ENHANCING SYLLABUS DEVELOPMENT THROUGH AI-DRIVEN ASSISTANCE

Vijayan N

School of Business, Temasek Polytechnic, Singapore

vijayan@tp.edu.sg

Developing a subject syllabus is a critical component of curriculum design, yet it remains a complex and time-consuming process for academic staff. At Temasek Polytechnic, syllabus development must adhere to outcome-driven institutional standards set by the Academic Programme Validating Committee (APVC), while also incorporating feedback from multiple stakeholders. Staff often find the iterative nature of drafting, refining, and aligning syllabus components, such as subject aims, synopsis, learning outcomes, teaching methods, and assessment structures, both demanding and challenging. These difficulties are compounded by the need to ensure clarity, compliance with accreditation requirements, and adherence to educational best practices.

To address these challenges, a Generative Pre-trained Transformer (GPT) was introduced as an AI-powered assistant to support staff in syllabus drafting. The tool was designed to provide structured, template-aligned guidance and real-time feedback, helping staff produce well-structured and coherent syllabus documents more efficiently. By integrating AI into this process, the institution aimed to reduce drafting time, enhance clarity, and foster consistency across course documentation.

The implementation was carried out through APVC representatives, who facilitated the rollout and supported staff adoption of the tool. Feedback from users highlighted several key outcomes: a noticeable increase in drafting efficiency, improved clarity and consistency in subject syllabi, and enhanced staff confidence in syllabus development. The AI tool's ability to streamline the process also contributed to a more productive and less burdensome curriculum development experience.

This initiative illustrates the value of AI-driven tools in supporting higher education institutions' administrative and academic functions. Beyond saving time, the GPT tool empowers educators to focus more on content quality and less on formatting and structural concerns. Looking ahead, future iterations will explore refined feedback capabilities and expanded application to other academic documents, including course reviews and learning guides.

Overall, the integration of GPT into syllabus drafting demonstrates a practical and scalable approach to improving curriculum design through technology-enhanced academic support.

Keywords: *Pedagogical Innovation, AI in Education, Syllabus Development, Curriculum Design, Academic Standards*

Introduction

The development of subject syllabi is a cornerstone of curriculum design in higher education. At Temasek Polytechnic, this process is structured around rigorous institutional requirements, including alignment with outcome-based education (OBE) principles, accreditation and curriculum standards. Drafting syllabi entails defining subject aims, synopsis, intended learning outcomes (ILOs), learning and teaching strategies, and assessment methods—all of which must exhibit internal consistency and pedagogical coherence. However, the iterative nature of syllabus drafting, coupled with limited staff training and evolving educational standards, often renders the process burdensome. To mitigate these challenges, a GPT-based AI tool was introduced, providing real-time feedback and structured guidance in syllabus writing. This paper evaluates the tool's effectiveness and potential for broader adoption.

Syllabus Design Process

In current practice, this process is typically undertaken with limited support beyond standard templates and brief guidelines. There is minimal scaffolding provided to help staff make informed pedagogical decisions when crafting ILOs or aligning assessments.

The absence of real-time feedback mechanisms often results in prolonged back-and-forth among reviewers, further delaying finalisation.

Moreover, new or industry-based staff often experience uncertainty when interpreting educational standards, leading to inconsistent quality in early drafts. The reliance on manual vetting by academic committees adds an administrative burden and may dilute the time available for content enhancement.

Literature Review

In recent years, AI has also been increasingly integrated into curriculum design systems. Empirical studies by Kukulska-Hulme et al. (2021) have suggested that AI tools not only streamline administrative tasks but also encourage reflective practice among educators. The effectiveness of AI-supported curriculum design is particularly evident in contexts where educators are transitioning from industry roles and require scaffolding to interpret pedagogical expectations. AI interventions serve as an adaptive tool in facilitating the crafting of materials efficiently.

