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# AI-Assisted Analysis of PowerPoint Slides: A Methodological Approach to Decolonising Business Education


## Abstract

Despite growing calls to challenge epistemic inequalities within business education, there remains a lack of systematic and scalable approaches for identifying coloniality within routine curricular artefacts. This study addresses this gap by asking: How can a reproducible AI-assisted workflow be developed to identify and audit colonial markers within MBA PowerPoint lecture slides?

This 'Systems and Tools' article adopts a sequential three-phase research design. First, a Colonial Markers Framework was developed through iterative expert review, AI-assisted analysis, and comparative thematic synthesis of MBA teaching materials from two programmes within a UK university. This process resulted in seven colonial markers relating to language and terminology, inclusivity and representation, capitalist and economic focus, Eurocentrism and Western dominance, epistemological dominance and knowledge production, historical context and oversight, and case study and example bias. Second, the framework was implemented within an exploratory Langflow-based workflow to assess the feasibility of automated colonial marker detection. While the approach demonstrated promising alignment with expert interpretations, technical limitations relating to document processing, citation accuracy, and workflow stability constrained its effectiveness. Third, insights from this exploratory phase informed the development of a more robust LangChain-Python workflow incorporating optical character recognition, automated reporting, structured data generation, and enhanced reproducibility.

Findings demonstrate substantial convergence between AI-generated and expert-identified colonial markers, suggesting that AI can support the systematic auditing of teaching materials when guided by a human-developed analytical framework. Exploratory evaluation with MBA programme leads further indicated that the resulting outputs were interpretable, accessible, and useful as prompts for reflective curriculum review.

## Keywords:

decolonising the curriculum; decolonising business education; decolonising PowerPoint presentations; colonial markers; artificial intelligence; AI

## Introduction

Business Education in general, and the Master of Business Administration (MBA) in particular, are among the most sought-after degrees globally (Kumar et al., 2024). Despite their prominence, Business Education has proven resistant to decolonising the curriculum (DtC) initiatives, which often remain peripheral and provisional (Jammulamadaka et al., 2021). Institutional support for educators to implement DtC strategies is limited, with universities frequently failing to provide adequate guidance or training (Govender & Naidoo, 2023; Mbhele et al., 2024). Furthermore, critiques of epistemic homogeneity in the field have intensified (Abdallah, 2024), reflecting the persistent dominance of European and American theorising in Business Education curricula (Śliwa et al., 2025). Accordingly, scholars have called for the liberation of teaching and theorising from excessive Western influence (Abreu-Pederzini & Suarez-Barraza, 2020, in Hrenyk & Salmon, 2024, p. 548).

This Euro-American epistemic monopoly reinforces enduring coloniality within UK Business Education programmes, producing patterns of epistemic suppression, denial, and erasure of non-Western knowledge systems (Woods et al., 2022; Jammulamadaka et al., 2021; Banerjee, 2022). Despite being a prominent medium through which educators disseminate and frame knowledge, the PowerPoint slide (PPS) represents a particularly salient 'site' (Shahjahan et al., 2022) for examining knowledge production, as it often functions as a static 'artefact' (Reitan et al., 2024) through which colonial knowledge is packaged, stabilised and reproduced.While slides are widely critiqued for overuse and standardisation (Hopper & Waugh, 2014), decolonial research has largely overlooked their role in reproducing dominant epistemologies. Moreover, the potential of artificial intelligence (AI) to conduct systematic, large-scale analysis of curricular materials in Business Education remains underexplored. Thus, this research addresses a critical gap by investigating how coloniality is embedded within the PPS of two MBA programs within a UK university and explores how AI can be leveraged to audit the use of colonial theories across these programs.

This study focuses on identifying and auditing coloniality within MBA PPS rather than attempting to eradicate it. This is because coloniality is structurally embedded and cannot be meaningfully reduced to removal without further intervention with the educators themselves. Instead, AI-assisted analysis is used to support systematic detection of colonial markers, with identification treated as a necessary basis for any future pedagogical or institutional change. Accordingly, this study is guided by the following research question:

"How can a reproducible AI-assisted workflow be developed to identify and audit colonial markers within MBA PowerPoint lecture slides?"

