British Journal of Multidisciplinary and Advanced Studies,7(5),17-23,2026

Engineering and Technology

Print ISSN: 2517-276X

Online ISSN: 2517-2778

https://bjmas.org/index.php/bjmas/index

Publication of the European Centre for Research Training and Development -UK

Challenges and Opportunities in AI-Enabled Curriculum Renewal

Mahmoud Al Ahmad
Department of Electrical and Communication Engineering
UAE Unievristy
AlAin 15551, UAE
email: m.alahmad@uaeu.ac.ae

doi: https://doi.org/10.37745/bjmas.0609 Published September 24, 2026

Citation: Al Ahmad M. (2026) Challenges and Opportunities in AI-Enabled Curriculum Renewal, *British Journal of Multidisciplinary and Advanced Studies*,7(5),17-23

Abstract: *Artificial intelligence (AI) offers opportunities to support curriculum analysis, strengthen alignment, and prepare graduates for changing professional practice. Its educational value depends on reliable evidence, faculty judgment, and accountable implementation. This work examines the opportunities and challenges of AI-enabled curriculum renewal, distinguishing AI-assisted curriculum design, the development of AI competencies, and AI use in teaching and learning. It considers data quality, assessment validity, equitable access, institutional governance, and faculty capacity. A staged approach is proposed that connects identified educational needs with piloting, evaluation, and continuous review. The central argument is that AI adoption should be assessed through credible evidence of learning and operational feasibility while preserving disciplinary depth and academic responsibility.*

Keywords: artificial intelligence, curriculum renewal, higher education, assessment, AI literacy

INTRODUCTION

Curriculum renewal determines what graduates should know, what they should be able to do, and how they should exercise professional judgment [1]. It therefore requires more than updating course titles or adding emerging technologies. Universities must preserve disciplinary foundations while responding to changes in professional practice, student needs, and the wider community [2]. Artificial intelligence (AI) introduces new possibilities for this work, but it also raises questions about the quality of evidence, academic responsibility, equitable access, and the validity of assessment.

Three related activities need to be distinguished: using AI to support curriculum analysis and design, incorporating AI knowledge and competencies into the curriculum, and using AI within teaching and learning [3]. These activities can reinforce one another, but each requires its own educational justification. A program may use AI to map learning outcomes without introducing an adaptive learning platform; equally, teaching AI literacy does not require delegating curriculum decisions to an algorithm [4].

This article argues that AI can support curriculum renewal when academic teams define the educational problem first, validate the tools and evidence they use, and evaluate the resulting changes against student learning. Its contribution

Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Publication of the European Centre for Research Training and Development -UK

should be judged by the quality of the curriculum and the capabilities of graduates. UNESCO's guidance similarly emphasizes human agency and the ethical and pedagogical validation of generative AI in education [5]. The discussion below considers opportunities alongside the conditions and limitations that shape their responsible implementation. An overview of the proposed approach is illustrated in Fig. 1.

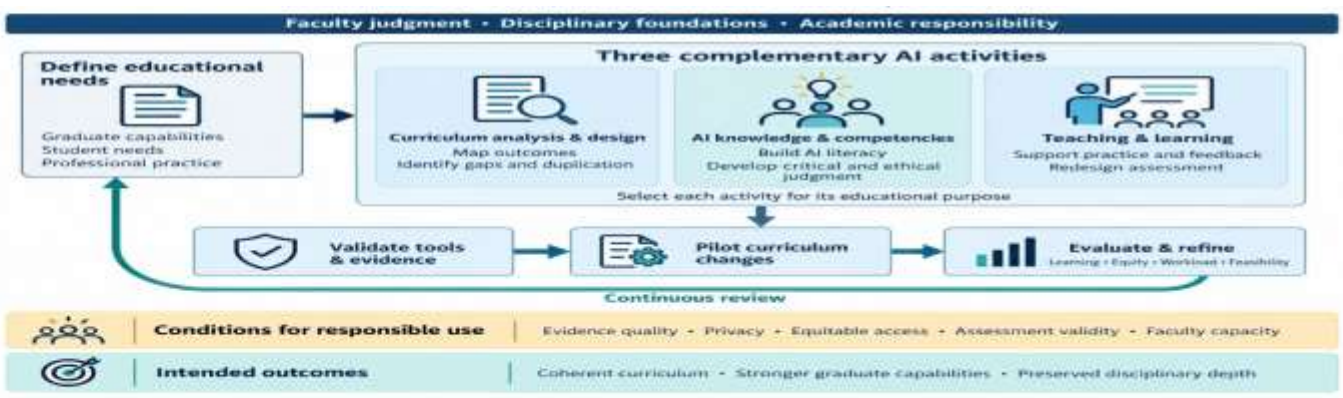

Fig. 1. Proposed framework for AI-enabled curriculum renewal integrating curriculum analysis and design, AI competencies, and teaching and learning through human oversight, validation, piloting, and continuous evaluation

