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Openness Without Co-Creation? A Critical-Integrative Review of Open Educational Resources and Open Educational Practices Through User Innovation, Open Innovation, and Service-Dominant Logic

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ABSTRACT

Neither effective participation in shaping the institutional conditions governing educational resources nor the realization of educational value can be directly inferred from the formal openness of these resources. This study addresses this mediation problem by examining Open Educational Resources (OER) and Open Educational Practices (OEP) as condition-dependent forms of cooperative knowledge production within the framework of a theoretical triangulation of user innovation, open innovation, and service-dominant logic. Methodologically, it combines a systematic literature review covering the period from January 1, 2020, to September 15, 2026, with a critical-integrative evidence synthesis; identification and selection are documented in accordance with PRISMA 2020. Out of approximately 10,122 identified records, 20 studies were included; supplementary literature expands the theoretical, methodological, and contextual frame of reference to about 113 publications. The synthesis addresses four thematic clusters: student knowledge production, institutional governance, generatively assisted co-creation, and multidimensional value assessment. As a central theoretical finding, openness is reconstructed as an institutionally mediated relationship within which the incorporation of users' experiences of problems and their translation into context-specific educational value each require independent bridging premises. Thus, substantive co-creation presupposes effective influence on relevant decisions; such influence cannot be inferred from resource availability or productive task participation alone. Furthermore, in an exploratory secondary analysis of 31 complete cases, the relationship between concerns about publication and willingness to participate again remains imprecisely estimated after accounting for perceived educational value (partial rank correlation = -0.18 ; 95% bootstrap confidence interval $[-0.49, 0.23]$); institutional co-decision-making was not assessed. Within the premise-based determinant-indicator matrix, the theoretical mediating assumptions are related to observable decision-making relationships and counter-indicators without prejudging their empirical validity. For tertiary education and innovation management, this results in a framework for evaluation that combines the actual exercisability of granted decision-making rights with the consideration of well-founded objections and the revisability of institutional conditions and establishes an empirical research agenda on the distribution of realized educational value.

INTRODUCTION

The fact that an educational resource is formally open does not, from a heuristic perspective, automatically imply that its users participate in determining the institutional conditions under which the granted rights of use and modification become operational from a praxeological standpoint. At its core, therefore, it should be noted that for a reconstruction of open higher education within the framework of innovation studies, it becomes necessary to explain the extent to which access to material is linked to the authority to actively shape the conditions for its use and further development. However, by connecting research on open educational practices to learner-centered design and, subsequently, to equity-based claims to participation, it effectively introduces a framework for addressing this mediating issue. Deductively, in this context, this examination must encompass not only the identification of available resources but also the institutional conditions

that facilitate and constrain co-creation. Moreover, and from the context-sensitive evaluation of equity, diversity, and inclusion, this perspective gains further precision, insofar as the normative claim to openness must still be assessed in light of the concrete conditions under which it is realized (Bali *et al.*, 2020). Therefore, this study focuses on the institutional mediation between available resources and effective co-creation, a phenomenon that cannot be explained solely by the open nature of a license or by mere participation in a production process.

Based on this problem formulation, the present study aims to elucidate the theoretical bridging premises and requirements for empirical testing under which institutional co-determination within open educational practices can be subject to an appropriate empirical investigation. Its research objective does not involve a direct measurement of institutional decision-making powers but rather the identification of the prerequisites

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for their empirical examination, while the supplementary secondary analysis focuses exclusively on estimating associations between subjective evaluations and willingness to participate again.

Consequently, however, the conceptual distinction between Open Educational Resources (OER) and Open Educational Practices (OEP), with regard to the formulation of theorems, gives the above problem its analytical contours. While the reference to resources denotes the conditions for using a given material, the examination of open practice reveals those pedagogical practices within which the material's meaning is generated and its further development is organized; at the same time, conceptual overviews show that open pedagogy encompasses various forms of such practices (Brandenburger, 2022; Short *et al.*, 2026; Tietjen & Asino, 2021). In this respect, the assumption that additional access to learning materials would, in and of itself, lead to an expansion of students' agency would already require explanation, especially since the literature on equity explicitly examines the social prerequisites for actual participation (Cox *et al.*, 2020; Croft & Brown, 2020; Katz & Van Allen, 2022).

However, through the deductive operationalization of a theory-triangular research approach from the perspective of innovation studies, the difference observed here between the provided material, on the one hand, and the altered praxeology, on the other, can be both specified and explained in a manner more targeted to the present problem-exploratory research purpose, provided that the specific object of innovation in question is identified at its core. In this regard, for example, Farrow and Díez-Arcón (2024) examine OER-related innovation based on 44 cases and develop a conceptual framework for this purpose that takes organizational value propositions into account. At the same time, however, the study already establishes a subject-specific connection between openness and innovation per se, on which further theoretical development must build (Farrow & Díez-Arcón, 2024). Consequently, the research gap identified here does not assert an unconditional absence of innovation-related research but rather highlights the insufficiently clarified relationship between the opening up of knowledge production and the institutional authority to help shape its conditions.

Similarly, in the context of user innovation, this reciprocity is initially explored from the perspective of those whose user experiences can justify a need for change; open innovation shifts the focus to the institutional adoption of such contributions, while service-dominant logic identifies their context-dependent value realization as a further subject of explanation (Chesbrough, 2003; Vargo & Lusch, 2016; von Hippel, 2005). According to the premise advanced here, the epistemological value of such a theoretical triangulation lies precisely in the fact that the transitions between these subjects remain open and must be specifically justified. Moreover, a single reference to participation does not imply an identity of theoretical

premises. Within the theoretical triangulation developed here, participation acquires explanatory significance only insofar as the premises connecting the respective objects of inquiry are made explicit, since a shared conceptual reference does not establish the equivalence of their theoretical foundations (Alexy *et al.*, 2020; Cruz *et al.*, 2024). Accordingly, the empirical requirement concerns whether, and under which conditions, a need articulated through users' situated experience informs institutional revision and becomes consequential for educational value realization; each transition requires evidence appropriate to the relationship postulated, without treating confirmation of one relationship as validation of the other theoretical perspectives.

In this study, the theoretical approach is operationalized through a critical-integrative literature review. Its comprehensive core corpus of 20 studies, considered within a broader frame of reference, is analyzed to determine which relationships between student co-production and the realization of educational value have been empirically demonstrated and at which points their interpretation from the perspective of innovation studies requires additional mediating premises. Following this distinction between observed correlations and theoretical attribution of meaning, an exploratory secondary analysis of publicly available data on student production of openly licensed materials is conducted; the question specified in addition to the initial study focuses on the extent to which publication concerns are related to a willingness to participate again when the perceived educational value is factored into the calculation (Biddle & Clinton-Lisell, 2023a). By ensuring that the resulting partial correlation estimate remains tied to the significance of the actually measured characteristics, it is possible to specify an empirically accessible partial relationship within the theoretical framework without treating subjective evaluations as evidence of institutionally effective co-creation.

Based on the previously developed distinction between theoretical attribution of meaning and empirical evidence, this study is structured around four interrelated research questions. It begins by specifying the additional premises under which OER/OEP can be reconceptualized as a link between user-driven innovation and institutional knowledge processing (RQ1). Within this framework, the literature review focuses on the extent to which student co-production and perceived educational value are related to actually available decision-making authority and which mediating steps between these variables remain empirically unclear (RQ2). As a limited empirical exploration of this relationship, the secondary analysis examines what correlation remains between concerns about publication and willingness to participate again after statistically accounting for perceived educational value, whereby its interpretation remains limited to the scope of the surveyed characteristics (RQ3). By combining these two approaches to knowledge, we then determine which empirically distinguishable determinants, indicators,

and counter-indicators make the previously assumed institutional mediating conditions amenable to further examination (RQ4). These questions are guided by the theoretical thesis that openness must be reconstructed as a relationship contingent on certain preconditions, whose educational relevance becomes apparent only when those institutional conditions are taken into account through which a formally granted opportunity for participation can actually be realized as substantive co-creation.

LITERATURE REVIEW

Openness and the Conditions for Its Institutional Realization

Within the typology developed by Bali *et al.* (2020), open practice is defined along various orientations that encompass a shift from material to process, as well as the position of learners and the relationship to social justice. For the present study, this differentiation serves as the starting point for a relational definition of the subject matter: It becomes necessary to explain how formally granted access can translate into effective influence under specific institutional conditions. Within the present reconstruction of institutional mediation, the systematic examination of equity, diversity, and inclusion provides a basis for investigating under which conditions formally granted opportunities for participation become practically exercisable by those entitled to them, thereby locating the educational significance of openness in the relationship between institutional arrangements and participants' effective scope for action (Iniesto & Bossu, 2023).

Hence, within the framework of the present argument, it must be examined whether participants can independently influence the conditions of their participation, particularly when these conditions remain institutionally predetermined despite the openness of the resources.

First, it should be noted that the concept of infrastructural access conditionality frames such prerequisites within an agent-centered reference framework as constitutive conditions for actual utilization. Consequently, a particular possibility remains unresolved as long as it is uncertain whether the resources required for its use are in fact available and whether institutional guidelines permit independent participation in the sense of an implication (Vindigni, 2026c, 2026e). Applied to OER/OEP, the concept leads to the test hypothesis that editable materials and technically accessible platforms account for only a portion of the conditions under which students can contribute their concerns to collaborative development decisions. Consequently, the proposed extension broadens the scope of observation without presupposing the existence of corresponding exclusion mechanisms in every open arrangement (Vindigni, 2026b, 2026g).

Throughout this study, epistemic co-determination is understood as institutionally effective participation in the identification of research questions and in the reasoned evaluation of shared bodies of knowledge. As a working definition, it distinguishes between accepting a contribution and having the opportunity to discuss and,

if necessary, revise the criteria for its recognition. These findings align with research on the diversification of open educational resources and equity pedagogy, whose concerns extend beyond a mere quantitative expansion of available materials (Katz & Van Allen, 2022; Nusbaum, 2020; Tualaulelei & Green, 2022).

For an empirical study, therefore, specific decision-making procedures would need to be reconstructed, within which a student's objection is acknowledged, rejected, or leads to a revision.

However, defining the subject matter in this way does not negate academic quality standards. Rather, it establishes as a normative premise that their institutional application must remain justifiable and allow for factually feasible revisions; equating participation with the unconditional recognition of all contributions would undermine the epistemological claim of collaborative knowledge production. In line with post-digital literacies, co-creation is accordingly understood as a capacity for reflexive action within pre-structured relationships, the significance of which lies precisely in the ability to understand and evaluate existing conditions (Vindigni, 2026h). For the subsequent development of indicators, priority is thus given to a procedure's capacity for justification and revision over the mere number of contributions received.

User Innovation and the Scope of Student Authorship

Within the user innovation perspective, the anticipated benefits of a solution's use constitute an explanatory premise for users' engagement in its development, while their situated knowledge of the underlying problem provides a potential resource for shaping the innovation process (von Hippel, 2005). For open higher education, the user innovation approach raises a specific follow-up question: Under what conditions can students transform learning difficulties into changes whose problem definition and design they themselves help shape? A key premise is that user experience can offer a distinctive perspective on the need for change; whether this need is actually articulated and institutionally addressed remains an empirical question.

With the creation of instructional materials, this form of user-driven innovation is not yet fully defined, because student-generated content can also emerge within the framework of unchangeable assignments. Studies on renewable assignments and OER co-creation in subject-specific teaching contexts offer concrete points of reference here, and the varying degrees of design flexibility inherent in these approaches must be preserved in interpretation (Hernández-Castellano *et al.*, 2020; Van Allen & Katz, 2022; van der Walt & Bosch, 2025). As an analytical consequence, authorship of an artifact and control over its problem statement are recorded separately; only on the basis of this distinction can it be determined whether a student's contribution articulates an independent solution or fulfills an institutionally prescribed production task.

An additional restriction is required for the concept of

lead user. Its application presupposes a lead in identifying needs compared to another reference group, as well as an increased expected benefit from the corresponding problem solution; therefore, classification based solely on student status or a pronounced willingness to participate would not be sufficiently justified (Escobar *et al.*, 2023; von Hippel, 2005). In the matrix developed here, the lead user is therefore treated as an empirically rigorous specification whose characteristics must be demonstrated separately. For collaborative development processes, the additional question arises of how individual experiential knowledge is transformed into a shared course of action; research on user-innovation communities makes such a community-based explanatory need relevant (Garg *et al.*, 2025).

