence frameworks (DigComp, UNESCO SDGs, CEFR) bridge policy, academia and practice – but OER platforms do not index resources by them.

The resulting broken link makes **reuse, revision and redistribution** of competence-aligned OER practically impossible for most educators.



Core Problem

No OER repository supports competence-framework-based search.

Educators searching for DigComp 2.3 or SDG 15 OERs must rely entirely on keyword guesswork – framework alignment is always inferred, never filtered.

Major OER Platforms

Platform	Volume	Key Feature
MERLOT	100k+	Peer-reviewed HE repository
OER Commons	50k+	Authoring + discovery hub
OERSI	90k+	Federated meta-index (45 repos)
UNESCO-UNEVOC	Curated	SDG-aligned TVET knowledge hub
OERhub.at	Growing	Austrian HE repository
H5P Hub	Distrib.	Interactive learning objects
Una-europa.eu	—	Alliance toolkit, no OER index
ELIXIER	≈55k	School / vocational level (DE)

Abstract

Despite digitalization and inter-networking in business and private domains, the higher education sector stands out as siloed and non-interoperable when it comes to sharing educational resources.

This paper reports on a simple search experiment demonstrating the lack of standardised approaches to linking established educational competence frameworks (DigComp, UNESCO SDGs) and the largest repositories of open educational resources (OER).

Searches across eight major OER platforms using three use cases consistently failed to retrieve competence-aligned materials through framework-based queries.

The paper concludes with recommendations to establish standard practices for OER metadata tagging to tackle the observed problem.

Search Experiment

Aim: Demonstrate whether a lecturer can locate OER by specifying a concrete competence from an established framework. Three use cases (UC) were run against all eight major OER platforms:

UC 1 DigComp 2.3

Engaging in Citizenship through Digital Technologies

BSc Political Science

Keywords: digital citizenship, civic participation, e-participation, digital democracy

UC 2 DigComp 1.3

Managing Data, Information & Digital Content

MSc Library & Information Science

Keywords: digital info management, data management, metadata management

UC 3 UNESCO / SDG 15

Normative Competency – Life on Land

BSc Environmental Engineering

Keywords: SDG 15, biodiversity, sustainability engineering, Life on Land

Cross-Case Results

Platform	DigComp 2.3 Citizenship	DigComp 1.3 Data Mgmt	SDG 15 Life on Land
MERLOT	None	Partial	Partial
OER Commons	Partial	Yes	Yes
OERSI	None	Partial	Partial
UNESCO-UNEVOC	Partial	Partial	Partial
H5P Hub	Partial	Partial	None
OERhub.at	None	None	Yes
Una-europa.eu	None	None	None
ELIXIER	None	None	None

Yes = relevant OER found Partial = keyword approximation only
None = no relevant content

Key Takeaway

OER Commons was the most productive repository across all use cases, yet even there framework alignment must be inferred rather than filtered.

The root cause is not a lack of educational materials but a lack of standardised metadata practices

Establishing a machine-readable competence-tagging standard – endorsed by recognised bodies such as CEN/CENELEC – would unlock the full potential of the OER ecosystem through positive network externalities.

Key Findings

Zero framework-native search: No platform supports DigComp, SDG, or any other competence framework as a native search facet.

Keyword approximation only: Educators must manually interpret and map keywords. Framework alignment is always inferred, never filtered.

OER Commons leads across all three use cases, but even there competences are not explicitly tagged – content alignment must be inferred.

Disciplinary OER culture matters: Library science (UC 2) has a strong meta-tagging tradition, producing visibly better results than other domains.

Platform architecture determines success: ELIXIER (school-level), Una-europa.eu (alliance-only) and H5P (delivery) were absent by design, not by topic.

Second-order competences are invisible: Values-negotiation, civic empowerment, normative reasoning — cannot be retrieved through any current metadata system.

Root Causes

⚠ No universally adopted metadata standard for competencies across the OER ecosystem

⚠ Competence tagging is **manual, inconsistent and optional** — contributors are not required to tag resources to competence frameworks

⚠ LOM frameworks (IEEE LOM, Dublin Core, regional extensions) differ significantly by region and policy context

Recommendations

✓ Adopt a **standard practice** for referencing competence frameworks in OER metadata using XML LOM fields <classification> and <educational>

✓ Use **permanent identifiers** (W3C w3id.org) for competence framework elements to enable machine-readable crosswalks between platforms

✓ Promote the use of chosen competence frameworks-specific permanent identifiers and LOM XML fields through the endorsement of **NSBs and/or ESBs** – comparable to how Austrian LOM uses identifiers for UN SDG framework and to classification of the fields of sciences (ÖFOS 2012) in <classification> field.

✓ Develop **machine-assisted LO extraction** and automated crosswalks between DigComp, SDGs, EQF and discipline-specific frameworks

✓ Standardised tagging (frameworks, identifiers, and practices) eliminates non-discoverability problem → more OER contributors → **positive network externalities** → exponential growth in reuse

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