By addressing this question, the study aims to contribute to both decolonial theory and AI-based pedagogical research, advancing our understanding of the slow pace of change in Business Education while proposing innovative methodological pathways forward.

The paper begins by situating decolonising the curriculum within higher education and examining its uneven adoption in business education, highlighting PPS as a key site of knowledge reproduction. It then introduces AI as a method for systematically analysing teaching materials and outlines the development of a reproducible workflow. Following this, the methodology details the identification and operationalisation of colonial markers, the synthesis of expert and AI-generated themes, and the construction of an analytic pipeline for PPS analysis. Findings present the colonial markers identified and demonstrate the workflow's capacity to surface recurring patterns, alongside insights from a small-scale user evaluation with programme leads on interpretability and practical utility. Finally, the paper concludes by reflecting on AI-assisted approaches as tools for critical curriculum analysis and suggests directions for future multi-institutional research.

# Literature Review

## Decolonising the Curriculum (DtC)

Colonialism - the historical conquest of the Americas, Asia, and Africa (Mignolo, 2011) is distinguishable from coloniality – the persistent 'expansion of colonial logics' (Allen & Girei, 2023, p. 2) that perpetuate a type of intellectual colonisation that not only sustains racial, economic, and epistemic inequalities (Govender & Naidoo, 2023; Maldonado-Torres, 2007; Quijano, 2000; Shafi et al., 2026) but is found at the centre of Western business school curricula (Woods et al., 2022). In response, decolonisation can be understood, at a minimum, as an epistemic movement (Ndlovu-Gatsheni, 2019) designed to make explicit the deconstruction of colonial ideologies within which theories and concepts have been advanced (Albakri, 2026; Choat et al., 2024; Woods et al., 2022). In this way, DtC seeks to affirm the epistemic rights of non-Western knowledge production; to disrupt the Western canon; and provide a clearing for alternatives to flourish (Shahjahan et al., 2022). DtC can therefore be described as 'the sustained dismantling of colonial structures, logics and epistemologies that continue to shape institutions, curricula and research practices' (Albakri, 2026, p.2).

Recent high-profile campaigns within higher education spaces have garnered considerable attention to the extent that DtC has become difficult for universities to ignore (Begum & Saini, 2019; Doharty et al., 2021; Jammulamadaka et al., 2021; Mbembe, 2016). In the lands of former colonisers, DtC gains are forestalled by a fixation on the noble if narrow pursuit of diversification of knowledge (Mitova, 2020) and intellectual decolonisation (Moosavi, 2020), epitomised by internationalising course reading lists. Building from these efforts the current study seeks to expose and challenge existing hierarchies of knowledge that at once canonically privilege western theorising while delimiting, peripheralizing and belittling non-western sources of knowledge.

Campaigns such as ''Rhodes must fall'' in South Africa in 2015 inspired similar movements in the UK, such as ''Rhodes Must Fall in Oxford,'' ''Leopold Must Fall at Queens,'' ''Gladstone Must Fall'' at the University of Liverpool and ''Galton Must Fall at UCL'' (Abu Moghli & Kadiwal, 2021; Doharty et al., 2021; Pimblott, 2020; Woods et al., 2022). These acts of resistance sparked other student movements in the UK, including ''#WhyismyCurriculumWhite,'' ''#WhyisntmyProfessorBlack,'' and the Goldsmiths Anti-Racist

Action group's 137-day occupation of Deptford Town Hall in 2019 (Abu Moghli & Kadiwal, 2021; Pimblott, 2020). Together these initiatives brought the notion of DtC into sharper focus and into the consciousness of greater numbers of students, educators and university leaders. However, DtC continues to be exposed to coloniality's resilience such that advancements appear piecemeal and marginal (Moosavi, 2025). Part of this is to do with how DtC has been shaped as a matter of *principle* and *discussion* rather than a matter of *doing* and concrete *challenge* (Hoadley & Galant, 2019; Mbhele et al., 2024). As such Govender and Naidoo (2023) point to the need for DtC research to prioritise issues of implementation. Additionally, Govender and Naidoo (2023) consider epistemic renewal an essential DtC pre-condition, listing several decolonial insights suitable to guide curriculum transformation that will prove insightful for the current study To that end, this paper adds to the growing body of literature which concerns itself with the transformative *doing* of DtC by way of validating a new approach to scrutinising MBA teaching material (PPS). In so doing, the current study reaches for new ground by conceptualising the identification of colonial markers through the application of AI techniques.