In terms of defining the subject matter of innovation studies, the evaluation of student contributions is traced back to the institutional prerequisites under which the need for change articulated therein can be recognized as a justified reason for revising existing materials. In this respect, the very recognition of this need brings into focus the question of whose user experiences are taken into account in defining a problem worthy of revision and by what criteria decisions regarding their inclusion are made. If established materials inadequately represent certain contexts of use, the articulation of corresponding difficulties thus opens up a potential path to further development, the institutional effectiveness of which, however, remains to be examined separately: From the equity-based rationale for open education, the present analysis therefore derives the requirement to relate the possibilities for articulation that have been opened up to the procedures for their evaluation and the decision-making powers distributed within them, without prejudging the substantive justification or actual recognition of a concern based solely on its hitherto limited representation (Iniesto & Bossu, 2023; Nusbaum, 2020; Vindigni, 2024b).

Open Innovation and the Processing of External Knowledge

Through open innovation, the opening of organizational boundaries regarding the absorption and use of knowledge becomes analyzable, whereby an open outcome can be distinguished from an open development process (Alexy *et al.*, 2020; Chesbrough, 2003). For OER/OEP, this gives rise to the “bridge premise” that the licensing of a resource does not in itself provide information about how contributions are incorporated into institutional decisions. Rather, the processing of a proposal appears to be the mediating step that requires further explanation: Who assesses its relevance, what feedback do the participants receive, and to what extent is a rejection negotiable?

Absorptive capacity further helps to establish that the perception and use of external knowledge depend on organizational prerequisites; dynamic capabilities, in turn, enable the transformation of existing resources

and modes of action (Cohen & Levinthal, 1990; Teece, 2007). Here, both approaches are utilized to clarify institutional mediation, without inferring the existence of corresponding capabilities solely from an open course offering. In particular, an empirical distinction must be made as to whether a university merely accepts contributions or is also able to modify its routines in such a way that experiences not initially anticipated can be productively sustained.

In this respect, drawing on the convergence of OER-related innovation with organizational value propositions as described by Farrow and Díez-Arcón (2024), it can be stated that a praxeological approach to the institutional embedding of open resources is emerging, to which the investigation of the value creation experienced by instructors in a cross-institutional OER community can be linked (Baas *et al.*, 2023). In the context of the present theoretical triangulation, this connection is relevant to research insofar as organizational value propositions and value creation as experienced by actors denote different levels of reference, the relationship between which can only be determined through the reconstruction of concrete contexts of use. An institutionally formulated value proposition does not, in itself, establish whether the anticipated value is realized in educators’ situated practice; even where participants report a benefit, the further question remains whether their experience informs organizational decisions concerning the development of collaboratively produced knowledge.

As an independent theoretical extension, it is therefore proposed to examine the institutional processing of collaborative contributions to determine under what conditions experiences from the exchange enable a revision of existing resources or their conditions of use and what significance such changes acquire for the participants, whereby the link to Open Innovation and Service-Dominant Logic constitutes an analytical contribution of the present study and is not presented as empirical confirmation of this theoretical connection that has already been established.

In relation to these two approaches, the question takes on greater clarity: Does knowledge exchange already demonstrate institutional processing, or must this be reconstructed based on subsequent decisions? For the purposes of this paper, we therefore propose distinguishing between the visibility of a contribution within the exchange and its effectiveness in the further development of a resource.

In this context, governance is understood as the institutional regulation of those decisions through which contributions are approved and scope for development is allocated. Conceptual work on OEP as digital public goods, as well as on the organization of open knowledge commons, establishes a connection here to collective stewardship and long-term availability (Alsuhaymi & Atallah, 2026; Atenas *et al.*, 2026; Otto & Kerres, 2022). As a separate line of inquiry, the revisability of these regulations is identified as a subject of examination: A

formally open infrastructure could be institutionally organized in such a way that its use remains broadly accessible, while its further development is reserved for a limited group. Whether such a constellation actually exists would have to be assessed on the basis of its decision-making structure rather than on the basis of the vocabulary of openness.

Service-Dominant Logic and Context-Dependent Value Realization

According to service-dominant logic, value is understood as a realization mediated by resource integration and institutional arrangements, the definition of which incorporates the respective context of use (Vargo & Lusch, 2016). For educational processes, this perspective requires distinguishing between the production of a material and the question of what significance its use acquires for the actors involved. Given the heterogeneity of conceptualizations of co-creation evident in higher education-related syntheses, it remains to be determined which relationship between participation in an educational process and the value realization claimed therein is to be explained in each case; a shared conceptual framework neither establishes the comparability of the participation relationships under investigation nor the equivalence of their educational significance (Cruz *et al.*, 2024; Omland *et al.*, 2025). For the present definition of the subject matter, this implies the requirement to specify educational value from the perspective of the respective actors involved and by taking into account the institutional conditions of its potential realization before observed results can be interpreted as an expression of value co-creation; in particular, it must be made clear through which theoretical premises and empirical indicators a connection between cooperative production and educational benefit is established. Only on the basis of this explanation can it be examined to what extent an institutionally produced outcome actually gains educational value for the learners and what contribution their active participation makes to its realization.

As a working distinction, co-production refers to participation in the creation of a resource, while value co-creation refers to the realization of value in its use. Under this definition, both concepts can be linked without presupposing their identity: A jointly created material may be relevant to certain participants, while others may derive only minimal learning benefits from its creation. Here, and praxeologically, these possibilities are formulated as testable scenarios, the examination of which builds upon the various strategies and outcome dimensions identified in the literature (Werth & Williams, 2022; Zarandi *et al.*, 2024).

For empirical analysis, this distinction is of immediate significance. A questionnaire item on perceived educational value elicits a subjective assessment of the project under study; it does not directly measure either actual competency development or the distribution of institutional decision-making power (Biddle & Clinton-

Lisell, 2023a, 2023b; Cronbach & Meehl, 1955). As a theoretical classification, such an item is therefore treated merely as an approximation of a subject-related dimension of value-in-use. Whether the perceived value stems from cooperation, subject-matter support, or other characteristics of the teaching situation cannot be determined without corresponding additional observations.

Furthermore, a relational understanding of higher education points out the importance of divergent value attributions. Within the author-centered frame of reference, trust and co-creation are treated as components of institutional relationships, the stability of which requires appropriate consideration of the perspectives of all participants (Vindigni, 2026f). For the present study, the analysis gives rise to the normative requirement that an institutionally desired outcome should not be presented as the learners' educational value. For the purposes of the study, both the evaluated outcome and the relevant perspective must be disclosed before different value judgments are consolidated into a common indicator.

Theoretical Triangulation as a Premise-bound Constitution of the Object

From the combination of these perspectives, a set of interrelated conditions is developed whose deductive validity depends on the explicit articulation of its premises. Provided that substantive participation presupposes an effective influence on relevant decisions, it is not determined by the availability of resources alone; insofar as educational value is realized contextually, it does not necessarily follow from this influence either. As a distinct theoretical derivation, openness is therefore conceived as an institutionally mediated relationship whose transitions require additional conditions in each instance and can be called into question by contradictory observations (Chesbrough, 2003; Vargo & Lusch, 2016; von Hippel, 2005).

This status as a theoretical derivation differs from an empirically proven regularity in that a testable relationship is first established. The choice of a theoretical perspective does not yet prove its validity for a specific case study, and the classification of an item does not automatically guarantee its construct validity; it is precisely the linking of theoretical concepts with observable characteristics that requires an examination of their reciprocal relationships (Cronbach & Meehl, 1955). Table 1 therefore specifies the respective subject of explanation and the limits of its generalizability before findings from the literature or secondary analysis are drawn upon.

With regard to this connection, the author-centered frame of reference serves a heuristic and normatively explanatory function. Infrastructural access conditionality calls into question the actual feasibility of a granted possibility, while postdigital literacies open up the reflexive assessment of sociotechnical conditions as an educational entitlement (Vindigni, 2026e, 2026h). These preliminary studies are not treated as empirical

confirmation of the connection made here; their function lies in clarifying the subjects that must be distinguished from one another in the subsequent analysis of evidence. Thus, theoretical triangulation provides scope for findings

that limit individual expectations, rather than retroactively reinterpreting every observation as confirmation of openness.

Table 1: Objects of Explanation and Bridge Premises of Theoretical Triangulation

Perspective	Subject of Explanation	Bridge Premise for OEP	Limits of Available Evidence
User Innovation	User-driven problem-solving based on usage experience.	A user's own need for change can be articulated and translated into design.	Student-led production demonstrates neither a lead in identifying needs nor an independent definition of problems.
Open Innovation	Institutional adoption and utilization of external knowledge.	Contributions enter processes in which their relevance is assessed and their further development becomes possible.	Open licensing does not directly reflect organizational adoption processes.
Service-Dominant Logic	Contextual value realization through resource integration.	a resource gains significance within specific contexts of use.	Subjective benefit assessment measures neither competency development nor decision-making power.

Source: Author (2026).

Note. This is the author's own theoretical derivation based on Alexy et al. (2020); Chesbrough (2003); Vargo & Lusch (2016); von Hippel (2005). The bridging premises are test hypotheses; the table does not include any additional empirical validation.

MATERIALS AND METHODS

Research Design and Status of the Lines of Evidence

Methodologically, the study combines a systematic literature review with a critical-integrative synthesis and an exploratory quantitative secondary analysis. For the literature-based line of evidence, reported research findings are related to the previously specified explanatory variables; for the statistical line of evidence, publicly available individual-level data are analyzed based on a newly specified sub-question. The rule for integration is that both approaches retain their distinct units of analysis: a publication does not constitute an additional respondent, and a further calculation of the same dataset does not constitute an independent replication sample (Biddle & Clinton-Lisell, 2023b; Page, McKenzie, et al., 2021; Page, Moher, et al., 2021).

With the term critical-integrative, an approach is defined that incorporates the contextual conditions of a finding into its theoretical interpretation. Quantitative relationships are analyzed according to their operationalization, while qualitative findings are used to reconstruct situated meanings; a conceptual study, in turn, can clarify terms without thereby proving an observed causal relationship. These requirements for transparent syntheses and for the appropriateness of qualitative analysis decisions serve as methodological reference points for this distinction (Braun & Clarke, 2021; Campbell et al., 2020; Hong et al., 2018). As a deliberate methodological choice, we refrain from producing a new statistical summary of heterogeneous study results into a single overall effect.

Search Period and PRISMA Documentation Status

Therefore, the search for topic-specific literature covered

the period from January 1, 2020, to September 15, 2026. During this period, based on the reported search and selection framework, 20 studies were selected for the qualitative synthesis from approximately 10,122 identified records. Including supplementary literature on the theoretical foundation and methodological rationale, as well as on the contextualization of the findings, the entire reference framework comprises approximately 113 publications; however, its scope must be distinguished from the size of the selected analysis corpus: A source may contribute to the explanation of a premise or the assessment of the scope of a conclusion without thereby attaining the status of a study included in the qualitative synthesis. To ensure a transparent presentation of these different evidence functions, the reporting on identification and selection is based on PRISMA 2020 and further specified by PRISMA-S with regard to the documentation of search strategies so that inclusion in the core corpus is based on the documented selection decisions and is not inferred from the mere use of a publication in the text (Page, McKenzie, et al., 2021; Page, Moher, et al., 2021; Rethlefsen et al., 2021).