PRESERVING FOUNDATIONS WHILE RESPONDING TO EMERGING NEEDS

A central challenge is deciding which knowledge should remain essential and which content should change. In engineering, mathematics, physical principles, design methods, and professional ethics provide the basis for understanding new technologies. An AI-enabled curriculum should strengthen students' ability to apply and question these foundations. Adding tool-specific content without considering its educational purpose can consume limited credit hours and leave less time for deep learning, laboratory work, and independent reasoning [6].

AI-assisted environmental scanning can help committees examine job advertisements, professional publications, research developments, and stakeholder feedback. These sources may reveal emerging competencies or changes in how established knowledge is applied. However, job advertisements represent only part of the labour market, and repeated terminology does not establish educational importance. Committees should compare such findings with disciplinary expertise, alumni experience, employer consultation, and the program's long-term objectives.

The appropriate response is not always a new course. AI literacy, data interpretation, sustainability, or ethical analysis may be introduced through revised examples, laboratory activities, design projects, or coordinated learning outcomes across existing courses [7]. Any addition should be accompanied by a review of duplication, prerequisites, student workload, and content that can be reduced or removed. This approach makes room for renewal while protecting the depth and coherence of the degree.

MAPPING OUTCOMES AND STRENGTHENING PROGRAM COHERENCE

Curriculum quality depends on alignment among program objectives, graduate attributes, course learning outcomes, teaching activities, and assessment [8]. Students need opportunities to develop important capabilities at increasing levels of complexity. A program that promises competence in teamwork, design, or ethical judgment must show where students practise these capabilities and how their achievement is assessed.

Natural-language tools can support a first-pass analysis of course descriptions, syllabi, assessment briefs, and rubrics. They may flag repeated topics, inconsistent terminology, apparent gaps, or weak links between outcomes and assessment. Generative AI can also produce draft learning outcomes or alternative curriculum maps for discussion. These outputs can make the review process more manageable, particularly when documentation is extensive.

Nevertheless, textual similarity is not evidence of equivalent teaching, and mentioning an outcome in a syllabus does not demonstrate student attainment. A tool may incorrectly classify two topics as duplicates or infer coverage that does not occur in practice. Faculty should verify each important mapping against actual tasks, assessment criteria, and samples of student work. Uncertain classifications should remain visible until resolved, with the evidence and responsible reviewer recorded [9].

For example, an engineering curriculum review might identify data analysis in several introductory courses but little assessment of students' ability to interpret uncertain experimental results in later design work. The appropriate revision could connect early analytical exercises with laboratory interpretation and a final design justification. This illustrative case shows how AI can help locate a question for investigation, while educators determine the curricular response.

INTERPRETING LEARNING DATA WITHOUT OVERSTATING ITS MEANING

Course results, progression records, student feedback, and learning-platform activity can help identify points where students need support [10]. AI-supported analysis may reveal recurring prerequisite difficulties, uneven attainment of learning outcomes, or scheduling and sequencing bottlenecks. These findings can guide discussion about bridge modules, advising, opportunities for practice, or changes to the order in which concepts are taught.

The analysis is only as useful as the underlying data and its interpretation. Inconsistent outcome labels, missing records, changing assessment difficulty, and differences between student cohorts can distort comparisons. Platform activity is a partial indicator of engagement, and grades reflect assessment practices as well as learning. A pattern associated with poor performance does not, by itself, establish its cause. Curriculum teams should examine alternative explanations before changing requirements or attributing difficulties to students.

Predictive tools require particular care. A model developed with one cohort may perform differently for another, and its errors may be unevenly distributed [11]. Predictions should prompt supportive human review rather than determine access to courses or label a student's potential. Institutions should assess both missed support needs and unnecessary interventions, provide a way to correct inaccurate records, and revisit model performance as the curriculum and student population change.