Furthermore, the relevance of AI in addressing misalignment in curriculum elements is echoed in research by Abbasi, Wu & Luo (2025), who argue that intelligent systems can act as mediators to bridge gaps in pedagogical coherence. They further contend that curriculum tools must be contextualised to fit specific institutional frameworks—a point highly pertinent to this study's application of GPT at Temasek Polytechnic.

The complexity of curriculum design has long been acknowledged in pedagogical literature. Harden (2001) highlighted the "spiral curriculum" as a reflective, iterative model requiring continuous revision. More recently, Biggs and Tang (2011) advanced the principle of "constructive alignment," emphasizing coherence between learning outcomes, pedagogy, and assessment.

Studies by Leask (2015) and Toohey (1999) affirm that academic staff often struggle to translate industry expertise into formalized curriculum documents. Literature underscores the importance of institutional support and capability building in curriculum writing (Barnett & Coate, 2005). Furthermore, Boud and Falchikov (2007) emphasize the necessity for continuous feedback loops during syllabus development. Yet, these processes are time-intensive and demand high cognitive engagement.

With the rise of artificial intelligence in education (AI), tools like ChatGPT and other large language models (LLMs) have shown promise in assisting educators with administrative and cognitive tasks (Zawacki-Richter et al., 2019). AI-powered writing assistants are increasingly being explored in higher education for their potential to streamline complex tasks, support formative feedback, and enhance instructional design quality (Luckin et al., 2016). However, empirical research on their application to syllabus development remains limited.

Research Methodology

This study employs a qualitative methodology to evaluate the AI GPT's implementation at TP. Data were collected through individual interviews with curriculum writers from multiple schools within the institution. In total, 18 academic staff members who engaged with the GPT tool were interviewed. Semi-structured interviews were used to gather insights into user experiences, perceived benefits, and areas for enhancement.

Artefacts generated during the GPT usage—such as annotated syllabi drafts, feedback loops, and revision histories—were also analysed to triangulate findings. A simple thematic analysis (Braun & Clarke, 2013) was employed to identify recurring patterns in user feedback and to infer implications for curriculum design support.

Development of the AI-Enabled Tool

The GPT tool was tailored using multiple institutional and pedagogical resources. This includes:

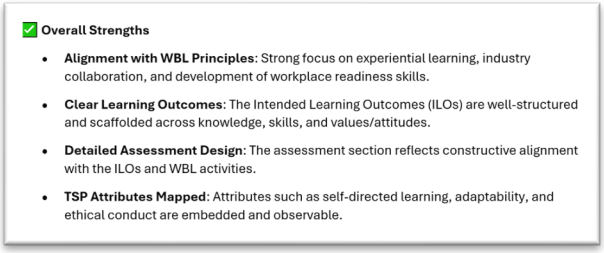
- Temasek Polytechnic's official curriculum writing guidelines
- Bloom's Taxonomy, including verb lists for ILO articulation
- Syllabi and course overview templates
- School-specific curriculum guidelines, instructional strategies and assessment philosophies

The tool was designed to function interactively, whereby users input draft content, and the AI provides suggestions, flags inconsistencies, and recommends improvements. These may include rewriting ILOs, suggesting alternative assessment methods, and/or learning and teaching strategies or ensuring alignment between learning strategies and subject outcomes.

Findings and Analysis

Benefits Identified by Users

Feedback from interviewees highlighted a strong appreciation for the AI tool in supporting the syllabus writing process. Drafting a syllabus independently, especially without comprehensive knowledge of academic conventions, has traditionally been a challenging task for many staff. The GPT tool alleviates this burden by offering immediate, structured feedback on early drafts. This enables staff to consider revisions that align both with academic standards and industry relevance, an area in which they possess strong familiarity. Key benefits reported by interviewees are summarised and discussed below.