Accordingly, the supplementary documentation distinguishes between the reported selection balance, the study-level evidence register, and the broader theoretical, methodological, and contextual reference framework. It documents the distinction between records, reports, and underlying studies, identifies the 20 studies included in the qualitative synthesis, and specifies their analytical contribution to the four synthesis clusters. The reported selection figures are summarized in the PRISMA flow representation and in the accompanying supplementary tables. Source-level search exports, database-specific

execution records, and historical screening logs constitute a separate documentation layer and are not reproduced in full within the present supplement. Accordingly, Table 2 summarizes the reported selection process, while the supplementary material provides the study register, analytical assignments, and the documentation necessary to distinguish the qualitative synthesis corpus from the

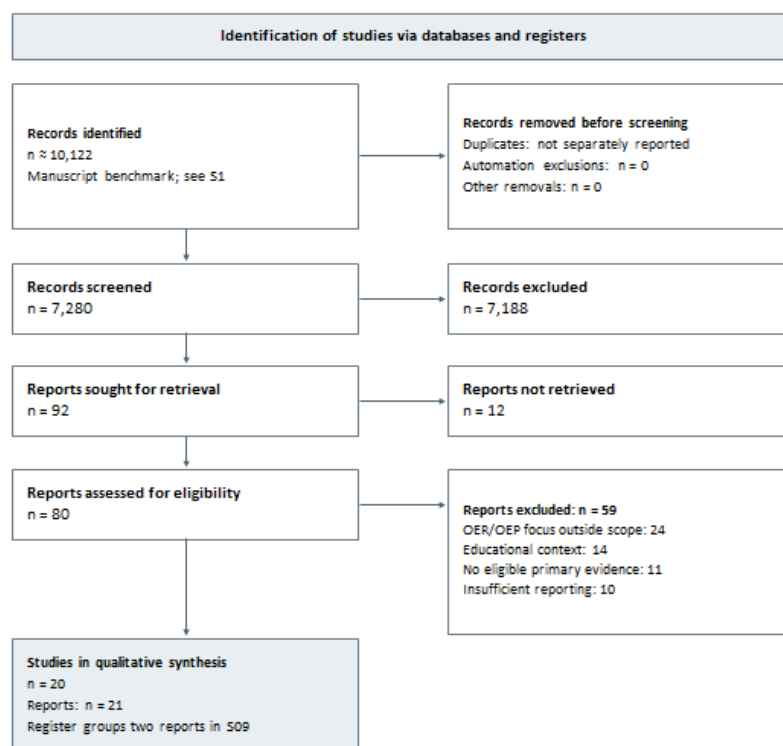
broader reference framework (Haddaway *et al.*, 2022; Page, McKenzie, *et al.*, 2021; Rethlefsen *et al.*, 2021). With regard to the inclusion in the topic-specific analysis corpus defined above, from a research methodology perspective, formal eligibility is operationally defined as an English-language, peer-reviewed publication that appeared within the specified research period and

Table 2: Criteria and Verification Status of the Research and Selection Process

Process or Reference Value	Reported Balance	Function, and Documentation Threshold
Search Period	January 1, 2020–September 15, 2026	Thematic literature; supplemented by older sources on theory and methodology.
Identification	Approximately 10,122 data records	Reported benchmark from the finalized author protocol; rounded figure.
Duplicate Removal	See the original protocol	No separately reported count; no value calculated from the difference between initial and final counts.
Screening	7,280 records	The numbers of records reviewed and excluded in this revised version.
Eligibility	80 reports	Full-text exclusions and their reasons.
Included	20 studies (21 reports)	Reported core corpus of the qualitative synthesis.
Reference Framework	About 113 publications	Supplementary literature on theory, methodology, and context; complete list with 113 reference entries, including data sources.
Secondary Analysis	32 cases; 31 complete	Independent, person-based reference measure; no increase in the number of included studies.

Source: Author (2026).

Note. Research benchmarks based on the author's data; the distinction between records, publications, and survey cases is based on Page, McKenzie, *et al.* (2021), Page, Moher, *et al.* (2021), and Rethlefsen *et al.* (2021).



Adapted from the supplied PRISMA 2020 template, Page *et al.* (2021), <https://doi.org/10.1136/bmj.n71>, CC BY 4.0, <https://creativecommons.org/licenses/by/4.0/>.

Figure 1: PRISMA 2020 Flow Diagram for the Identification, Screening, Eligibility Assessment, and Inclusion of Studies and Documents (see Supplements, made available to the reviewers)
Source: Author (2026).

whose subject matter explicitly links OER or OEP to collaborative design or institutional organization. In this context, the key factor is whether the openness of resources or open practices serves a specific function that can be clearly defined in relation to the research question and is connected to the conditions of collaborative development or their institutional context; simply using the concept of openness in a superficial manner does not warrant inclusion in this corpus, nor does conducting a general study of digitally supported educational processes. Works whose research focus remains limited to digitization in general, without specifying the connection to open educational resources or open practices within the context under investigation, are therefore considered ineligible for inclusion.

This subject-specific delimitation also guides the inclusion of supplementary literature, whose function lies in justifying the theoretical approach or methodologically underpinning its application, without thereby establishing its inclusion in the selected core corpus. In particular, older foundational texts on innovation theory remain relevant for explaining the premises drawn upon but are kept outside the temporally limited empirical corpus of analysis so that their theoretical value is not equated with the status of an included study. By maintaining these distinct functions of evidence, it is possible to clearly demonstrate which publications underpin the qualitative synthesis and which elucidate its conceptual prerequisites or interpretive scope; the total number of cited works thus indicates the scope of the frame of reference, while the number of included studies is derived exclusively from the documented selection decisions (Page, McKenzie, *et al.*, 2021; Page, Moher, *et al.*, 2021).

Note. The unit of count for the core empirical corpus is the underlying study in each case; where applicable, multiple publication reports are linked to one another in the supplementary study registry to avoid multiple weighting of the same evidence base. Supplementary theoretical and contextual literature is excluded from this study count; similarly, the reanalysis of a dataset already included does not constitute an additional primary study. Supplementary Section S2 and Table S7 link the working study identifiers to the corresponding publications and analytical cluster assignments; the accompanying profiles specify source locations and appraisal limitations without requiring reproduction of the source-level inclusion ledger in the present supplement.

Search Logic and Theory-Based Analysis

The conceptual search matrix combines the terms “Open Educational Resources,” “OER,” “Open Educational Practices,” “OEP,” “Open Pedagogy,” and “Student-Generated Content” with “Open Innovation,” “User Innovation,” “Co-Creation,” “Co-Design,” “Lead User,” “Crowdsourcing,” and “Value Co-Creation.” For database-specific reproduction, the actual field delimitations and filters applied in the original protocol are decisive; their specific technical implementation cannot be retroactively

derived from the overarching search matrix (Rethlefsen *et al.*, 2021). As part of the supplementary reference checking, publication metadata and original materials were additionally examined, whereby a search reference was used as evidence only after its contextual relevance had been verified.

For the theory-guided evaluation, the research design and original subject matter of a study are documented before it is assigned to a cluster. In the next step, it is determined whether a finding pertains to resource availability, a specific design option, or a result of usage; additional theoretical relationships are then identified as derivations from the present study. A retrospective characterization of this procedure as a fully inductive process of category formation would be inaccurate, because the theoretical perspectives already structure the analysis. Consequently, following the review of the quality of qualitative analytical methods, the reflexivity of category use is emphasized in contrast to a merely formal invocation of triangulation (Braun & Clarke, 2021; Shareefa *et al.*, 2023).

As a quality perspective, the fit between the research question and design, as well as the transparency of the respective data basis, is taken into account. Criteria-based appraisal procedures provide methodological guidance in this regard but require necessary review protocols to justify study-by-study scores if the necessary review protocols are not available (Hong *et al.*, 2018). Therefore, no aggregated quality scores or reviewer agreement values are reported for the present synthesis. This limitation prevents computational precision from replacing an actually documented quality assessment.

Source and Operationalization of Secondary Data

The empirical basis for this study is the dataset provided in the Open Science Framework for an investigation of a diversity-related open pedagogy assignment by Biddle and Clinton-Lisell. In the original project, students at a community college in Hawai'i created openly licensed photographs; the survey focused on two asynchronous psychology courses held in the fall of 2021 and spring of 2022. Making selected photographs publicly available was part of the assignment, with the option of anonymous publication and the choice of a Creative Commons license (Biddle & Clinton-Lisell, 2023a). For the secondary analysis, the subject matter is accordingly defined as an experience within an existing framework per se, rather than as a choice between voluntary publication and non-publication.

Furthermore, on September 18, 2026, the publicly available response file and the questionnaire were reviewed. The file comprises the reported sample, consisting of 32 rows; for the jointly examined items regarding publication concerns, willingness to participate again, and perceived educational value, 31 complete cases are available. One case contains no information for these three items and is excluded solely from the calculations related to them; no imputation or modification of the responses is performed. The reproduction materials

provide only these variables and the semester assignment, while timestamps, free-text responses, and demographic data are not included (Biddle & Clinton-Lisell, 2023b). Table 3 links the operationalization back to the original questionnaire. In particular, willingness to participate refers to an expressed intention and not to observed subsequent behavior; publication concerns do not measure institutional censorship;

and perceived educational value does not replace an independent performance measurement. As conceptual approximations, the items are therefore only applicable to the specific sub-questions identified. A subsequent renaming to “innovativeness,” “agency,” or “institutional co-decision-making” would exceed their original meaning (Biddle & Clinton-Lisell, 2023b; Cronbach & Meehl, 1955).

Table 3: Operationalization of the Three Variables in the Secondary Analysis

Variable	Surveyed Item	Response Coding	Interpretation Threshold
Concerns C	Concerns about making the project publicly available.	1 to 5; higher values = stronger concerns	No measure of censorship, institutional power, or actual non-publication.
Willingness W	Willingness to participate in another course involving a similar student-led public project.	1 to 5; higher values = stronger willingness	Stated intention; no observed subsequent participation.
Educational Value V	Perceived educational value of the project for one’s own course experience.	1 to 5; higher values = stronger perceived value	Single item; no independent measure of learning achievement or co-creation.

Source: Author (2026).

Note. These are paraphrases of the original items; this is not a newly validated scale. Analysis is based on the original numerical responses; $n = 31$ complete cases (Biddle & Clinton-Lisell, 2023b). The exact questionnaire wording and source-column mappings are provided in Supplementary Table S8, with the source-file provenance and SHA-256 checksum documented in Supplementary Section S3.

Statistical Analysis Plan

For the exploratory sub-question, the response distributions, as well as the median and quartiles, are first reported. A new total score is not calculated because the three items measure different constructs; a high correlation alone would not be sufficient justification for doing so. Subsequently, Spearman rank correlations with midranks for tied observations are calculated and supplemented by partial rank correlations, whereby the statistical adjustment pertains to the respective specified relationship (Cronbach & Meehl, 1955; Kim, 2015). The relationship between publication concerns and willingness to participate is determined as the primary estimate after accounting for perceived educational value.

Based on the same 31 fully analyzable cases, the relationship between publication concerns (C) and willingness to participate (W) is determined as a partial rank correlation after mathematically accounting for perceived educational value (V), whereby the calculation shown in Equation 1 is based on the bivariate Spearman correlations of these variables. For a computational cross-check, the midranks of C and W, formed while taking rank ties into account, are each regressed against the midranks of V, with both linear models including a constant; the Pearson correlation of the remaining residuals, calculated subsequently, provides an algebraically equivalent approach to the same partial rank relationship and thus allows for verification of the computational procedure without constituting an additional basis of empirical evidence (Kim, 2015). Methodologically, this equivalence remains tied to the linear adjustment performed in the rank space, which accounts exclusively for those components

of variation that are mapped within the respective linear projection onto V; therefore, neither a complete capture of possible dependencies on V nor a causal relationship between C and W can be inferred from the remaining residual relationship. Even a partial coefficient of zero would not constitute sufficient evidence of conditional independence under this operationalization, whereas the identification of a causal effect would require additional assumptions and a suitable study design (Kim, 2015; Maxwell & Cole, 2007).

$$r_s(C, W \cdot V) = \frac{r_s(C, W) - r_s(C, V) r_s(W, V)}{\sqrt{(1 - r_s(C, V)^2)(1 - r_s(W, V)^2)}} \quad (1)$$

To illustrate the estimation uncertainty, 50,000 nonparametric bootstrap replicates are generated at the individual level, using random seed 20260918. Within each replicate, the rank values, including their ties, are recalculated; the empirical percentiles at .025 and .975 serve as 95% intervals. Using this method, the uncertainty is described under the working assumption of independent cases; however, it does not ensure a representative random sample, a correction for possible dependencies within the two courses, or sufficient interval coverage in each small sample (DiCiccio & Efron, 1996; Lakens, 2022).

As a sensitivity test, the central estimates are recalculated after successively removing one case at a time. In addition, the semester assignment is included in the residualization alongside the educational value to examine a limited computational sensitivity to this observed contextual distinction. Given the available information, demographic subgroups models and extensive regression

specifications are not used; the choice of method thus follows the narrowly defined research objective rather than a predetermined target sample (Lakens, 2022; Shmueli, 2010).