REDESIGNING ASSESSMENT AND DEVELOPING AI LITERACY

AI creates opportunities to draft project scenarios, generate practice exercises, and provide feedback, but it also requires a reconsideration of what assessment demonstrates. When students can obtain polished text or code from a generative system, the final product alone may provide incomplete evidence of their understanding. Curriculum renewal should therefore specify which capabilities students must demonstrate independently and which include the responsible use of AI.

Assessment can combine supervised individual tasks with work in which AI assistance is explicitly permitted [12]. Oral explanations, laboratory demonstrations, staged design submissions, and discussion of errors can provide evidence of reasoning and ownership. Where AI is allowed, students should document its contribution, verify consequential outputs, and justify their final decisions. Assessment criteria should reward disciplinary understanding and critical evaluation, rather than the appearance of a polished response. No single assessment format eliminates misuse; the aim is to gather credible evidence through complementary methods.

AI literacy should develop progressively across the program. Students need to understand the limitations of generated outputs, check claims and sources, recognize possible bias, protect confidential information, and disclose assistance according to institutional expectations. Discipline-specific applications should build on these foundations. For example, engineering students could compare an AI-generated design with analytical calculations, simulation results, and experimental constraints, then explain any discrepancies.

Faculty also need preparation in assessment design and AI use. UNESCO's AI competency framework for teachers provides a useful reference by connecting a human-centred mindset and ethics with AI foundations, pedagogy, and professional learning [13]. Universities can adapt these dimensions to their disciplinary contexts and staff development needs. Familiarity with a particular application is insufficient without the ability to judge whether its use supports the intended learning outcome.

PROTECTING EQUITY AND ESTABLISHING ACCOUNTABLE GOVERNANCE

Personalized practice and timely feedback may help students address specific learning needs. However, these opportunities depend on access to suitable devices, reliable connectivity, accessible interfaces, and appropriate language support. If assessed work relies on a paid AI service, differences in subscription access may affect students' opportunities to succeed. Programs should provide the necessary access or offer an equivalent route to meeting the same learning outcomes.

Personalization also requires boundaries. Adaptive exercises can vary the amount or sequence of practice while preserving common academic expectations [14]. They should not narrow a student's pathway because a model predicts limited success. Faculty should examine whether recommendations expand learning opportunities and whether students can seek support or challenge an unsuitable recommendation.

Governance must translate ethical principles into responsibilities and procedures. Before using student data, the institution should define the educational purpose, the minimum information needed, authorized access, retention arrangements, and the conditions under which an external provider may process the data. Identifiable student records and confidential assessment material should be handled only through approved arrangements. UNESCO's guidance highlights data privacy and institutional validation as central considerations for educational uses of generative AI [13].

Academic accountability should remain explicit. Curriculum committees should approve proposed changes; data stewards should oversee data quality and access; and quality-assurance teams should assess whether the changes achieve their objectives. Significant AI-assisted recommendations should be traceable to their sources and human reviewers. A fluent explanation produced by a generative model should not be treated as proof that its recommendation is sound. Students and staff also need a clear route to question consequential decisions and correct errors.

British Journal of Multidisciplinary and Advanced Studies,7(5),17-23,2026
Engineering and Technology
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Publication of the European Centre for Research Training and Development -UK

BUILDING FACULTY CAPACITY AND INSTITUTIONAL COMMITMENT

Curriculum renewal changes teaching responsibilities, workloads, and familiar academic practices. Concerns about subject coverage, professional identity, reliability, or increased workload deserve substantive discussion. Early participation by faculty, students, advisers, technical staff, and relevant external stakeholders can reveal implementation problems before a revised curriculum is approved.

Leadership should establish a shared educational purpose, transparent decision criteria, and a timetable that allows consultation to lead to decisions [15]. Faculty members need time to review AI-generated analyses, redesign assessments, and learn unfamiliar methods. Recognition of this work, peer collaboration, and access to specialist support are necessary conditions for sustained participation. Training should include opportunities to test tools on representative tasks and discuss incorrect or misleading outputs.

Resources extend beyond software subscriptions. Institutions should account for integration, data preparation, technical support, accessibility, staff development, and ongoing evaluation [16]. They should also consider whether teaching materials and records can be transferred if a provider changes its service or the institution stops using a tool. Potential time savings should be assessed after including the work of checking outputs and correcting errors. Adoption is justified when the educational benefit and operational feasibility are credible.

MAINTAINING ACADEMIC STANDARDS AND QUALITY ASSURANCE

AI can help organize evidence for internal review and accreditation, but formal compliance remains an institutional responsibility. Generated summaries or mappings should be checked against the applicable requirements and the actual curriculum. A completed matrix does not establish that students have achieved an outcome; assessment evidence and documented academic review remain necessary.