## Decolonising Business Education

Business Education's sought-after status means current student enrolment continues to outpace most other university programs (Śliwa & Decker, 2024). As such, western systems of Business Education are exported the world over, courtesy of the MBA, with its non-inclusive Euro-American, male, white, cis, theoristic-universalism, which among other things can be seen to erase race (Dar et al., 2021; Doharty et al., 2021) and disincorporates history and place from theory-making (Adefila et al., 2022; Mignolo, 2020a; 2020b). It is argued here that Business Education's teaching of business theory (incl., ideas, models, frameworks), mediated through PPS involves the under reported sedation of epistemic inequality operationalised through knowledge hierarchies that at once essentialise western theorising whilst peripheralising non-western theory making (Hrenyk & Salmon, 2024; Woods eta al., 2022).

With Business Education described as ''the most strategic instance of epistemic coloniality in the last 200 years'' (Ibrarra-Colado, 2006 in Jammulamadaka et al., 2021, p. 721), and with DtC advancements limited and unevenly distributed across the curricula (Śliwa et al., 2025), the field currently occupies a state of "liminal transformation," where institutional pressures

often serve to insulate business schools from the structural changes required to de-centre these Western-centric epistemologies (Afriyie & Copland, 2025). It is the position of this paper that it is high time Business Education researchers and educators heed the calls to ‘‘Act up!’’ (Dar et al., 2021) and ‘‘get to the front’’ of DtC efforts (Jammulamadaka et al., 2021).

This study is informed by Banerjee (2022), who contends that a decolonial Business Education research agenda ought to begin with an analysis of the colonial dimensions inherent in its theories. As such, two MBA programs offered by one UK university will be scrutinised to reveal the prevalence of what has been conceptualised here as ‘‘colonial markers.’’ Working from the PPS, colonial markers act as proxies to locate the presence of coloniality or signal the absenteeism and de-centring of non-western theories. In this way our study sits within wider DtC approaches already taking root within Business Education whilst systematically probing the PPS and signalling a fresh approach to DtC.

## Decolonising Using AI

While DtC efforts continue to gain attention, discussions have often focused on the problems associated with colonial knowledge systems rather than on actionable methodologies for decolonisation. This gap is evident in works such as Xi Lin et al. (2024) , which emphasise the importance of curriculum redesign yet lacks a methodological framework for achieving it.

Recent advances in AI have made new approaches to curriculum transformation possible, particularly those based on the epistemic criticisms and refusals of a Eurocentric epistemic canon (Albakri, 2026). Of note, Broadhead (2024) and Sicka (2024), investigate the use of AI, specifically ChatGPT, as a tool to develop more inclusive curricula. Sicka (2024), for instance, applied the framework developed by Govender and Naidoo (2023) to manually identify colonial principles and compared this to the outputs generated by ChatGPT. Findings suggest that, under guided use, ChatGPT can assist DtC through content pluralisation and the inclusion of indigenous perspectives (Sicka, 2024). However, without careful oversight, this AI tool risks perpetuating coloniality through biases inherent in its design and data sources (Sicka, 2024).

Broadhead (2024) conducted a similar study but concluded with a more cautious view. The research highlights how biases embedded in AI systems, like ChatGPT, can reinforce "Eurocentric thinking and unconscious biases" (p. 29) when standard methods are applied to large datasets. This risk is compounded by issues raised by Arora et al. (2023), who suggest that AI models often reflect and amplify the biases of content creators, which are embedded through data configuration and training processes, potentially automating colonial thought patterns.