Exploration Status and Reproducibility

Since this secondary analysis was not pre-registered, and both the selection of the sub-question and its interpretation were based on knowledge of the original publication, its research claim is limited to an exploratory deepening of the already published dataset. Within this research framework, the bivariate recalculations serve as reference points that allow us to track how the estimated relationships change when the selected evaluation dimensions are taken into account together; their recalculation based on the same responses does not constitute either independent empirical confirmation or a claim to original discovery. Rather, the additional specification of the correlation analysis is claimed as a further contribution, through which a limited sub-question within the existing operationalization can be addressed without reinterpreting its exploratory status through subsequent theoretical classification into a predefined hypothesis test or deriving a claim to field-wide priority (Biddle & Clinton-Lisell, 2023a; Kim, 2015). To ensure computational traceability, this limitation on the claim to knowledge is accompanied by documentation of the data processing, which specifies the selection of the original columns and the hash value of the source file as well as the software versions used; on this basis, an executable script generates the descriptive results and interval estimates from the unaltered responses. While this allows for verification of the mapping of the input data to the reported calculations, it must be separately justified to what extent the collected characteristics capture the theoretical objects to which their interpretation refers, since the reproducibility of a computational procedure does not in itself guarantee the conceptual meaning of its variables. In the interest of reflective verifiability, the data source and analytical processing are therefore kept traceable to the limits of the statements derived from them so that computational reproducibility can serve as a prerequisite for scientific verifiability, while the assessment of content validity and theoretical scope remains a scientific interpretive endeavor for which the researcher bears independent responsibility (Cronbach & Meehl, 1955; Vindigni, 2026a).

Note. Computational specifications and software versions are reported in Supplementary Section S3, with the executable reproduction script provided in Supplementary Section S4.

RESULTS AND DISCUSSION

At this point and as part of the operationalized analysis that follows, the function of each item of evidence is first preliminarily determined in relation to its original subject of investigation before any connection is established with the theoretical framework. For example,

a study of student perceptions can reveal the subjective meaning of an open-ended task, while statements about the institutional distribution of decision-making power require additional information regarding decision-making procedures. Therefore, from a research methodological standpoint, it is essential to differentiate between the conceptual reference of co-creation and its empirical implementation (Clinton-Lisell, 2021; Cruz *et al.*, 2024; Omland *et al.*, 2025). Consequently, the four clusters establish an analytical framework whose elements may overlap and therefore do not form four disjoint subsamples, each with its own independent case count. Within this framework, quantitative and qualitative findings retain their distinct epistemological statuses. While a statistical relationship describes the joint variation of operationalized characteristics, a qualitative investigation reveals the meaning of an experience within the context under study; integrating both approaches therefore requires specifying what their respective statements refer to (Braun & Clarke, 2021; Hong *et al.*, 2018). As a methodological consequence, findings are not merged solely on the basis of a consistent assessment of openness but are examined for their fit with the respective research question. Furthermore, in this context, evidence attributed to the systematic core corpus refers to studies S01–S20; additional citations in the following synthesis serve theoretical, methodological, or contextual functions and do not expand the reported core-study count.

Cluster I: User Innovation and Student Knowledge Production

Student knowledge production constitutes an analytically distinct object of inquiry whose educational significance must be reconstructed through the conditions under which learners participate in creating and revising educational content; the existence of a student-created artifact alone establishes neither the scope of their decision-making authority nor the contribution of their user experience to defining an innovation need.

By relating different assignment formats to the opportunities for action and the difficulties experienced by learners, empirical studies on open pedagogy offer an understanding of the concrete nature of this participation (Baran & AlZoubi, 2020; Hilton *et al.*, 2020), while a systematic synthesis of these studies provides a comparative analysis of the various empirical approaches and thus offers a foundation for a nuanced examination of the form and scope of student participation in open educational practices (Clinton-Lisell, 2021). For an interpretation grounded in the science of innovation, it must also be determined whether participants can influence the problem formulation and whether their user experience enables a change to the intended solution. Within the theoretical framework developed here, the scope of participants' decision-making authority is therefore treated as a mediating condition to be investigated when determining whether student production constitutes user innovation, rather than

assuming that participation in content creation already demonstrates this relationship.

Because Renewable Assignments provide for the reuse of student work beyond the immediate assessment context, the creation of such work acquires a temporal dimension within which its subsequent use becomes an integral part of the pedagogical task design; studies in teacher education and computer science explore such arrangements, particularly with regard to the understanding of open resources and the intrinsic motivation of the participants (Van Allen & Katz, 2022; van der Walt & Bosch, 2025). Building on these research approaches, the present conceptual framework raises the follow-up question of the extent to which the long-term availability of a student's contribution is linked to ongoing opportunities to influence its editing and further use. One constellation worthy of analytical examination is the scenario in which a resource remains usable beyond the end of the semester, while the opportunities for co-creation granted by the institution to its original creators end with the course's conclusion. Accordingly, based on the revision and participation rights actually granted, it would be necessary to determine whether the continued availability of the work product over time also preserves control over its further development, or whether the two relationships are institutionally decoupled from one another.

By examining the collaborative development of OER by faculty and students at a South African university, Mudau (2025) identifies a connection between cooperative knowledge production and the opportunity to incorporate one's own experiences into the content design of educational resources; within the framework grounded in Ubuntu and decolonial perspectives, student agency is explored through the experience described by the participants of being able to help shape academic subjects from within their respective life and action contexts (Mudau, 2025). This context-sensitive analysis aligns with the study by Trust *et al.* (2023), insofar as it uses student self-reports to elucidate the significance attributed to participation in OER design projects for their learning and how participants assess their contribution to achieving course-related learning objectives, thereby making the subjectively experienced educational relevance of resource production accessible to empirical analysis (Trust *et al.*, 2023).

For the theoretical triangulation developed here, both studies thus provide empirical reference points; however, their explanatory value within the field of innovation studies can only be fully realized through an independent analysis of the institutional mediating relationships: It remains to be examined under what conditions the articulated experiences of learners are recognized as a need worthy of revision and can influence the definition of the problem beyond the mere execution of a given development task. In this explicitly expansive interpretation, a connection to user innovation is sought where usage-based experiential knowledge contributes

to the identification of innovation needs, while open innovation refers to the organizational conditions for its adoption, and value co-creation raises the question of the extent to which a jointly generated contribution of resources is realized as value in the respective educational context; empirical confirmation of these mediating relationships remains the subject of a study based on an appropriately operationalized framework.

In this regard, it remains to be determined separately, within the field of innovation studies, to what extent a positively evaluated project experience is based on completing a predetermined task or is linked to the opportunity for participants to articulate their underlying need for change and to help shape its translation into a development task. Moreover, and from a motivation-based perspective on self-determination, this distinction is expanded to include the question of under what conditions learners experience their participation as self-determined (Werth & Williams, 2021). The transition from a subject-centered experience to effective institutional agency requires independent empirical justification; therefore, it is necessary to examine whether perceived self-determination is linked to actual decision-making authority regarding the problem and its further handling, or whether it pertains to the scope for action within predetermined institutional parameters.

Furthermore, textbooks, teaching materials, etc. designed in a co-creation manner by students, as well as open-ended assignments in methodology training, bring the selection of the knowledge forms presented into sharp focus in the tertiary education setting. Relevant studies explore specific learning arrangements within which participation in the creation and the content orientation of a resource can be considered together (Carranza Ko & Shochet, 2024; McGowan-Kirsch & Soczka Steidinger, 2026). As a separate analytical extension, the question arises as to whether learners merely contribute additional examples or also have a say in determining which perspectives structure a resource as a whole. Only the second question reveals the scope of epistemic co-decision-making, whereas visible authorship alone does not provide enough information about the issue.

When evaluating the empirical evidence, it is also necessary to distinguish between intention and actual cooperation. Further, the intention to collaboratively create OER, as examined by Wang *et al.* (2022) from the perspective of Social Exchange Theory, reveals an intentional object whose significance for the synthesis must be grounded in this original operationalization; an articulated intention to cooperate does not allow one to infer either the actual implementation of collaborative development work or the institutional opportunities for shaping that it opens up.

Following the analytical distinction between expressed intentions to participate and actual development work, research on open subject-specific learning offerings and reusable resources must also be classified according to their respective subjects of inquiry, since the examined

aspects of open education explore different facets of resource development, the comparability of which within the field of innovation studies requires a separate justification (Hernández-Castellano *et al.*, 2020; Patiño *et al.*, 2023; Sanabria-Z *et al.*, 2024). For the present synthesis, this gives rise to the methodological requirement of first translating the common reference to resource openness into a connection between the findings via explicit bridging premises; to this end, it must be disclosed which empirically recorded characteristics support an interpretation as user-generated or cooperative further development of knowledge and at which points this interpretation extends beyond the original scope of the respective study. Under this premise, the explanatory contribution of a study is measured by the extent to which its findings support a specific relationship within the theoretically reconstructed innovation process, whereby the integration of heterogeneous research subjects must preserve their analytical distinctiveness so that a relationship established only through the synthesis is not already assumed to be consistent empirical evidence. Consequently, for the purpose of integrating these findings within innovation studies, their transfer depends on explicit bridging premises that clearly explain how each identified characteristic reflects a specific aspect of cooperative development and what additional observations are needed to examine its relationship to effective co-creation in institutions.

Against this backdrop, the issue of public visibility takes on particular significance. Studies on student experiences with participatory technologies address privacy and identity as components of open practice (Harrison, 2025). Within the conceptual framework developed here, the study provides a point of departure for the normative proposition that self-determined participation should encompass the possibility of declining public dissemination on reasoned grounds without incurring disadvantages unrelated to the academic quality of the contribution.

Within such a conceptual framework, non-publication should not automatically be interpreted as a lack of willingness to innovate, because it could in fact reflect the exercise of the decision-making leeway that has been granted (Vindigni, 2026h).

Cluster II: Institutional Governance and Educational Ecosystems

From the perspective of institutional mediation, the second cluster examines the sustainability of open educational practices as a challenge involving the transition from situationally driven co-creation to organizationally embedded avenues for action, the continued existence of which beyond the timeframe of individual courses requires independent justification. The focus is thus on the conditions under which cooperative knowledge production attains an institutional commitment that ensures responsibilities for further development remain in place even after the completion of a specific project

and that participants can rely on recognized procedures for collaborative work. However, systematic exploratory studies are being conducted on these issues, such as those on the sustainability of OER, in which, on the one hand, contextual factors at various levels are examined, while, on the other hand, conceptual work on decentralized learning ecosystems and knowledge communities provides a framework for investigating the collaborative use of open resources in relation to the prerequisites for their further development (Aksoy *et al.*, 2025; Alsuhaymi & Atallah, 2026; Otto & Kerres, 2022).

For the present synthesis, we derive from these studies the analytical distinction between the persistence of a resource stock and the reproducibility of the social practice from which that stock emerged: While continued accessibility can initially be determined by the discoverability and usability of existing materials, the institutional perpetuation of cooperative knowledge production additionally requires evidence that new needs for revision are addressed and transformed into collaborative development processes while opportunities for co-creation remain intact. As empirical points of reference, documented revision histories should be consulted and examined to determine who can propose changes and how decisions are made regarding their incorporation. Within this framework, the continued availability of resources coupled with the loss of opportunities for participation should be treated as a counter-indicator to the equation of material permanence with institutionally sustained co-creation; the extent to which the two actually interact must therefore be determined on the basis of independent observations in each case.

Studies on adoption based on Rogers' diffusion theory further indicate that the decision to use a resource constitutes a distinct research question (Menzli *et al.*, 2022). For the present approach, this perspective is expanded to include the question of what design possibilities exist after adoption. A decision to adopt open educational resources can serve as the starting point for collaborative development; however, whether such continued development is institutionally intended and practically feasible remains to be determined through additional observations.

In this regard, the study of an interinstitutional OER community by Baas and colleagues provides a concrete point of connection. Using a mixed-methods design, the study examines the value creation as perceived by instructors while maintaining the original community-based theoretical framework (Baas *et al.*, 2023). Retrospectively characterizing the study as a direct test of service-dominant logic would therefore be unjustified. Rather, for the present triangulation, it can be noted that a contribution can gain significance in different institutional contexts of use, and its realization of value cannot be determined solely by the place of its origin.

Read against these premises, reflective case studies of institutional support for open practice provide a basis for examining how locally developed educational initiatives

become embedded in organizational arrangements, with particular attention to the conditions under which their continuation becomes institutionally supported beyond the originating project.

Concurrently, current research on normative and/or process-oriented educational innovation projects examines how institutional challenges are effectively addressed within the educational environment (Campbell *et al.*, 2023; Schophuizen & Kalz, 2020). Policy-related work from other higher education contexts expands this perspective to include the conditions of concrete implementations (Edamo, 2026). Taken together, these findings give rise to a comparative question: Under what conditions does an institutional regulation actually open up opportunities for action, and when does it remain ineffective in light of the resources required to implement it? The various contextual findings are not interpreted as an overarching hierarchy of effectiveness among governance instruments.