A useful quality-assurance process connects each proposed change to an identified problem, a clear rationale, and an observable result [17]. For example, if a revision is intended to strengthen design reasoning, the evaluation should examine students' design justifications using agreed criteria. Student satisfaction, tool usage, and the speed of document preparation may provide useful information, but they cannot substitute for evidence of learning.

External expectations should inform renewal without displacing academic judgment. Employer feedback may identify immediate skill needs, while disciplinary knowledge and the university's educational mission provide a longer perspective. Decisions should reconcile these considerations with available resources and the needs of the local student population. AI can assist in organizing the evidence; the institution must explain and defend the resulting priorities.

IMPLEMENTING AND EVALUATING CURRICULUM CHANGE

Implementation should begin with a defined educational problem and a baseline. The curriculum committee should identify what needs improvement, what evidence supports that judgment, and which outcomes will indicate progress. Before selecting a tool, the team should consider whether a simpler process can address the problem and what additional value AI is expected to provide [18].

A limited pilot can then test the proposed approach in selected courses or a specific curriculum-review task. The pilot should have named owners, approved data arrangements, staff preparation, and criteria for continuation, revision, or withdrawal. Tool outputs should be checked for accuracy, omissions, and usefulness. Changes affecting students should also be reviewed for workload, accessibility, assessment validity, and unintended differences in opportunity.

Evaluation should distinguish the performance of the tool from the effects of the curriculum change. Faster mapping or fewer administrative steps may show an operational benefit, while improved student reasoning or more coherent progression would indicate an educational benefit. Comparisons across cohorts need caution because student characteristics, staffing, assessment, and other conditions may also change. Findings should be reported with these limitations, rather than attributing every improvement to AI.

Wider implementation requires updated syllabi, advising information, registration rules, and clear arrangements for students following the previous curriculum [19]. Departments should check whether students can complete required courses without delay and whether staff can deliver the revised sequence. Regular review should examine learning outcomes, progression, equity, workload, and costs. Institutions should be prepared to modify or discontinue an AI application when its benefits are insufficient or its risks cannot be adequately addressed.

CONCLUSION

AI-enabled curriculum renewal offers opportunities to examine evidence, strengthen alignment, develop teaching and assessment materials, and prepare students for professional environments in which AI is used. These opportunities remain conditional on the quality of the data, the validity of the analysis, faculty expertise, adequate resources, and accountable implementation. They should be treated as possibilities to evaluate, rather than guaranteed outcomes of technology adoption.

A strong curriculum preserves disciplinary depth while helping students apply knowledge critically and responsibly. Universities can advance this goal by connecting AI use to explicit educational needs, involving stakeholders in decisions, and evaluating changes through credible evidence of learning. Academic leadership remains responsible for determining what graduates should learn and for ensuring that the means used to support that learning are fair, feasible, and educationally justified.

Acknowledgment

The author acknowledges the use of ChatGPT 6 Astra Medium to assist with proofreading, language editing, manuscript organization, and preparation of the graphical abstract. The author retains full responsibility for the accuracy, originality, and integrity of the final manuscript.

REFERENCES

[1] Mcleod P, Steinert Y. Twelve tips for curriculum renewal. Med Teach. 2015 Mar;37(3):232-8. doi: 10.3109/0142159X.2014.932898.

[2] Mena-Guacas, A.F.; López-Catalán, L.; Bernal-Bravo, C.; Ballesteros-Regaña, C. Educational Transformation Through Emerging Technologies: Critical Review of Scientific Impact on Learning. Educ. Sci. 2025, 15, 368. https://doi.org/10.3390/educsci15030368

[3] Guillén-Gámez, F.D., Tomczyk, Ł., Habibi, A. et al. Transforming curriculum design with generative AI: a model for assessing teacher digital competence. Education Tech Research Dev (2026). https://doi.org/10.1007/s11423-026-10647-6

Print ISSN: 2517-276X

Online ISSN: 2517-2778

https://bjmas.org/index.php/bjmas/index

Publication of the European Centre for Research Training and Development -UK

[4] Xiao Tan, Gary Cheng, Man Ho Ling, Artificial intelligence in teaching and teacher professional development: A systematic review,Computers and Education: Artificial Intelligence,Volume 8,2025, 100355. https://doi.org/10.1016/j.caeai.2024.100355.