Additional challenges with AI tools are highlighted by Achiam et al. (2023), who discuss the tendency of models like ChatGPT to ''hallucinate,'' producing outputs with factual inaccuracies, reasoning errors, or overly deferential responses that merely align with user input. This may in turn limit the relevance of its outputs such as addressing recent developments in DtC research. Considering the urgent need to decolonise curricula and the potential of AI to assist in this process, developing, training, and refining AI tools tailored to DtC objectives appears both promising and necessary. By acknowledging AI's limitations—such as algorithmic biases and knowledge gaps—while integrating existing frameworks on coloniality such as that proposed by Govender and Naidoo (2023), AI methodologies could be adjusted to avoid reinforcing these challenges. Such initiatives could significantly address the current gap in the literature, where few studies propose and apply practical methodologies for decolonising curricula (Adams, 2021; Mason et al., 2023; Nemorin, 2024; Phirangee & Foster, 2024; Xi Lin et al., 2024). This approach would not only further the DtC movement but also provide a foundation for future research and application in this critical area.

## PowerPoint's Ubiquity

Pedagogical PPS research appears largely bifurcated, such that two areas of focus have emerged within the literature (see Stoner, 2007, for an alternative categorisation), the first concerned with educator effectiveness; and the second with student experience (Chavez Herting et al., 2023). Common to both is an acknowledgement of PPS ubiquity (Hallewell & Crook, 2020; Hertz et al., 2016; Hill et al., 2012; Mbhele et al., 2024; Roberts, 2018), which is astutely captured by Hopper and Waugh's (2014) sharply titled article, ''PowerPoint: An overused technology deserving of criticism, but indispensable.'' Despite its pedagogical detractors PPS has maintained its grip on teaching and learning, in large part,through the

acquisition of prime real estate within the classroom. Here, PPS can be observed standing *between* educator and student, thereby mediating teaching and learning *per se*. Added to this, habit and social influence appear complicit in PPS status as a tool of continuous use (Chavez Herting et al., 2023). Despite such ubiquity, remarkably little is known about PPS pedagogical effectiveness (ibid) and even less about its use of theory and associated colonial complicity. With two out of three educators routinely incorporating PPS within their teaching (Burke et al., 2009 in Chavez Herting et al., 2023), the paucity and precarity of DtC-PPS research is striking. While Mbhele et al. (2024) acknowledge that ‘‘universities are not doing enough to help educators to have relevant strategies to decolonize the curriculum,’’ their own research falls short of offering up actual PPS methodologies.

To the best of our knowledge, this study provides a novel methodological contribution by conceptualising and operationalising colonial markers through an integrated human and AI-assisted workflow. While previous research has explored AI’s role in curriculum redesign (Broadhead, 2024; Sicka, 2024), this study fills a critical gap by providing a reproducible, computational pipeline for the systematic identification of colonial assumptions within routine teaching materials. By moving beyond the binary of AI as purely beneficial or harmful, we conceptualise AI as a tool that can be repurposed to achieve "educational sovereignty" (Moravec, 2026). Given the exploratory, proof-of-concept scope of this work, the proposed methodology offers a potentially scalable framework for curricular analysis that supports, rather than replaces, the essential interpretive judgement of educators.

# Methodology

## Research Design

This study employed a sequential three-stage research design to develop and evaluate an AI-assisted approach for identifying colonial markers within MBA teaching materials. First, a Colonial Markers Framework was developed through an iterative process involving expert review, AI-assisted analysis, and comparative thematic synthesis. This stage established the conceptual foundation for the study by operationalising recurring indicators of coloniality within business education materials. Second, the framework was applied within an initial proof-of-concept workflow developed using Langflow. This exploratory phase enabled the

research team to assess the feasibility of automating colonial marker detection and to identify methodological and technical limitations associated with a low-code implementation. Third, insights gained from the Langflow phase informed the development of a more robust LangChain-Python workflow, which incorporated enhanced document processing, automated reporting, and structured data outputs. The effectiveness and practical utility of the final workflow were subsequently examined through analysis of MBA teaching materials and an exploratory evaluation with programme leads. These stages reflect an iterative process of framework development, technological refinement, and practical evaluation, with findings presented alongside each phase to demonstrate how successive insights informed the evolution of the overall methodology.