The assessments of a resource's potential users are also relevant to its adoption. Qualitative studies on evaluations by faculty members and surveys on the use of OER identify selection criteria, while literature reviews on barriers to use identify various obstacles (Baas *et al.*, 2022; Bond *et al.*, 2021; LeMire, 2025). Within the framework of the theoretical development proposed here, this approach leads to the question of how subject-matter quality assessment can be empirically distinguished from a mere reproduction of already established selection preferences. As a possible approach, documented decisions regarding initially unusual contributions and the resulting opportunities for revision are proposed.

In this regard, and from the perspective of institutionalizing open educational practices within this framework, it should be noted that research on sustainability models attributes the continued existence of open resources to those organizational conditions that make their ongoing maintenance and further development possible even beyond the duration of individual projects.

However, as an institutionally mediated reproductive relationship, the durability of resource provision must be inferred from the interdependencies of the conditions necessary for their preservation. Accordingly, the benchmark for context-dependent sustainability assessment is the institutional capacity to reproduce those interdependent conditions, the continued guarantee of which allows the provision of open resources to endure beyond situational enabling constellations (Tlili, Nascimbeni, *et al.*, 2023; Torres-Castillo *et al.*, 2026). Building on this, equity-focused research on open textbooks and Open STEM Education opens up a distributive perspective within which institutional sustainability must be understood in relation to the conditions for participation specific to various actors: It remains to be explored for whom these sustained offerings actually open up accessible educational opportunities and under what conditions previously underrepresented perspectives are recognized as contributions relevant

to shaping the field so that resource persistence and participatory educational relevance remain analytically distinguishable (Cox *et al.*, 2022; Diaz Eaton *et al.*, 2022).

To clarify this relationship from a didactic perspective, this synthesis draws on the revised taxonomy of learning objectives as a supplementary analytical framework, which allows intended learning objectives to be differentiated according to dimensions of knowledge and cognitive processes and linked to corresponding task requirements and performance assessment procedures (Krathwohl, 2002). This analysis raises the question of how to define the educational relevance of institutional sustainability at a more precise didactic reference level. Accordingly, we must reconstruct the didactic and institutional conditions under which permanently available resources are transformed into learner-centered opportunities for knowledge acquisition, whereby heterogeneous learning prerequisites must play a constitutive role in shaping tasks and support services so that formal accessibility can be linked to actually realizable opportunities for academically challenging engagement. Whether the intended objectives are adequately represented in learning activities and assessment procedures requires separate examination; their taxonomic specification provides an analytical basis for this examination but does not itself establish empirical goal attainment (Krathwohl, 2002). Following on from this differentiation, the study examines institutionalized co-creation by identifying the decision-making spaces within which learners can participate in the formulation and revision of didactic objectives, taking into account relevant educational legal requirements. In doing so, the conditions for the legitimacy of pedagogical evaluation standards also become the subject of analysis: It must be examined to what extent student participation, beyond the completion of assigned tasks, also influences the criteria by which the resulting contributions are recognized as educationally relevant.

What needs to be empirically determined is whether those involved in the production of resources participate within already established, binding goal horizons or whether they can also initiate well-founded changes to these goal horizons and have a say in their institutional implementation.

In the context of this synthesis, this gives rise to the analytical requirement to relate institutional sustainability to the distribution of its educational benefits, without inferring from the long-term availability of a resource that substantial participation is equally guaranteed over the long term. A separate proposition derived from this is that once a product has been opened up, it can remain freely accessible even under changing institutional conditions, while its further development is once again reserved for a limited group of actors. Empirically, such a change would need to be examined by analyzing decision-making processes over time.

Through its conceptual reflection on an open publishing community, EdTechnica places the organization of collaborative knowledge production itself at the center

of analysis, thereby providing a frame of reference for examining the institutional processes through which contributions are incorporated into a collectively managed body of knowledge (Allman *et al.*, 2024). Considerations developed in our own preliminary work on community management and the design of institutional processes can be linked to this perspective, with their application to OER/OEP presented here as a theoretical extension: There is a need to examine the extent to which institutional coordination enables participants to exert a well-founded influence on decisions regarding their contributions even after their submission (Vindigni, 2023a, 2025c). For the present conceptual framework, the revisability of such decisions is therefore proposed as a criterion for assessing institutional openness; its empirical investigation requires transparent information on how contributors' objections are incorporated into further processing and what opportunities for co-determination remain regarding subsequent use. Under this premise, more efficient processing of submitted contributions gains its scientific significance in the field of innovation studies only through the additional examination of whether the acceleration of institutional processes is also accompanied by effective opportunities for influence; otherwise, it would remain unclear whether only the processing of external contributions is being optimized, while control over their further development remains unchanged in the hands of the coordinating bodies.

Cluster III: Generatively Assisted Co-Creation

With regard to the integration of generative systems into OER/OEP, in this context, scholarly discussion since 2023 has increasingly addressed the implications of synthetic content production for educational practice, particularly within the tertiary education sector (Bozkurt, 2023; Mills *et al.*, 2023; Panke, 2024). For the inquiry pursued here, the significance of this debate lies in the need to examine how the educational relevance of a generated resource is constituted within its institutional context, since participation in its production does not in itself establish whether those involved can also influence the conditions governing its subsequent use. As a theoretical starting point, generative AI is conceived here, following the author-centered framework, as a probabilistic epistemic actant whose operations may be involved in the production of knowledge offerings without establishing a responsible subject position (Vindigni, 2026a). For the constitution of the subject matter, this implies that technical involvement in an output must be distinguished from the institutionally legitimized co-decision-making of human participants.

Research in teacher education explores the potential of generative systems for planning and open learning arrangements; more recent studies relate such applications to OER-enabled pedagogy as well as to the conditions for their development and use (Çelik & Şahin, 2026; Panke *et al.*, 2026; van den Berg & du Plessis, 2023). A common overarching question here is how participants can assess

the subject-matter requirements of a generated proposal and justify its revision. Under this premise, the simplified creation of materials constitutes a technical finding whose educational significance can only be assessed on the basis of the associated cognitive operations.

Furthermore, through its examination of a chatbot adapted to business management education, the study provides an empirical basis for considering how students' assessments of its use relate to expert judgments of its responses, while leaving the question of independently demonstrated learning gains open (Alfirević *et al.*, 2024). For theoretical integration, this leads to the question of institutional control over the infrastructure being used: To what extent can participants understand the selection of knowledge bases and influence the conditions for their further use? A test hypothesis is formulated that access to an interface denotes a different form of control than the ability to examine its epistemologically relevant prerequisites. Following the analysis of platform-based universities, the scope of the respective access would therefore need to be determined empirically (Vindigni, 2026g).

Programmatic contributions discuss open education as a framework for the responsible use of generative AI while simultaneously highlighting the ambivalences of this connection (Ossiannilsson *et al.*, 2024; Tlili *et al.*, 2024, 2026). More recent OEP models expand the conceptual discussion to include new forms of practice without yet providing empirical evidence of effectiveness for each of these forms (Duan, 2026). For the present synthesis, their value therefore lies in clarifying potential research topics; no confirmed superiority of generatively assisted knowledge production is derived from the range of models presented.

Synthetic circularity refers to the risk of self-confirming processing of generated knowledge offerings when their validity is, in turn, secured solely through subsequent generative operations (Vindigni, 2026a). Applied to OER/OEP, this leads to the development of an application hypothesis: Repeated machine processing could increase the linguistic consistency of a text without improving its substantive justification. Accordingly, it would be necessary to investigate whether revision procedures incorporate original sources and divergent interpretations, or whether merely another technically plausible output serves as confirmation.

Referring to the literature on algorithmic inequality and cultural representation, the evaluation of generatively mediated knowledge production can be narrowed down to the question of under what conditions different forms of knowledge become visible as relevant interpretive frameworks at all and to what extent their representation takes into account the perspectives of those whose experiences are intended to be represented (Vindigni, 2025a, 2025b). For the present study, this yields an analytical framework within which the consideration of marginalized positions is to be assessed based on their potential to influence revisions: The decisive factor

would be whether the actors in question can justifiably object to oversimplified or factually inappropriate representations and whether their objections are demonstrably incorporated into the revision, such that the mere inclusion of additional content does not in itself constitute sufficient evidence of substantial epistemic participation.

In line with this determination, the postdigital perspective emphasizes the preservation of epistemic autonomy as a normative educational goal, the fulfillment of which must be examined in relation to individual judgment and the institutional conditions for its effective exercise (Vindigni, 2026h). Empirically, therefore, it would be necessary to reconstruct the extent to which learners can independently examine the premises of generated statements and develop reasoned counterarguments, while also determining whether they have avenues for action through which such judgments can actually influence further knowledge production; only in this way would the investigation go beyond demonstrating an individually available competence to capture its institutionally enabled effectiveness. This aspect is not measured within the secondary data; therefore, no numerical confirmation of the AI-related cluster is claimed.

Cluster IV: Value Co-Creation and Multidimensional Value Assessment

In the fourth cluster, the examination of institutionally mediated openness focuses on the question of under which theoretical premises empirically measured outcome variables can be interpreted as an expression of education-related value realization. A quantitative point of reference is provided by the 25 studies synthesized by Tlili, Garzón, *et al.* (2023), which show a standardized mean learning performance difference of $g = 0.07$, as well as the subsequent synthesis of 32 studies with $g = 0.10$, whose quantitative analysis is supplemented by an activity-theoretical reconstruction of the arrangements under investigation (Tlili, Garzón, *et al.*, 2023; Tlili *et al.*, 2025). For the present conceptual framework, the validity of these findings remains tied to the respective operationalized interventions and performance measures; therefore, no isolated contribution of institutional co-decision-making is derived from the summarized differences. Furthermore, in light of the quality issues within the OER review literature documented by Mishra (2025), the adoption of synthesized findings requires an independent methodological assessment; accordingly, both meta-analyses are considered separately here, without aggregating their study or participant counts as independent evidence prior to examining possible overlaps (Mishra, 2025).

In this respect, this commitment to the original object of measurement also necessitates preserving the distinct significance of different manifestations of educational benefit. Furthermore, studies on course or module performance and its variation by age and/or teaching format reveal different correlations than those found in

the reconstruction of subjective learning experiences. Nevertheless, it is also evident in this context that both perspectives can indeed be related to one another within a single research design (Bol *et al.*, 2022; Clinton-Lisell, 2023; Mayer, 2023). In addition, this conceptual framework is expanded to include temporal and economic dimensions through the examination of performance trajectories and the systematic analysis of the affordability of learning materials. However, the joint consideration of these dimensions does not in itself prove that the identified value contributions are equivalent (Disha & Vollman, 2023; Mullens & Hoffman, 2023). For the purposes of this synthesis, economic relief and professional development are therefore initially documented separately so that we can subsequently examine under which institutional conditions they interact and at what points their trajectories diverge.

Following on from the question of such mediating conditions is the longitudinal study of continuous OER improvement cycles within the RISE framework, in which resource use and performance development are related to repeated revision processes (Castellanos-Reyes *et al.*, 2024). For the theoretical framework developed here, this approach opens up the possibility of examining value realization in the course of resource development, although a correlation between revision and subsequent performance does not yet allow for a causal attribution to individual governance characteristics. As a further research proposition, it is therefore suggested that the documentation of revisions be expanded to include their institutional genesis: It would need to be made clear what feedback justifies a need for change, how decisions are made regarding its consideration, and what influence those providing feedback can exert on its implementation. Only such an expansion would make it possible to relate observed improvement processes to the participatory powers actually at work within them.

Beyond this connection between resource development and learning outcomes, higher education-related co-creation research explores relational contexts by relating student participation behavior to institutional relationships, taking into account, among other factors, trust and identification with the institution (Goi *et al.*, 2024; Phan *et al.*, 2026; Zamora-Ramos *et al.*, 2023). Within the present synthesis, such studies serve a contextualizing function; their application to OER/OEP remains contingent upon the explicit definition of the value reference under investigation in each case. In particular, institutional attachment is treated as a distinct relational quality, whose relationship to academic learning development must be examined separately. According to service-dominant logic, the interpretation focuses on identifying which stakeholders experience a result as value and in what contexts of use before this experience can be defined as a shared realization of value (Cruz *et al.*, 2024; Vargo & Lusch, 2016).

Further transdisciplinary exploration is supported by the authors' own preliminary work on digital co-creation and

adaptive learning processes, which offer complementary points of reference; their explanatory contributions are drawn upon while preserving their original subject areas (Vindigni, 2023b, 2024a). Building on this, a multi-perspective value assessment is proposed, within which institutional expectations of benefit are confronted with learners' experiences and related to separately documented evidence of subject-specific learning development. Under this premise, divergent evaluations would be treated as findings requiring interpretation, because it is precisely

their lack of agreement that could shed light on the conditions under which institutionally claimed benefits and educational value realized by learners diverge. In contrast, aggregating these findings into an overall value would require an explicitly justified weighting, the normative assumptions of which would need to be disclosed. Using this distinction between empirical findings and theoretical value attribution, Table 4 brings together the four clusters in terms of their evidential function and clarifies the resulting management questions.