[5] UNESCO, Guidance for Generative AI in Education and Research. Paris, France: UNESCO, 2023. [Online]. Available: https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research

[6] Zhao, HG., Li, XZ. & Kang, X. Development of an artificial intelligence curriculum design for children in Taiwan and its impact on learning outcomes. Humanit Soc Sci Commun 11, 1339 (2024). https://doi.org/10.1057/s41599-024-03839-z

[7] Bae, J.-S.; Ko, K.-M.; Park, H.-J. Toward Sustainable AI Literacy in Higher Education: A Delphi–AHP Approach to Identifying Key Components of AI/Data Extracurricular Programs. Sustainability 2026, 18, 8050. https://doi.org/10.3390/su18168050

[8] Wijngaards-de Meij, L., & Merx, S. (2018). Improving curriculum alignment and achieving learning goals by making the curriculum visible. International Journal for Academic Development, 23(3), 219–231. https://doi.org/10.1080/1360144X.2018.1462187

[9] Emiliano del Gobbo, Alfonso Guarino, Barbara Cafarelli, Luca Grilli, Pierpaolo Limone, Automatic evaluation of open-ended questions for online learning. A systematic mapping, Studies in Educational Evaluation, Volume 77,2023, 101258, ISSN 0191-491X. https://doi.org/10.1016/j.stueduc.2023.101258.

[10] Honson V, Vu T, Tran TP, Tejada Estay W (2024), "Using learning analytics to alleviate course and student support administrative load for large classes: a case study". Journal of Work-Applied Management, Vol. 16 No. 2 pp. 303–315, doi: https://doi.org/10.1108/JWAM-11-2023-0121

[11] Teo Susnjak,Beyond Predictive Learning Analytics Modelling and onto Explainable Artificial Intelligence with Prescriptive Analytics and ChatGPT,International Journal of Artificial Intelligence in Education, Volume 34, Issue 2,2024,Pages 452-482,ISSN 1560 4292,https://doi.org/10.1007/s40593-023-00336-3.

[12] Madleňák, R.; Madleňáková, L.; Cvacho, V.; Gachulinec, D. Ethical Challenges of Artificial Intelligence in Higher Education: A Four-Pillar Student-Activity Framework for Institutional Governance. Educ. Sci. 2026, 16, 555. https://doi.org/10.3390/educsci16040555

[13] UNESCO, AI Competency Framework for Teachers. Paris, France: UNESCO, 2024. [Online]. Available: https://www.unesco.org/en/articles/ai-competency-framework-teachers

[14] du Plooy E, Casteleijn D, Franzsen D. Personalized adaptive learning in higher education: A scoping review of key characteristics and impact on academic performance and engagement. Heliyon. 2024 Oct 22;10(21):e39630. doi: 10.1016/j.heliyon.2024.e39630.

[15] Bădescu, G.; Susinski, M.; Vasile, C.; Săvescu, P.; Constantinescu, E.; Tănasie, G.; Dima, N.; Filip, L.-O.; Savu, A.; Didulescu, C. Preventive and Restorative Academic Integrity in AI-Assisted Higher Education: A Critical Conceptual Synthesis and Integrated Governance Framework. *Educ. Sci.* **2026**, *16*, 1365. https://doi.org/10.3390/educsci16091365

[16] Samaniego López, M.V.; Orrego Riofrío, M.C.; Barriga-Fray, S.F.; Paz Viteri, B.S. Technologies in Inclusive Education: Solution or Challenge? A Systematic Review. *Educ. Sci.* **2025**, *15*, 715. https://doi.org/10.3390/educsci15060715

[17] Klein TA, Seelbach CL, Brannan GD. Quality Assurance. [Updated 2023 Mar 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557503/

[18] Zhong M, Wei L and Mo H (2025) Enhancing graduate AI education through practical and values-driven curriculum integration. Front. Educ. 10:1630073. doi: 10.3389/feduc.2025.1630073

[19] Wagner JL, Smith KJ, Johnson C, Hilaire ML, Medina MS. Best Practices in Syllabus Design. Am J Pharm Educ. 2023 Apr;87(3):ajpe8995. doi: 10.5688/ajpe8995.

British Journal of Multidisciplinary and Advanced Studies,7(5),17-23,2026
Engineering and Technology
Print ISSN: 2517-276X
Online ISSN: 2517-2778
https://bjmas.org/index.php/bjmas/index
Publication of the European Centre for Research Training and Development -UK