## Phase 1: Development of the Colonial Markers Framework

This stage of the study was designed to establish proof of concept by moving from conceptual discussion of coloniality in business education to the systematic identification and codification of "colonial markers" within teaching materials. The objective was to develop a replicable analytic framework capable of supporting both human and AI-assisted review of lecture PPS, while also examining the extent to which AI-generated analysis converged with expert interpretation, with the view to identify these markers.

### *Selection of teaching materials*

Due to the prevalence of the MBA within Business Education (Śliwa & Decker, 2024), two repositories of MBA teaching materials from one UK university were selected. One comprised material from a programme primarily serving UK and EU students, and the other from an internationally oriented MBA cohort. Each repository contained multiple module slide decks. Although limited in scale, this sampling strategy enabled close comparative analysis across two distinct programme contexts within the same institutional setting.

### *Manual expert analysis*

The selected slide decks were subjected to qualitative content analysis by a seasoned multidisciplinary research team of educators from the Global North and South, spanning business, computing, education, and criminology (n=8). Contributors had an average of eight years in UK higher education institutions, with varying experiences in writing on DtC and

innovative pedagogies (e.g. Anonymous et al., 2026). A predefined coding framework was intentionally not supplied at this stage. Instead, reviewers were asked to identify potential indicators of coloniality inductively to capture the breadth of disciplinary interpretation and avoid prematurely constraining analytic categories.

The 8 reviewers examined slide structure, theoretical framing, case selection, imagery, referencing practices, and the educators' assumptions about prior knowledge. Attention was also paid to the distribution of theoretical perspectives, the geographic and cultural positioning of examples, and the implicit epistemological hierarchies embedded within slide narratives. Observations generated by the research team were synthesised through a collaborative, iterative discussion process to derive recurring indicators of colonial framing.

### *AI analysis*

In parallel, the same slide decks were analysed using a large language model (ChatGPT-4o). Slides were converted to PDF format to enable full-text extraction and ensure compatibility with the model's document parser. To verify accuracy, additional text extraction methods were used and compared with the model's internal parsing to confirm that slide content had been captured reliably. A series of prompts were iteratively developed to guide analysis. Early prompts requested broad identification of colonial themes within the slides, as shown below:

*"I have some PowerPoint slides which you need to analyse in the context of decolonising the curriculum. Your objective is to read through these PowerPoint slides and provide me with a comprehensive explanation as to the occurrences of colonialism. Please take note of the language and the theories, modules used within the PowerPoints, as well as the imagery, styling of the slides and general layout.''*

Meanwhile subsequent prompts sought more structured outputs, including slide-level commentary and thematic synthesis. For instance:

*"Please decipher the main occurring themes regarding colonialism in the comprehensive analysis you've just conducted and explain what each theme means and how it links to the points you have made.''*

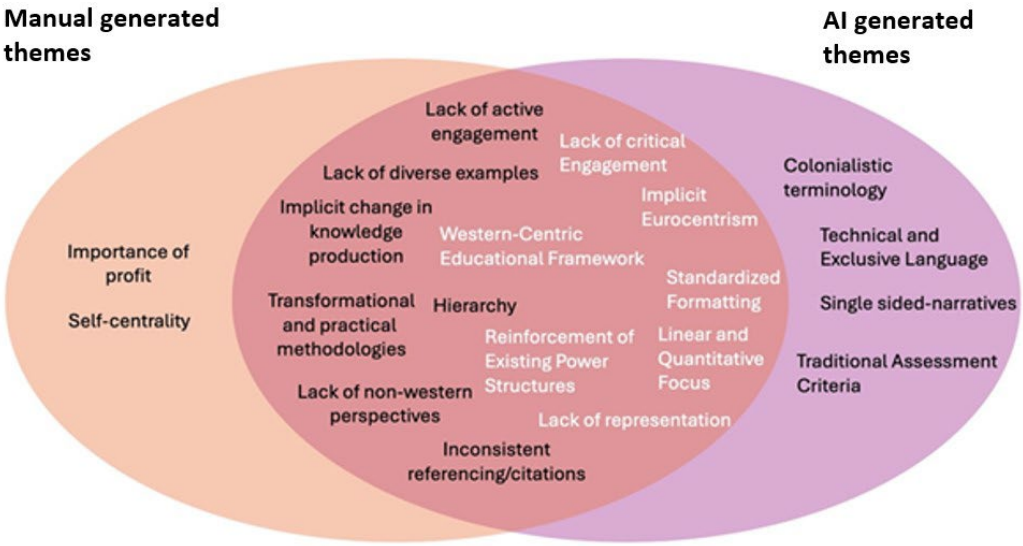
Prompt refinement was undertaken to improve specificity and relevance to business education contexts. The model was instructed to attend to language, imagery, theoretical framing, and structural features of the slides.