Table 4: Cross-Cluster Comparison of Evidence Functions

Cluster	Exemplary Sources	Relationship to Innovation	Methodological Approach	Scope of the Statement	Management Issue
I	(Trust <i>et al.</i> , 2023; Van Allen & Katz, 2022; van der Walt & Bosch, 2025)	Student-led co-production; potential user innovation	Project-based studies and perception data	Experiences with development and reuse; examine decision-making authority separately.	What problems and revisions can learners determine on their own?
II	(Aksoy <i>et al.</i> , 2025; Baas <i>et al.</i> , 2023; Farrow & Díez-Arcón, 2024)	Institutional knowledge processing; open innovation	Mixed methods, review, and case comparison	Context-specific conditions for cooperation and sustainability.	How do contributions lead to transparent decisions about learning progress?
III	(Çelik & Şahin, 2026; Mills <i>et al.</i> , 2023; Tlili <i>et al.</i> , 2026)	Generatively Assisted co-creation and knowledge production	Conceptual and application-oriented approaches	Opportunities and evaluation requirements; mixed evidence on impacts.	Who verifies academic validity and initiates corrections?
IV	(Omrand <i>et al.</i> , 2025; Tlili, Garzón, <i>et al.</i> , 2023; Tlili <i>et al.</i> , 2025)	Value co-creation; evaluation of results	Meta-analysis, meta-synthesis, and conceptual review	Various dimensions of learning and values; no single indicator for shared decision-making.	For whom does what educational value arise, and under what conditions?

Source: Author (2026).

Note. Original comparative synthesis. Exemplary sources from the frame of reference are listed.

Results of the Exploratory Quantitative Secondary Analysis: Distributions and Common Evaluation Patterns

Of the 32 data records, 31 complete cases are identified for the selected variables. Within this subsample, 16 cases fall into the first semester category and 15 into the second; in the complete source dataset, this distribution is 17 to 15. The same complete subsample is used for all correlation estimates reported jointly below, ensuring that differences between the coefficients are not attributable to varying sample sizes. The distributions shown in Table 5 are based on our own calculations using the documented original data (Biddle & Clinton-Lisell, 2023b).

Among the 31 fully evaluable cases, the ratings of perceived educational value and willingness to participate again are concentrated in the upper ranges of the scale; 25 individuals assign the educational value to one of the two highest response categories (80.6%), while 22 individuals do so for willingness to participate (71.0%).

With a median of 3 for publication concerns, twelve of the 31 respondents selected one of the two highest response

categories (38.7%); alongside the predominantly positive evaluations observed across the sample, reservations about public dissemination thus remain evident, although these aggregate distributions do not establish whether favorable evaluations and pronounced concerns coincide within individual responses. In their descriptive scope, these percentages remain tied to the observed response pattern and do not justify a cross-university estimate of the prevalence of such evaluations or concerns (Biddle & Clinton-Lisell, 2023b).

At the level of individual response patterns, the analytical distinction between the attribution of educational value and concerns about publication is reflected in the fact that seven respondents placed both characteristics in one of the two top response categories; this overlap accounts for 22.6% of the 31 fully evaluable cases, or 58.3% of the twelve cases with correspondingly pronounced concerns. It is treated solely as an independent descriptive calculation reflecting the joint occurrence of the relevant responses and does not constitute an additional categorical scale (Biddle & Clinton-Lisell, 2023b). For theoretical

interpretation, it is therefore important to note a case-specific coexistence, in light of which the assumption of mutual exclusivity between positive attributions of

educational value and publication-related reservations cannot be upheld within the sample under study.

Table 5: Response Distributions and Central Tendency Measures for the Selected Items

Variable	n	1	2	3	4	5	Median	Q1–Q3
Concerns	31	6	5	8	7	5	3	2–4
Willingness to Participate	31	0	4	5	9	13	4	3–5
Educational Value	31	1	0	5	9	16	5	4–5

Source: Author (2026).

Note. Author's own calculation based on Biddle & Clinton-Lisell (2023b). Columns 1 through 5 contain the absolute frequencies of the response categories. Q1 and Q3 denote the 25th and 75th percentiles. One case in the original dataset has missing values for all three items. See also Supplementary Table S9.

Bivariate and Partial Rank Correlations

For publication concerns and willingness to participate, the bivariate Spearman rank correlation is $r_s = -.390$ with a 95% bootstrap interval of $[-.702, -.004]$. The correlation between perceived educational value and willingness to participate is $r_s = .837$ with an interval of $[.650, .960]$; for concerns and educational value, the correlation is $r_s = -.357$ with $[-.672, .044]$. As a descriptive comparison based on the same data, these relationships are presented in Table 6 alongside the partial estimates; this analysis does not constitute an independent replication of the original study (Biddle & Clinton-Lisell, 2023b).

After accounting for educational value, a partial rank correlation of $-.179$ remains between publication concerns and willingness to participate. With a 95% bootstrap interval of $[-.491, .233]$, the uncertainty encompasses both a negative and a positive relationship, which is why a precisely defined independent relationship cannot be derived from these data. Conversely, when concerns are taken into account, the partial rank correlation between educational value and willingness

to participate is $.811$, with an interval of $[.587, .954]$. All values are based on the same exploratory recalculation of the original responses (Biddle & Clinton-Lisell, 2023b).

Sensitivity and Limits of Statistical Precision

In all 50,000 bootstrap replicates, the five reported estimates were defined; no replicates had to be discarded due to constant rank vectors. When a single case is successively excluded, the partial correlation between concerns and willingness to participate ranges from $-.228$ to $-.044$, while the partial correlation between educational value and willingness to participate ranges from $.782$ to $.882$. When semester assignment is additionally taken into account in the calculations, the first-mentioned partial correlation is $-.218$. Table 7 documents these supplementary calculations (Biddle & Clinton-Lisell, 2023b).

Despite the consistently negative sign of the first leave-one-out series, there is no protection against the uncertainty of new samples, because 30 of the 31 cases already observed are retained in each instance.

Table 6: Bivariate and Partial Rank Correlations with Bootstrap Intervals

Relationship	Variable Considered	Estimated Value	95% Interval
Concerns – Willingness to Participate	None	-.390	$[-.702, -.004]$
Concerns – Educational Value	None	-.357	$[-.672, .044]$
Educational Value – Willingness to Participate	None	.837	$ [.650, .960]$
Concerns – Willingness to Participate	Educational Value	-.179	$[-.491, .233]$
Educational Value – Willingness to Participate	Concerns	.811	$ [.587, .954]$

Source: Author (2026).

Note. Author's own calculation based on Biddle & Clinton-Lisell (2023b); $n = 31$. Spearman correlations with midranks for tied observations, partial correlations as linear adjustments to rank values. Percentile intervals based on 50,000 bootstrap replicates, seed 20260918. All intervals are exploratory, marginal, and without multiplicity correction; no correction for course dependencies. See also Supplementary Table S10.

Accordingly, leave-one-out intervals are interpreted as case-deletion sensitivity diagnostics, and bootstrap intervals as resampling-based descriptions of uncertainty under the stated assumptions; both methods answer different questions (DiCiccio & Efron, 1996; Lakens, 2022). The additional semester variable does not account for unobserved differences or possible dependencies within the courses.

Drawing on 31 complete cases, the present secondary analysis examines how perceived educational value and publication concerns relate to willingness to participate again within the instructional context from which the data originate (Biddle & Clinton-Lisell, 2023b). Its exploratory contribution to the evidence synthesis must be interpreted in light of the uncertainty surrounding the partial association between publication concerns

Table 7: Sensitivity of the two partial rank correlations

Evaluation	Concerns – Willingness to Participate Again, Controlling for Perceived Educational Value	Educational Value – Willingness to Participate Again, Controlling for Publication Concerns
Estimate based on 31 complete cases	-.179	.811
Smallest leave-one-out value	-.228	.782
Largest leave-one-out value	-.044	.882
Additional consideration of the semester	-.218	Not covered by this sensitivity analysis
Defined bootstrap replicates	50,000 of 50,000	50,000 of 50,000

Source: Author (2026).

Note. Author's own calculation based on Biddle & Clinton-Lisell (2023b). Leave-one-out refers to the successive exclusion of one person at a time, followed by a new ranking. Ranges are not confidence intervals. Semester adjustment was performed using an additional binary variable in the residualization process; no institutional multilevel analysis was conducted. See also Supplementary Table S11.

and willingness to participate again, as reflected in the bootstrap confidence interval, while any generalization beyond the context-specific sample requires separate justification. Since institutional decision-making authority was not measured, the observed associations do not establish the postulated institutional mediation; their contribution to theoretical development lies in specifying a narrowly defined empirical point of departure from which subjective value attributions can be examined in relation to independently assessed institutional decision-making arrangements, leaving the broader mediating assumptions open to a distinct empirical investigation (Shmueli, 2010).

Theoretical Derivation: Institutional Mediation as an Independent Object of Study

In the transition to the theoretical discussion, empirical findings, their subject-specific interpretation, and the proposed theoretical conclusions are distinguished according to their respective claims to validity. While the findings refer to documented observations and estimates of correlations, their interpretation examines their meaning within the respective boundaries of operationalization and context. Assumptions regarding institutional mediation that go beyond these findings are identified as premise-bound theoretical propositions and as the basis for the determinant-indicator matrix, the empirical validity of which cannot be derived either from the observed correlations or from the plausibility of their interpretation.

Based on a critical and integrative synthesis of literature review and secondary analysis, this paper proposes establishing institutional mediation as an independent field of inquiry through which the relationship between resource availability and the realization of educational value can be explored in terms of the conditions that make it possible. Following on from the literature on open educational practices, this approach focuses on the institutional anchoring of the actually available powers of shaping and thus on the conditions under which formal openness can enable substantial co-creation (Bali

et al., 2020; Omland *et al.*, 2025). Within this theoretical framework, the secondary analysis serves an empirically limited function by reconstructing relationships between the assessed evaluation dimensions in a specific participatory context, without thereby statistically identifying the institutional conditions under which they arise (Biddle & Clinton-Lisell, 2023b).

Equating these two objects of inquiry would oversimplify the theoretical examination, because positive evaluation does not directly capture either the existence or the scope of institutional decision-making rights.

The present conceptual framework clarifies this distinction through the term epistemic admission. This refers to the process through which a contribution is recognized as a knowledge offering worthy of discussion and becomes subject to a transparent scholarly review; as a distinct analytical category, epistemic admission thus concerns an institutional relation and not a dispositional characteristic of the contributing individual. It can be linked to the discussion of recognition and representation in open education, without inferring its practical implementation from its normative justification (Cox *et al.*, 2020; Iniesto & Bossu, 2023; Nusbaum, 2020).

However, the approval of a contribution does not yet determine who has control over its further use. The next step in the mediation process is therefore to determine participation in revision decisions, through which feedback can be incorporated into changes to the shared material.

In the theoretical relationship between open innovation and user innovation, the institutional incorporation of external knowledge can be understood as a mediating process, the explanation of which must take into account both the organizational conditions of knowledge processing and the usage-related origin of the articulated innovation needs; while the open innovation perspective addresses the selective incorporation of external knowledge contributions, user innovation focuses its analytical approach on those actors whose situated problem experience leads to a need for change (Alexy *et al.*, 2020; Chesbrough, 2003; von Hippel, 2005). For the

present theoretical triangulation, this perspective gives rise to the follow-up question of the extent to which this problem experience retains its subject-defining significance within institutional selection procedures, or is altered, through its translation into established evaluation categories, in such a way that the development task undertaken deviates from the originally articulated need. Empirically, this relationship could be explored through a process-oriented reconstruction that relates the original problem report to the justifications for its institutional handling and the documented revision; in particular, it would be necessary to determine whether the individuals who raised the issue can track changes to their problem definition and assess their appropriateness so that the acceptance of a contribution can be evaluated in a nuanced manner with regard to the ongoing influence of its authors.

Such a process reconstruction would go beyond merely counting submitted contributions, as it examines their institutional effectiveness. Under the normative premise established here, not every rejection should be considered an exclusion; rather, its substantive justification, together with the possibility of a factually feasible re-examination, becomes the criterion for evaluation. Within the author-centered framework, this requirement for a reflexive assessment can be linked to institutionally pre-structured options for action (Vindigni, 2026e, 2026h). Empirically, a distinction should be made between the reasons for a rejection and the subsequent opportunities that arise, rather than treating the mere existence of a feedback channel as evidence of substantial participation.

