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From Open Educational Resources to an Open Learning Resource Ecosystem in the AI Era: Policy Implications for Vietnamese Higher Education

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ABSTRACT: Open educational resources (OER) expand access to and reuse of high-quality learning materials; however, their effectiveness depends on coherent institutional policies, users' digital competencies, and mechanisms for collaborative sharing. This study re-examines the findings of a national survey on OER in Vietnamese higher education and interprets them in the context of the national digital transformation agenda and the emergence of generative artificial intelligence (GenAI). The findings reveal a gap between the widespread routine use of digital resources and limited understanding of open licensing, weak information evaluation skills, insufficient institutional incentives, and a lack of collaborative communities. While GenAI can considerably lower the barriers to localizing, translating, and adapting OER, it also increases the demands for quality assurance, copyright compliance, and transparency about the provenance of resources. The study proposes a multi-layered OER–AI governance model with human-in-the-loop oversight and derives policy implications for developing a sustainable open learning resource ecosystem in Vietnamese higher education.

KEYWORDS: Open educational resources (OER), higher education, digital transformation, generative artificial intelligence, learning resource ecosystem, human-in-the-loop governance.

1. INTRODUCTION

Open educational resources (OER) are not synonymous with free content on the Internet. According to UNESCO (2019), OER are learning, teaching, and research materials in any format and medium that are in the public domain or released under an open license, permitting no-cost access, reuse, repurposing, adaptation, and redistribution by others. This legally granted right to reuse and adapt materials is what makes OER a structural component of open education and distinguishes them from digital repositories that merely store content. Survey evidence from Vietnamese universities indicates that, although the use of digital materials has become routine, considerable gaps remain in awareness of OER, understanding of open licenses, capacity for co-creation, institutional incentives, and inter-institutional collaboration (Do et al., 2019).

Since 2022, digital transformation in education has been a government priority under Decision No. 131/QD-TTg (Prime Minister, 2022). At the same time, the rapid development of generative artificial intelligence (GenAI) is changing how academic materials are discovered, localized, adapted, and co-created. This study re-examines the published results of the national OER survey (Do et al., 2019) and interprets them in light of these developments, drawing on international policy documents and research on OER and GenAI. It addresses three research questions: (1) What structural bottlenecks of OER development are identified by survey data from Vietnamese universities? (2) How should these bottlenecks be reassessed in the context of national digital transformation and GenAI? (3) What multi-layered OER–AI governance model is needed to develop a sustainable learning resource ecosystem in Vietnamese higher education?

2. RESEARCH CONTENT

2.1 Theoretical background

2.1.1 From free materials to open educational resources

The defining feature of OER is the legal and pedagogical right to reuse, revise, and redistribute content, rather than the mere absence of fees. The 2019 UNESCO Recommendation on Open Educational Resources specifies that OER may exist in any medium, provided that they are in the public domain or released under an open license that permits no-cost access, reuse, repurposing, adaptation, and redistribution. The Recommendation also identifies five areas of action: building the capacity of stakeholders; developing supportive policy; ensuring inclusive and equitable access to quality OER; nurturing the creation of sustainability models; and facilitating international cooperation (UNESCO, 2019).

This framework implies that OER initiatives cannot be reduced to investment in hardware and digital storage. An institution may hold large collections of electronic documents, but these do not constitute open resources if they lack open licenses or if lecturers and students have no legitimate means of adapting and improving them. The guidelines of UNESCO and the Commonwealth of Learning emphasize that sustainable

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OER adoption requires coordination among governments, higher education institutions, academic staff, students, and quality assurance bodies (UNESCO & Commonwealth of Learning, 2015).

2.1.2 OER, learning quality, and open pedagogy

The pedagogical value of OER cannot be inferred from cost savings alone. In a review of 16 studies on the efficacy and perceptions of OER, Hilton (2016) found that students using OER generally achieved learning outcomes similar to, or in some cases better than, those using commercial textbooks, while saving considerable costs. Both faculty and students generally perceived OER positively. These findings suggest that OER can be an effective alternative to commercial textbooks, although openness does not in itself guarantee instructional quality.

An important theoretical development is OER-enabled pedagogy, also referred to as open pedagogy. When open licenses allow learners to revise and redistribute materials, students can move from being consumers of information to co-creators of renewable learning artifacts with value beyond the classroom (Wiley & Hilton, 2018). In Vietnam, 49.8% of surveyed students reported having used OER, but only 13.8% regularly used national platforms such as the Vietnam Open Educational Resources (VOER) repository (Do et al., 2019). This suggests that demand for digital resources exists but has not yet developed into sustained open educational practices.