✅ **Overall Strengths**

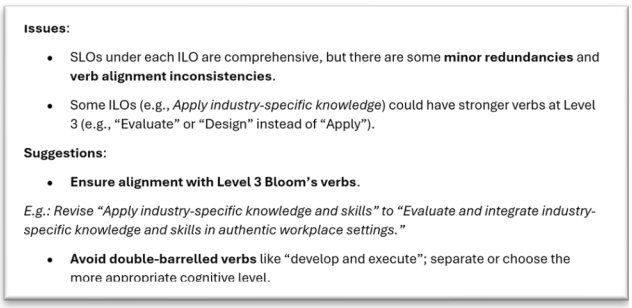
- **Alignment with WBL Principles**: Strong focus on experiential learning, industry collaboration, and development of workplace readiness skills.
- **Clear Learning Outcomes**: The Intended Learning Outcomes (ILOs) are well-structured and scaffolded across knowledge, skills, and values/attitudes.
- **Detailed Assessment Design**: The assessment section reflects constructive alignment with the ILOs and WBL activities.
- **TSP Attributes Mapped**: Attributes such as self-directed learning, adaptability, and ethical conduct are embedded and observable.

Figure 1 – A sample GPT response highlighting the strengths

Efficiency Gains:

The GPT tool substantially reduced the time required for drafting and revising syllabi. Staff who previously

needed weeks to complete initial drafts reported doing so within a matter of days. Industry-informed content in early drafts was efficiently adapted to meet the academic and curriculum standards of the School and Institution. A key point of reassurance expressed by interviewees was the immediate feedback provided by the tool, which helped guide meaningful enhancements to their syllabus drafts as shown as a sample in Figure 2 below.



Issues:

- SLOs under each ILO are comprehensive, but there are some **minor redundancies** and **verb alignment inconsistencies**.
- Some ILOs (e.g., *Apply industry-specific knowledge*) could have stronger verbs at Level 3 (e.g., "Evaluate" or "Design" instead of "Apply").

Suggestions:

- **Ensure alignment with Level 3 Bloom's verbs**.

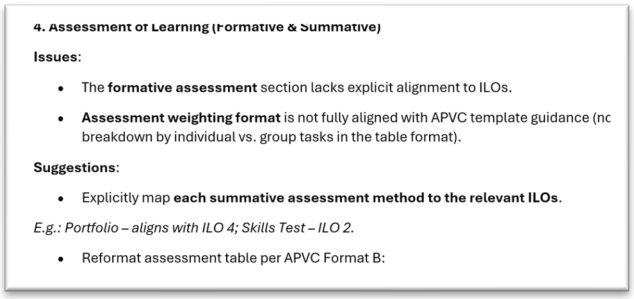
E.g.: Revise "Apply industry-specific knowledge and skills" to "Evaluate and integrate industry-specific knowledge and skills in authentic workplace settings."

- **Avoid double-barrelled verbs** like "develop and execute"; separate or choose the more appropriate cognitive level.

Figure 2 – Suggested changes to SLOs and educating on principles of verb usage in accordance with guidelines.

Improved Constructive Alignment:

The GPT tool supported the logical alignment of subject aims, intended learning outcomes (ILOs), teaching strategies, and assessments—an essential aspect of syllabus coherence. A sample of this is shown in Figure 3 below. Previously, achieving such coherence required multiple iterative revisions. With the GPT, feedback on constructive alignment is provided promptly, allowing for more cohesive drafts from the outset. As a result, syllabus documents submitted for stakeholder review now demonstrate greater internal consistency and align more closely with the institution's quality expectations



4. Assessment of Learning (Formative & Summative)

Issues:

- The **formative assessment** section lacks explicit alignment to ILOs.
- **Assessment weighting format** is not fully aligned with APVC template guidance (nc breakdown by individual vs. group tasks in the table format).

Suggestions:

- Explicitly map **each summative assessment method to the relevant ILOs**.

E.g.: Portfolio – aligns with ILO 4; Skills Test – ILO 2.

- Reformat assessment table per APVC Format B:

Figure 3 – Constructive alignment being emphasised and reference to institutional standards

Clarity and Language Quality:

Previously, repeated reviews and drafting cycles often led to fatigue, which affected grammatical accuracy and clarity in syllabus documents. The GPT tool mitigated this issue by providing feedback that enhanced both grammatical precision and sentence structure. This resulted in higher-quality drafts and was identified as a notable benefit by users of the tool.