Premise-Dependent Theorem Formulation and Empirical Falsifiability

A premise-dependent mediating theorem is proposed as a theoretical contribution: To the extent that substantial co-creation is determined by effective influence on relevant decisions, its existence cannot be deduced solely from a property of the material used; insofar as value realization encompasses the context of use, it, too, is not already given with the production of this material. Within the defined conceptual frameworks, this theorem has its logical scope; it is not an empirically confirmed law governing all open educational arrangements (Cronbach & Meehl, 1955; Tietjen & Asino, 2021; Vargo & Lusch, 2016). As an independent theoretical framework, its value lies in the systematic identification of those transitions whose prerequisites make it possible to test the innovation thesis in the first place.

Empirically meaningful propositions are derived from this definition only when different institutional conditions are linked to observable consequences.

For P1, the proposed relationship concerns the contribution of institutionally consequential revision procedures to the uptake of user-originated problem reports, rather than their status as a necessary or sufficient condition of co-creation. Within comparable resource-development arrangements, the proposition would receive support if procedures that

permit contributors to contest selection decisions were associated with a greater proportion of substantively comparable reports leading to documented revisions than arrangements without such procedures. Comparability would require attention to the reports' relevance and feasibility, since differences in their institutional uptake cannot otherwise be attributed to the opportunities for revision.

P2 specifies the conditions under which formally granted rights become exercisable: where decision-making entitlements are comparable, insufficient time or access to the infrastructure required for their exercise is expected to constrain participation in revision decisions. Empirical examination would therefore relate documented opportunities to their actual use under differing resource conditions, while distinguishing an inability to exercise a right from the absence of a perceived need to do so.

Under these specifications, participation achieved without the procedures proposed in P1 would challenge a claim of necessity but would not by itself contradict their potentially facilitative contribution. Evidence against the expected relationship would instead arise where adequately implemented procedures, under comparable conditions, were consistently associated with no greater uptake of relevant problem reports; correspondingly, P2 would require reconsideration where demonstrable resource constraints did not limit the exercise of otherwise comparable rights and no compensatory arrangements accounted for this observation. Such findings would bear on the proposed relationships, while the analytical distinction between formal entitlement and effective participation would remain conceptually separate from their empirical corroboration.

For P3, the hypothesis is formulated that perceived educational value may be linked to a willingness to continue open production arrangements without, at the same time, reflecting the distribution of institutional decision-making power. In the available dataset, the first part of this relationship is illustrated by a positive rank correlation; in the absence of an independent measure of decision-making power, the second part remains a research question arising from the definition of the subject matter (Biddle & Clinton-Lisell, 2023b; Vargo & Lusch, 2016). It is precisely this limitation that prevents the secondary analysis from being used retrospectively as empirical evidence for a broader institutional thesis.

Finally, P4 suggests that technical support can expand the production of open materials, while the ability of those involved to conduct independent subject-matter review must be examined separately. Following the distinction between transformation and surrogation, an expansion of epistemic agency should be examined in cases where learners can understand the premises of a generated proposal and modify them in a reasoned manner; a larger volume of available content would not be a sufficient indicator of this (Vindigni, 2026a, 2026h). The possibility remains, to be empirically distinguished, that productive output may increase while one's own capacity for justification remains unchanged or declines.

Table 8: Determinants, Indicators, and Counter-Indicators of Institutional Mediation

Determinant and Premise	Possible Indicator	Counter-indicator or Alternative Explanation	Status in this Study
Feasible Access	Editable material and actually usable access	Formal availability without the technical prerequisites for effective access	Derived from the literature; no independent usability test conducted.
Epistemic Admission	Justified consideration of a student's concern	Acceptance of submissions without review of content or feedback	Separate analytical category.
Effective Right to Shape	Documented participation in a relevant development decision	Co-production within unchangeable parameters	Not independently collected in secondary data.
Revisability	Documented revision in response to a reasoned substantive objection	Feedback channel with no discernible influence on decisions	Proposed process indicator.
Control Over Visibility	Justified choice of the scope of publication	Public dissemination required to avoid assessment penalties unrelated to academic quality	Contextual regulation should be distinguished from the evaluation item.
Contextual Value Realization	Subjective evaluation and independently assessed learning progress	Positive evaluation without measurable improvement in competence	Subjective dimension available as a single item.
Epistemic Control	Correction of generated content on substantiated disciplinary grounds	Adoption of plausible submissions without verifiable justification	Research proposition for AI-supported OEP.

Source: Author (2026).

Note. Our own proposals for operationalization, based on Cronbach & Meehl, (1955); Omland et al. (2025); Vargo & Lusch, (2016); Vindigni (2026a, 2026e, 2026b).

Determinants and Indicators of Institutional Mediation

For further analysis, determinants are defined as theoretically grounded conditions, while indicators refer to observable characteristics of their potential realization. Counter-indicators are used to identify observations that contradict an initial classification or limit its scope; their identification is intended to prevent the interpretation from relying exclusively on confirmatory cases. As a proposed operationalization, Table 8 therefore includes not only the relevant prerequisites but also the observations required for their assessment and the current status of the evidence (Cronbach & Meehl, 1955). To apply the matrix empirically, decision-making authority must be tied to a specifically identified decision-making unit, based on which its subject matter and scope can be determined, such as the selection of a textbook example, the revision of an assignment, or the reuse of a student's contribution. Following the process-oriented differentiation of co-creation, participation thus gains an observable point of reference, the definition of which requires, beyond the blanket attribution of student involvement, information about which decisions were actually open to discussion and what influence the participants were able to exert on their outcome (Omland et al., 2025).

By examining the possibility, as explored by Bakermans (2024), of helping to determine the weighting of assessment components within predetermined limits, this

perspective can be applied to the institutional organization of educational assessments. Within the matrix developed here, the scope of discretion granted would consequently need to be reconstructed in relation to those stipulations that remain beyond student co-decision-making so that its extent emerges from the concrete distinction between components open to decision-making and those predetermined by the institution. As a contextualizing follow-up case, the study does not expand the quantitative subsample of this paper; there is no independent recalculation of its data set.

This determination also implies the methodological necessity of distinguishing between the institutional granting of decision-making authority and its actual exercise, since a failure to exercise such authority could be consistent with either a lack of need for change or the expectation that objections would have no consequences. To distinguish between such explanations, supplementary contextual information would need to be drawn upon, through which the observed pattern of participation can be traced back to the conditions under which it arose. Following the analysis of infrastructural access conditionality, therefore, non-utilization is treated as a finding requiring interpretation, the interpretation of which as a preference for unchanged conditions requires independent justification; alternative explanations accordingly remain part of the empirical examination (Vindigni, 2026c, 2026e).

Linking the strands of evidence without empirical overreach

Accordingly, the connection between user innovation and value co-creation is not established through the retrospective labeling of questionnaire items. Neither were lead-user characteristics collected nor were individual changes in technical competence measured independently; the empirical analysis focuses on a subset of subjective value attribution within an already existing production arrangement (Biddle & Clinton-Lisell, 2023b). The theoretical contribution therefore lies in the explication of the additional knowledge required: For a more in-depth examination, the emergence of a need for change and its institutional processing would need to be linked to the experiences of the participants (Chesbrough, 2003; Vargo & Lusch, 2016; von Hippel, 2005).

In relation to existing co-creation research, this approach formulates a follow-up question whose novelty does not rest on the mere combination of established theories. Rather, what is relevant to our understanding is which empirical distinctions become necessary as a result of this combination and which observations might call a claimed relationship into question. Thus, those bridging premises that link positive evaluations of open practice to assumptions about institutionally enabled co-creation require empirical testing. Here, as findings of subjective value attribution, such evaluations retain their independent epistemological value; however, taken on their own, they do not constitute evidence of actually granted powers of shaping (Alexy *et al.*, 2020; Cruz *et al.*, 2024; Omland *et al.*, 2025).

Paradigmatic Fit of Evidence Integration

The key factor determining the paradigmatic fit of epistemological approaches is the correspondence between the empirically investigated object and the claimed scope of its interpretation. Within quantitative secondary analysis, correlations between operationalized variables are identified; however, the computational precision of these correlations does not compensate for an insufficient theoretical foundation of the constructs. An item aimed at measuring willingness to participate therefore does not gain additional significance as an indicator of institutional agency, even if it shows a high correlation with other measures. Following the establishment of construct validity, the statistical relationship must instead be situated within a theoretical framework that requires separate justification, within which the prerequisites for further conclusions must be made explicit (Cronbach & Meehl, 1955; Shmueli, 2010). These limitations would be followed by a qualitative exploration involving the reconstruction of the contexts of meaning within which participants interpret their experiences with specific teaching arrangements. Publication-related reservations could pertain to personal visibility as well as the subsequent use of a contribution, although both interpretations represent possibilities that initially require examination. Through thematic analysis,

corresponding patterns of interpretation could be explored in terms of their context-specific plausibility; a claim to situated understanding of others' perspectives would additionally need to be tied to the reconstruction of the respective constellation of experiences. The scope of insights that can thus be justified depends on the methodological congruence between the research interest and the analysis procedures, as well as on the available data set (Braun & Clarke, 2021; Harrison, 2025).

In the transition to a future mixed-methods design, it would therefore be necessary to identify the institutional process to which both approaches to knowledge are related while preserving their distinct scopes of inquiry. As a design proposition developed here, documented revision decisions would be examined in relation to the assessments of those involved in the corresponding decision process, with their temporal sequence providing a basis for determining how participants' judgments relate to the institutional handling of their contributions. Therefore, crucial to the viability of this integration framework would be its added value in terms of knowledge, which would need to be demonstrated through verifiable relationships between the decision-making process and subjective evaluation. Criteria for assessing mixed-methods designs could structure the methodological review, while the subject-specific justification for the integration would still need to be provided independently; a merely parallel presentation of results would not meet this integration requirement (Hong *et al.*, 2018).

Against this backdrop, the present paper is conceived as a theory-driven integration of evidence derived from a literature review and limited secondary analysis, the scope of which remains determined by the available data. An independently conducted mixed-methods primary study is therefore not claimed, especially since the combination of different forms of observation does not establish mutual validation as long as their subject-matter references diverge. Reflexive verifiability is thus realized through the transparent limitation of every conclusion to the premises and findings that support it, whereby the identification of epistemic boundaries itself becomes an integral part of scientific justification (Vindigni, 2026a).

Research Governance and the Research Agenda: Graduated Delegation and Retention of Epistemic Autonomy

A graduated matrix of epistemic delegation is proposed as a heuristic supplement for generatively assisted OEP. Building on the author-centered frame of reference, a distinction is made based on whether technical systems primarily perform formal processing or are increasingly involved in the selection and justification of disciplinary statements (Vindigni, 2026a). As an analytical framework, the matrix does not have the status of a validated scale; its function is to explicitly determine, in the context of a specific research or teaching activity, the scope of the delegated operation and the required human review.

Firstly, the varying levels of technical support result in a differentiation in their scope, the pedagogical significance of which can only be determined in relation to the actual cognitive process that takes place: Even comprehensive assistance can enable a challenging engagement with the subject matter, whereas its limited use does not yet guarantee a sufficient examination of epistemic prerequisites.

In the context of post-digital literacies, assessment is therefore tied to the participants' independent capacity for justification and revision, the extent of which cannot be inferred solely from the formal quality of a technically produced end product (Vindigni, 2026h).

Secondly, the concept of methodological

pseudocompetence builds on this distinction by problematizing the availability of scientific procedural forms coupled with a lack of insight into their prerequisites and limits of validity (Vindigni, 2026a). Applied to OER/OEP, this distinction underpins the application hypothesis formulated here: that the formal plausibility of a resource might suggest epistemic comprehensibility that was, in fact, absent during the creation process. An institutional review would therefore need to reconstruct the extent to which those involved were able to justify the selection and revision of content and independently assess its basis of validity, while simultaneously determining whether well-founded objections actually influenced further processing.

Table 9: Heuristic Grading of Epistemic Delegation in Open Educational Practices

Level	Delegated Operation	Required Human Review
1	Formal Processing and Structuring	Verify consistency with existing content and ensure its meaning is preserved.
2	Literature Search Suggestions and Classification Suggestions	Verify the existence, origin, and relevance of the original sources.
3	Semantic Condensation and Category Suggestions	Justify the categorization of the material and consider counterexamples.
4	Contribution to Interpretation or Modelling	Independently evaluate premises and alternative explanations.
5	Generation of Synthetic Data or Presumed Evidence	Explicitly indicate when information is synthesized; do not present substitutes for actually observed data as empirical evidence.