2.1.3 Policy, competency, and incentive mechanisms

The 2019 UNESCO Recommendation treats capacity building and policy development as interdependent. Open licenses have a real effect only when authors understand intellectual property rules, users have the information literacy to find and evaluate materials, and universities establish explicit mechanisms for recognizing and rewarding open educational work. Todorinova and Wilkinson (2020) show that faculty motivations for adopting and authoring OER vary, which implies that a single, uniform incentive scheme is unlikely to engage all academic staff.

2.1.4 OER in the context of generative AI

GenAI affects the lifecycle of educational resources in two opposing ways. On the one hand, language models can support resource discovery, summarization, translation, reformatting, metadata generation, and the adjustment of difficulty levels for different learners. The 2024 Dubai Declaration on OER links OER to digital public goods and calls for the use of emerging technologies, including AI, to support the creation, localization, and dissemination of open resources (UNESCO, 2024).

On the other hand, GenAI does not remove the requirements of academic quality, safety, and accountability. UNESCO guidance emphasizes data privacy, the validation of AI tools, alignment with learning objectives, and human-centered control (Miao & Holmes, 2023). Tlili et al. (2024) similarly highlight the role of open education in promoting the effective and safe use of GenAI. The key question is therefore how higher education institutions can build an integrated OER ecosystem that combines lawful licensing, quality assurance, and the responsible use of AI.

2.2 Results and discussion

2.2.1 The divergence between digitization and genuine openness

The most notable pattern in the survey data is a gap between routine digital behavior and actual understanding of and participation in OER. Among lecturers, 67.9% reported having heard of OER or OpenCourseWare, but only 41.2% reported understanding open licenses. Among librarians, the corresponding figures were 49.3% and 35.4%. Among students, 34.1% recognized the term OER, but only 18.1% understood open licenses (Do et al., 2019).

By contrast, basic digital practices are widespread: 70.3% of lecturers regularly recommend or send online documents to students, and 77.8% use search engines daily. More than 89.0% of students regularly search for information online; however, 42.6% report difficulties in finding relevant academic materials, and approximately 40.0% report lacking clear criteria for evaluating the reliability of digital resources (Do et al., 2019).

Table 1. Selected indicators from the survey on OER in Vietnamese higher education

Thematic group	Indicator	Respondent group	Proportion (%)
Awareness	Have heard of OER / OpenCourseWare	Lecturers	67.9%
Awareness	Have heard of OER / OpenCourseWare	Students	34.1%
Open licensing	Understand open licenses	Lecturers	41.2%
Open licensing	Understand open licenses	Students	18.1%
Resource use	Have used OER for study or research	Students	49.8%
Willingness to share	General willingness to share academic resources	Lecturers	86.4%
Legal assurance	Willing to share if copyright is legally protected	Lecturers	74.7%
Institutional policy	Institution has not recognized the benefits of OER	Lecturers / researchers	77.7%
Internal capacity	Lack of awareness is a main barrier	Lecturers	75.5%
Community	Lack of an OER co-development community is a barrier	Lecturers / researchers	74.4%

Source: Compiled by the author from Do et al. (2019).

These figures suggest that physical access is not the main bottleneck for OER participation. In the survey, 69.8% of students had their own computer and internet connection, yet their effective use of resources was limited by weak information evaluation skills. In addition, “free access” and “open licensing” were frequently confused: 42.3% of students and 48.9% of lecturers agreed that all free online materials are OER (Do et al., 2019). As chatbots and search engines now deliver content instantly, the ability to evaluate provenance, legal rights, and accuracy becomes even more important.

2.2.2 Copyright and open licensing as an institutional foundation

The data indicate that lecturers are not indifferent to intellectual property: 53.4% reported regularly checking licenses before using materials, and 71.9% reported citing sources fully. However, only 24.9% had ever published their own teaching materials under a Creative Commons (CC) license. This reveals a gap between compliance with citation norms and the active open licensing of one’s own work.

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Among students, 55.3% reported paying no attention to copyright and licensing when downloading online content, and 45.7% reported paying insufficient attention to citation. Notably, willingness to contribute increases when legal protection is assured: 74.7% of lecturers and 72.9% of librarians stated that they would contribute to institutional repositories if their authorship rights were legally protected (Do et al., 2019). This suggests that reluctance to share stems mainly from legal uncertainty rather than from unwillingness to share.