Staff Confidence:

Writers reported increased confidence in sharing their drafts with peers and stakeholders after refining them using the GPT tool. There was assurance that foundational elements—such as alignment across key components of the syllabus—had been adequately addressed. This enabled subsequent discussions to focus more meaningfully on curriculum scope, academic level, and the integration of relevant content from diverse stakeholder perspectives. Such constructive exchanges are now facilitated by the improved quality of syllabus drafts

Areas for Improvement

Despite the positive feedback, several areas for improvement in the GPT tool were identified. These will be discussed in the following section.

School-Specific Customisation:

As reflected in Abbasi, Wu & Luo (2025) there is a need to contextualise the guidelines for the desired curriculum, learning and teaching methods and assessment in accordance to the respective School's needs. The tool requires further refinement to accommodate the varied practices and pedagogical priorities across different Schools. Given the distinct guidelines and requirements set by each School, there is a clear need to customise the tool's inputs to reflect both school-specific and institutional standards.

Revision Integration:

The current version of the GPT tool offers feedback and suggests changes for various components of the syllabus. However, users expressed a desire for an integrated re-drafting feature that could iteratively refine the syllabus based on accepted revisions.

Discussion

The GPT-based syllabus writing tool bridges an important capability gap in curriculum design. While institutional guidelines provide foundational training, many staff, especially those from industry backgrounds, lack the pedagogical expertise to articulate outcomes and assessments effectively. The tool supports novice and experienced writers alike by automating checks, providing feedback, and encouraging best practices in educational design.

The integration of AI in syllabus development also redefines the curriculum writer's role. Rather than acting as sole authors, staff become collaborators with intelligent systems. This transformation aligns with the broader shift toward AI-supported work environments, where human–AI collaboration enhances productivity and quality (Holmes et al., 2022).

Conclusion and Recommendations

This paper demonstrates how AI-driven tools like GPT can significantly enhance the syllabus development

process in higher education. At Temasek Polytechnic, the tool has improved efficiency, increased staff confidence, and fostered better alignment in curriculum documentation. To maximise its impact, future efforts should focus on:

- Refining AI models to reflect school-specific pedagogical philosophies
- Integrating drafting and feedback cycles more seamlessly
- Expanding AI support to other academic writing domains (e.g., lesson plans, assessment blueprints)

As curriculum design becomes increasingly complex, AI tools offer scalable, intelligent support mechanisms to uphold educational quality and innovation.

References

Abbasi, B. N., Wu, Y., & Luo, Z. (2025). Exploring the impact of artificial intelligence on curriculum development in global higher education institutions. *Education and Information Technologies, 30*(1), 547–581.

Barnett, R., & Coate, K. (2005). *Engaging the curriculum in higher education*. McGraw-Hill Education.

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.

Boud, D., & Falchikov, N. (2007). *Rethinking assessment in higher education: Learning for the longer term*. Routledge.

Braun, V., & Clarke, V. (2013). *Successful qualitative research.* London, England: SAGE Publications Ltd.

Harden, R. M. (2001). AMEE Guide No. 21: Curriculum mapping: A tool for transparent and authentic teaching and learning. *Medical Teacher*, 23(2), 123–137.

Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Center for Curriculum Redesign.

Kukulska-Hulme, A., Bossu, C., Coughlan, T., Ferguson, R., FitzGerald, E., Gaved, M., Herodotou, C., Rienties, B., Sargent, J., Scanlon, E., Tang, J., Wang, Q., Whitelock, D., Zhang, S. (2021). Innovating Pedagogy 2021: Open University Innovation Report 9. Milton Keynes: The Open University.

Leask, B. (2015). *Internationalizing the curriculum*. Routledge.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence Unleashed: An Argument for AI in Education.* Pearson Education.

Toohey, S. (1999). *Designing courses for higher education*. Open University Press.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 16(1), 1–27.