Source: Author (2026).

Note. OEP-based adaptation based on Vindigni (2026a, 2026h).

Reflexive Control Architecture of Institutional Openness

From the interplay of accessibility and auditability, a governance perspective is developing that ties technical control back to institutional responsibility. Preliminary work on digital auditing and platform-based universities identifies the sociotechnical conditions under which actions are enabled and evaluated (Vindigni, 2026d, 2026g). For the present study, eight dimensions of scrutiny are derived from the analysis, the interconnection of which describes a reflexive control architecture; Table 10 lists the corresponding observations without yet claiming their empirical validation.

In terms of implementing open production arrangements, the proposed architecture gives rise to the requirement that students' decision-making authority be tied to specific matters and that the exercise of that authority be safeguarded through appropriate resources and transparent review procedures. Only through this institutional specification would it be possible to assess the extent to which formally granted opportunities for participation actually translate into available scope for action. Following research on institutional sustainability and open educational ecosystems, their viability would also need to be assessed based on whether the conditions enabling collaborative practice can be reproduced beyond

the duration of individual projects (Aksoy *et al.*, 2025; Atenas *et al.*, 2026; Otto & Kerres, 2022).

This continuity is linked to the need for explicit accountability, whose normative binding nature is not negated by the distribution of operational contributions, nor is it already sufficiently defined by it. In the case of resource production based on a division of labor or technical assistance, therefore, responsibility for professional approval and the obligation to initiate justified corrections would need to be clearly established. In an agent-centered understanding of distributed epistemicity, the effectiveness of knowledge operations stems from their relational interaction; however, the justification of their results and the responsibility for their use remain with the human or institutional actors and are not transferred to the systems employed through technical involvement (Vindigni, 2026a).

Research Gaps Regarding Construct Validity and Decision-Making Power

A first research gap concerns the discriminant definition of participation constructs, whose conceptual integration must first establish empirical comparability, since syntheses on open pedagogy and co-creation explore different subject matter (Omland *et al.*, 2025; Shareefa *et al.*, 2023; Tietjen & Asino, 2021). The central question, therefore,

Table 10: Eight Dimensions of a Reflexive Control Architecture

Dimension	Test Item	Documentable Observation
Access	Actual usability of the provided options	Available formats, required services, and observed barriers to access.
Provenance	Source and editing of contributions	Source paths, versions, and identified generative edits.
Problem Definition	Involvement in identifying relevant needs for change	Documented problem reports and how they were addressed.
Decision-Making Authority	Institutional scope of co-creation	Responsibilities and actual involvement in selection decisions.
Evaluation Criteria	Justification of disciplinary and pedagogical	Explicit criteria and procedures for their reasoned revision.
Visibility	Control over publication and attribution	Agreed-upon scope of publication and options for modifying it.
Correction	Practical revisability	Addressed objections, initiated changes, and justifications.
Responsibility	Attribution of approval and subsequent editing	Specified human or institutional responsibility.

Source: Author (2026).

Note. Original institutional analysis based on Vindigni (2026a, 2026d, 2026g, 2026h). Proposed as a governance framework; factor structure not estimated from the 31 survey cases.

is: on the basis of which observable decision-making relationships can epistemic co-creation be distinguished from the productive handling of institutionally prescribed tasks? It is proposed that the key research question be whether participants can help determine the problem definition and the criteria for recognizing their contributions, or whether they operate within already established parameters. The development of instruments based on these findings would first require reconstructing such decision-making powers on a case-by-case basis and translating them into context-appropriate indicators, whose construct-related coherence would need to be examined prior to psychometric consolidation (Cronbach & Meehl, 1955).

Beyond the construct-based determination of agency, a second research priority focuses on its institutional feasibility, whereby it must be determined under what conditions formally granted opportunities can actually become effective means of action for the participants. Building on research on equity, diversity, and inclusion, as well as on infrastructural access conditions, the focus thus shifts to the mediating relationship between institutional authorization and situated agency, an investigation that must take into account both the actor-related prerequisites for exercising these rights and the institutional thresholds for effective influence (Iniesto & Bossu, 2023; Vindigni, 2026e).

In particular, it remains to be clarified under what conditions existing rights of review can be exercised in practice and what institutional thresholds exist between formal entitlement and effective influence. As an empirical approach, we propose comparing production arrangements that are as similar as possible but have differently structured participation rules, whereby documented decision-making procedures would need

to be correlated with the actual observed exercise of rights; global self-assessments could supplement this reconstruction but cannot replace its institutional context.

Research Gaps Regarding Temporal Order and Value Distribution

The third research gap concerns the temporal relationship between evaluation and continued participation. In the present dataset, both were recorded as part of the same survey; therefore, neither their temporal sequence nor a mediating effect of educational value can be identified (Biddle & Clinton-Lisell, 2023b; Maxwell & Cole, 2007). For a subsequent study, the question is whether changes in perceived educational value precede actual renewed participation and to what extent this relationship depends on the available options for shaping that participation. A multiple-time-point design would need to observe both baseline evaluations and subsequent behavior without inferring the absence of unobserved influences solely from the temporal order.

A fourth research objective concerns the distribution of realized educational value under unequal initial conditions. The meta-analytical measures of learning performance and university-related relationship measures reveal different dimensions of outcomes. Even when combining findings related to academic performance with university-specific relationship measures, this analysis does not yet yield a sufficiently substantiated conclusion regarding the distribution of realized educational value among the various stakeholders. Rather, it remains to be determined which participants can realize benefits, taking into account their respective starting conditions, and to what extent the emergence of these benefits is linked to opportunities for co-creation provided by the institution (Goi *et al.*, 2024; Tlili, Garzón, *et al.*, 2023; Tlili *et al.*, 2025).

From these findings, the research question is developed: how are institutional participation rules related to the distribution of subject-specific learning development and subjective value attribution? To examine this, both areas of outcomes would need to be operationalized separately and then related to the actually available courses of action. A fifth research question follows: Does generatively assisted co-creation expand epistemic autonomy or merely alter visible output? However, this question builds on conceptual contributions to AI and open education, which provide a basis for such investigations without predetermining the nature of this relationship (Mills *et al.*, 2023; Tlili *et al.*, 2026; Vindigni, 2026h). In terms of an empirical approach, it is proposed to record subject-specific reasoning processes before and after a task and, in addition, to observe whether erroneous suggestions

can be identified and factually corrected. With this specification, the relationship between transformation and surrogation becomes amenable to subject-appropriate examination (Vindigni, 2026a).

For all proposed studies, sample planning should be based on the specific design and the desired precision. Simply adopting the sample size from an available secondary study would not justify either the required number of institutional contexts or the requirements for a longitudinal comparison (Lakens, 2022). As an overarching methodological requirement, it is therefore stipulated that the scope of a study must be defined at the very outset when selecting its unit of analysis and that a large number of individual responses should not be presented as representative of broader institutional evidence.

Table 11: Research Agenda and Required Follow-Up Designs

Desideratum	Research Question	Required Empirical Approach
Construct Validity	How can epistemic co-creation be distinguished from productive task participation?	Decision-based case reconstruction followed by instrument validation.
Institutional Mediation	Under what conditions do granted rights to revision actually become usable?	Comparison of specific participation rules and their application in multiple contexts.
Temporal Order	Do changes in educational value precede actual renewed participation?	Multi-timepoint data collection with observed follow-up behavior.
Value Distribution	How are rules of participation related to learning development and the realization of subjective value?	Separate measurement of outcomes, taking into account different baseline conditions.
Epistemic Autonomy	Does generative support enhance the ability to reason independently?	Assessment of subject-matter judgments and correction performance before and after a task.

Source: Author (2026).

Note. Original research questions derived from the theory-guided synthesis and the limitations of secondary analysis (Cronbach & Meehl, 1955; Iniesto & Bossu, 2023; Maxwell & Cole, 2007; Omland *et al.*, 2025; Tlili, Garzón, *et al.*, 2023; Tlili *et al.*, 2025; Vindigni, 2026b).

Limitations

It can be noted that, with regard to this exploratory study, the PRISMA-2020 flowchart makes the constitution of the analytical corpus for this study comprehensible by disclosing the step-by-step narrowing down of the searched literature, thereby enabling a transparent assessment of the selection criteria on which the critical-integrative evidence synthesis is based (Page, McKenzie, *et al.*, 2021). Only under this premise is it possible to establish the deductive rigor required for defining the determinants, indicators, and premises with regard to the research subject.

Furthermore, within the secondary analysis, 31 complete responses allow for an exploratory description of correlations; however, given the specific teaching context, their generalizability to universities with different institutional structures requires separate justification. This study, however, does not include a survey of German private universities. Self-selection and a common survey method remain potential sources of bias, the significance of which is not negated by the calculations. Furthermore,

the bootstrap intervals reflect only the method-related variation and, in the author's view, do not provide protection against systematic biases (DiCiccio & Efron, 1996).

Likewise, at the construct level, there are no independent surveys of decision-making rights and subject-specific learning development; consequently, positive attributions of educational value do not demonstrate either an increase in competence or substantial participation in shaping the program, and willingness to participate must still be distinguished from subsequent behavior (Biddle & Clinton-Lisell, 2023b; Cronbach & Meehl, 1955). Within this scope of analysis, a pronounced correlation is evident between perceived educational value and willingness to participate again, whereas the partial correlation between concerns about publication and willingness to participate remains imprecisely estimated after accounting for educational value. As an empirical clarification of a partial relationship, this finding does not constitute evidence of institutional co-decision-making but rather requires research to jointly examine subjective value attributions

and actually available decision-making powers without conceptually negating their empirical distinguishability.

CONCLUSION

The paper's distinctive conceptual contribution lies in a premise-bound triangulation of user innovation, open innovation, and service-dominant logic through which OER/OEP-related openness is reconstructed as an institutionally mediated process connecting situated problem experience with the conditions of educational value realization. Within this reconstruction, the institutional uptake of a contribution remains analytically distinguishable from its author's authority to influence the criteria governing its recognition and subsequent use, thereby locating the explanatory problem of co-creation in the distribution and practical exercisability of decision-making rights. Institutional decision-making bodies are accordingly introduced as potential sites of this mediation, whose significance requires examination of whether contributors can contest the evaluative premises applied to their concerns and obtain reasoned reconsideration of decisions affecting their contributions; whether such influence enables context-specific educational value realization remains a relationship to be established empirically.

As a theoretical contribution, the proposed framework explicates the bridging premises required to relate users' situated problem experiences to their institutional uptake and the realization of context-specific educational value. Within this conceptual framework, the supplementary secondary analysis retains a circumscribed evidential function: since institutional decision-making authority was not measured, its findings cannot establish the postulated institutional mediation. Accordingly, the determinant-indicator matrix is advanced as a theoretically grounded proposal for examining whether the effective consideration of reasoned objections and the revisability of institutional conditions constitute empirically defensible indicators of substantive co-creation; the validity of these indicators and the proposed relationships to value realization remain subject to separate empirical scrutiny.

Within the framework of the 2030 Agenda, the right to equal access to education and the elimination of education-related disadvantages, as enshrined in SDG targets 4.3 and 4.5, are thus extended to include an institutional assessment perspective on actually exercisable co-creation, whose contribution to inclusive higher education development must be demonstrated through the empirically verifiable link between participation and the realization of value (United Nations, n.d.).

Declarations

The author has no acknowledgements to declare.

Conflict of Interest

The author declares that no conflict of interest or competing financial interest exists.

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Ethics Statement

As a critical-integrative evidence synthesis based exclusively on previously published material, the study involved neither the recruitment of human participants nor the collection of new participant-related or personal data. Ethical approval and informed consent were therefore not applicable. No separate survey was conducted for the quantitative secondary analysis. The data used are publicly available research data, including the questionnaire by Biddle and Clinton-Lisell (2023b); the project license is documented as CC BY 4.0. The supplementary material provides the source-file identification and an executable script that generates a reduced analysis input file from the original workbook (Supplementary Sections S3–S4).

Author Contributions

The author assumed sole responsibility for the conceptualization and methodological design of the study, the literature search and critical-integrative evidence synthesis, the development of the analytical framework, and the preparation and revision of the manuscript.

Research Integrity Statement

The study was conducted and reported in accordance with the applicable principles of research integrity, methodological transparency, and accountable documentation, particularly the *Guidelines for Safeguarding Good Research Practice: Code of Conduct* issued by the Deutsche Forschungsgemeinschaft (DFG, 2025).

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