In the AI era, educational resources can be translated, condensed, visualized, and restructured almost instantly. Without embedded source attribution and version records, subsequent users cannot determine licensing obligations or the academic validity of a resource. Open licenses should therefore be accompanied by mechanisms for tracking provenance.

2.2.3 Governance and community gaps beyond infrastructure

The survey also identifies institutional barriers: 75.5% of lecturers cited lack of awareness; 71.0%, lack of institutional incentives; 65.7%, lack of recognition and reward; 64.8%, lack of technical skills; and 61.9%, heavy teaching workloads. Notably, 74.4% of lecturers and researchers identified the lack of a community for co-developing OER as a barrier, a higher proportion than those citing inadequate technological infrastructure (68.9%) (Do et al., 2019).

Academic libraries face similar challenges: 72.9% of librarians cited budget constraints, 68.9% copyright complexity, and 62.1% a lack of technical skills for OER curation. Although 84.1% agreed that university libraries should lead the creation and dissemination of OER, only 19.6% had ever collaborated with academic departments to build open collections. This gap suggests that the focus should shift from isolated OER repositories to an open learning resource ecosystem.

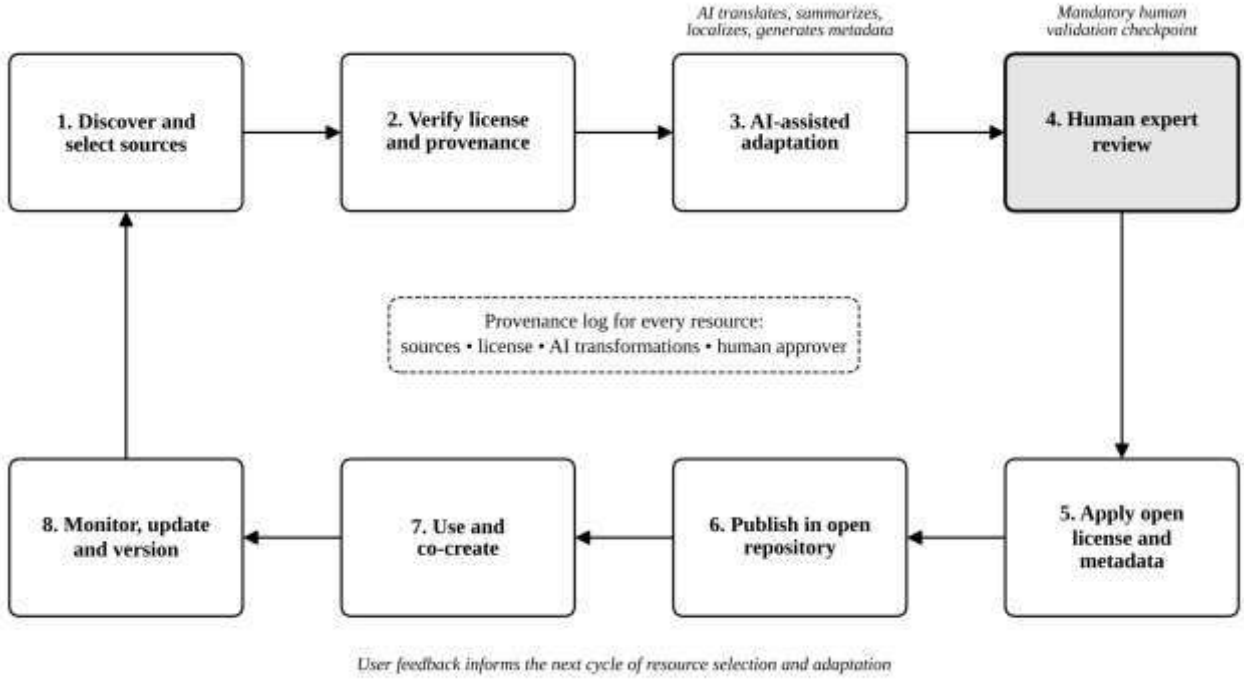


Figure 1. Workflow for moving from digital content to an OER–AI ecosystem
(Source: Proposed by the author based on the research findings)

Figure 1 reflects two principles. First, AI functions within defined stages of the OER lifecycle as a supporting tool rather than replacing academic judgment. Second, human validation is required before publication, in line with UNESCO's human-centered approach to AI (Miao & Holmes, 2023).

2.2.4 Integrating OER into digital transformation strategies

The survey indicates strong support for coherent policy: 77.6% of lecturers supported institutional participation in OER projects; 79.7% supported awareness-raising activities; 76.7% supported establishing a dedicated OER unit at the institution; and 72.9% supported guidance from the Ministry of Education and Training. However, only 46.2% reported that their university had regulations on OER sharing, and only 50.0% reported institutional incentives (Do et al., 2019).

Decision No. 131/QD-TTg provides the overall impetus for digital transformation in education, but digitization is not the same as openness: an electronic document becomes an OER only when explicit rights to adapt and redistribute it are granted. OER should therefore form a distinct component of institutional digital transformation strategies, covering open licensing, quality assurance, provenance tracking, and recognition of academic workload.

2.2.5 The dual effect of AI: Adaptation efficiency versus verification costs

In the survey, limited foreign language proficiency was a major barrier: 50.3% of students reported that language limitations hindered their use of international materials, and 35.8% cited weak search skills (Do et al., 2019). GenAI can lower these barriers considerably through rapid translation, explanation of terminology, and the synthesis of content in different formats. For legally reusable OER, AI can accelerate localization and adaptation to different learners.

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However, the costs do not disappear; they shift from drafting resources to verifying them. Generative models may fabricate references, omit important nuances, or introduce biases. Every AI-assisted educational resource should therefore document its original sources, open license, the transformations applied, and the subject-matter expert who approved it.

2.3 Proposed multi-layered OER–AI governance model

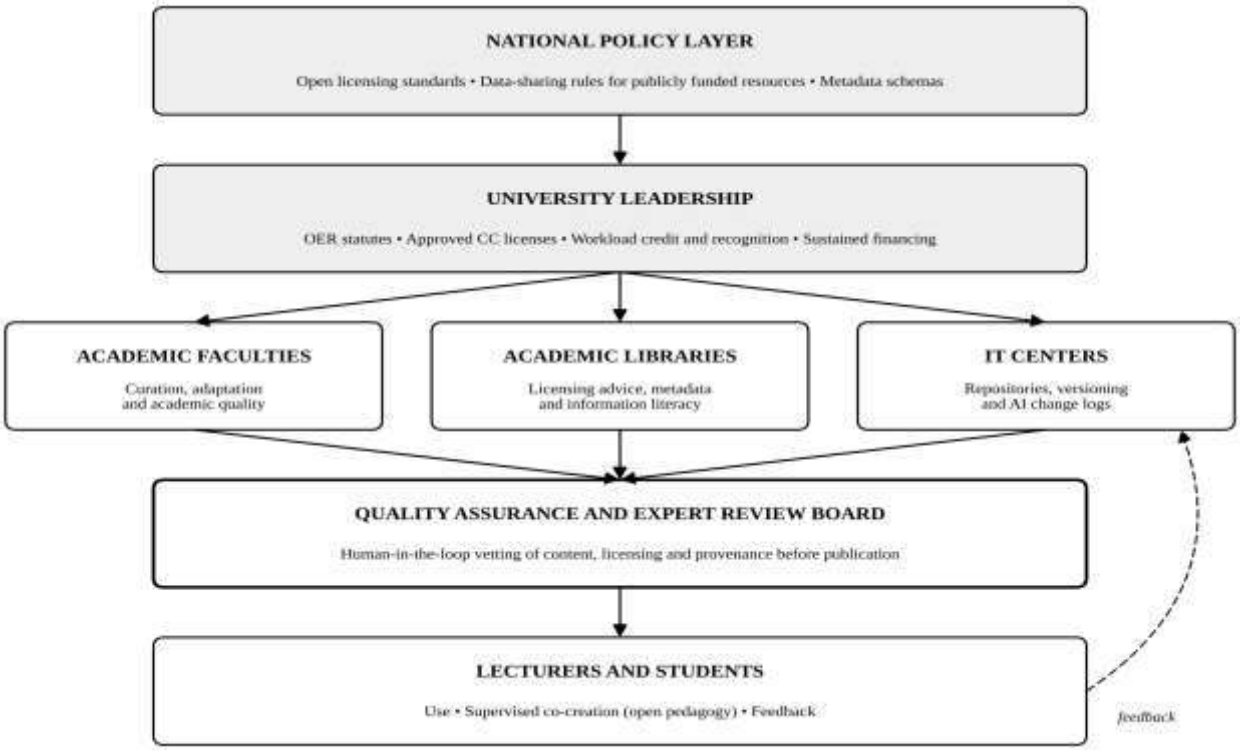
To address these interrelated bottlenecks, this study proposes a governance matrix that links six identified bottlenecks to requirements in the AI era, operational solutions, and responsible actors (Table 2).

Table 2. Governance matrix: From bottlenecks to OER–AI ecosystem solutions

Bottleneck	Requirement in the AI era	Proposed solution	Lead actors
Uneven awareness of OER	Distinguishing OER from general web content and GenAI outputs	Training in OER licensing, information literacy, and AI evaluation	University leadership, libraries
Low understanding of open licenses	Managing the growing number of AI-derived works	Standard licensing workflows, CC attribution rules, and edit logs	Legal units, libraries
Fragmented institutional policy	Aligning OER with digital learning systems and AI infrastructure	Dedicated institutional OER policies linked to digital transformation plans	Regulatory authorities, university leadership
Lack of recognition for lecturers	Recognizing the time required to create and verify OER with AI	Including OER creation and review in workload and promotion criteria	University leadership, human resources units
Isolated repositories; weak community	Interoperable data standards, metadata schemas, and versioning	Open-standard repositories and interdisciplinary OER networks	IT units, libraries, academic departments
Quality, bias, and legal risks	Controlling GenAI errors, copyright infringement, and privacy risks	Expert review with human oversight and provenance checks	Academic councils, ethics committees

Source: Developed by the author based on Do et al. (2019), UNESCO (2019, 2024), Miao & Holmes (2023), and Todorinova & Wilkinson (2020).

At the national level, authorities should define open licensing standards and data-sharing requirements for publicly funded educational resources. At the institutional level, university regulations should define intellectual property rights, approved CC licenses, and workload credit for lecturers. At the academic level, lecturers select and adapt materials, while students co-create open resources under supervision (Wiley & Hilton, 2018). Academic libraries act as advisory hubs for licensing, metadata, and information literacy; IT centers ensure versioning and the logging of AI-generated modifications; and quality assurance boards review content before publication (Figure 2).



(Source: Proposed by the author based on the research findings)

This model does not assign responsibility to a single unit. Libraries are responsible for the discoverability of resources, faculties for academic quality, IT units for technical stability, and university leadership for sustained funding. Institutional evaluation should reward the quality of participation, such as verified licensing, recorded edit histories, and documented human oversight, rather than the number of files uploaded.

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3. CONCLUSIONS AND POLICY RECOMMENDATIONS

3.1 Conclusions

The re-examination of survey data on OER in Vietnamese universities shows that the bottlenecks do not stem from a single deficit. Awareness, copyright literacy, incentives, evaluation skills, technological platforms, and collaboration form an interconnected chain. Although the academic community has established routine digital practices and shows a strong willingness to share, its capacity for open licensing, critical evaluation of resources, and collaborative co-creation remains limited. Because the survey data date from 2019, these conclusions should be confirmed by new surveys that reflect the period of digital transformation and GenAI.

Digital transformation and GenAI do not remove these barriers; rather, they make them more consequential. Limited copyright literacy becomes riskier when resources can be copied and modified instantly by AI. Weak source evaluation becomes more serious when AI produces fluent but inaccurate content. Gaps in accountability become more evident when educational products combine human authorship, third-party materials, and AI assistance. This study argues that sustainable progress requires a multi-layered governance ecosystem in which policymakers, lecturers, libraries, subject-matter experts, IT units, and quality assurance mechanisms work together across the resource lifecycle. AI should serve as a supporting tool for localization and adaptation, while the decision to publish remains with responsible human educators.

3.2 Policy recommendations

3.2.1 For state management agencies

The Ministry of Education and Training and other relevant ministries should formally include OER in the next phase of the national program on digital transformation in education following Decision No. 131/QD-TTg. Specific guidance should establish standard open licenses (such as CC BY and CC BY-SA) for educational resources developed with public funding, issue national metadata standards, and develop a federated network of open repositories that enables sharing across institutions.

3.2.2 For higher education institutions

University leadership should adopt institutional OER regulations before expanding digital storage infrastructure. These regulations should specify copyright attribution, approved Creative Commons licenses, and interdisciplinary review boards, and should include OER authorship and AI verification in lecturers' workload, promotion, and performance evaluation. Clear procedures should also define accountability when GenAI tools are used in developing learning materials.

3.2.3 For lecturers

Professional development for lecturers should focus on four competencies: (1) finding and evaluating OER for teaching purposes; (2) understanding open license terms and the obligations attached to derivative works; (3) adapting open materials to the institutional context; and (4) using GenAI ethically and responsibly with transparent human verification.

3.2.4 For students and academic libraries

Undergraduate and postgraduate programs should integrate academic integrity, copyright literacy, and critical AI literacy into foundational courses. Academic libraries should expand their role beyond collection management to become advisory hubs on open licensing, copyright compliance, and information literacy.

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