### *Comparative thematic synthesis*

Outputs from the manual expert review and the AI analysis were subsequently compared through a staged thematic synthesis. Observations generated by the research team and by ChatGPT were first coded independently to preserve the integrity of each analytic perspective. The two coded datasets were then brought together and examined comparatively to identify areas of thematic convergence. To support this process, both sets of coded outputs were also subjected to an AI-assisted thematic synthesis. This additional step was used to organise and cluster recurring concepts across the combined dataset, consistent with emerging research that positions large language models as complementary tools in qualitative content analysis rather than replacements for human interpretation (Turobov et al., 2024; Zhang et al., 2023). The resulting thematic report was reviewed iteratively by the research team, and conceptually aligned themes were consolidated into a refined set of candidate colonial markers.

To visualise the relationship between the two analytic streams, a Venn diagram was produced mapping themes generated through manual review against those produced through AI analysis (see Figure 1). This comparative visualisation enabled the research team to distinguish themes that appeared across both analytic modes from those unique to either human or AI interpretation. The process facilitated discussion regarding conceptual equivalence between differently phrased themes and supported the consolidation of overlapping categories into a shared analytical framework.

**Figure 1:** *Early Visualisation of Manual and AI Colonial Themes*




Although the Venn diagram presents human and AI-derived themes using different terminological labels, these categories were not conceptually distinct in most cases. Rather, they reflected the same underlying interpretive patterns expressed through different wording, with substantial overlap in meaning across the two analytic streams. For instance, several manually identified themes were mirrored closely in the AI outputs, albeit expressed in different terminology. For example, the manually derived theme of limited active engagement corresponded to the AI-generated theme of limited critical engagement. Similarly, manual references to hierarchical presentation of knowledge aligned with AI observations concerning reinforcement of existing power structures. The manual identification of limited non-Western perspectives corresponded to AI-generated observations regarding lack of representation. Such overlaps suggested that, when appropriately prompted, the model was able to identify patterns broadly consistent with expert interpretation. This therefore confirmed ChatGPT's potential as an analytical tool of merit in service to DtC research.

### *Colonial Markers: Framework Development*

Following the comparative analysis, it became evident that a standardised colonial markers framework was essential for future analysis. Therefore, the research team integrated internal insights with existing scholarly frameworks. In particular, the current study builds on Govender and Naidoo (2023), who asserted that DtC advancements be predicated on

epistemic renewal. To that end, the current paper extends these authors' decolonial insights through the conceptualisation of the seven colonial markers (see Table 1)

**Table 1:** *Colonial Markers Framework (Author's creation)*

| | |
|---|---|
| **1.Language and Terminology** | • **Description**: Examines the language used in curriculum materials in terms of inclusivity and accessibility for foreign learners.<br>• **Subthemes**:<br>o *Colonial terminology*: Avoiding terms rooted in colonialism that may carry bias.<br>o *English dominance*: Questioning the assumption that English is the default or "neutral" language.<br>o *Technical jargon*: Recognising when language becomes exclusionary or inaccessible. |
| **2.Inclusivity and Representation** | • **Description**: Explores the need for inclusive curricula that represent diverse cultural and economic perspectives.<br>• **Subthemes**:<br>o *Lack of cultural references*: Absence of cultural context that reflects global diversity.<br>o *Single-sided narratives*: Focusing on one-sided stories, often from dominant western perspectives.<br>o *Limited author diversity*: Reading lists that prioritise western scholars. |
| **3.Capitalist and Economic Focus** | • **Description**: Recognises the emphasis on profit-driven, capitalist structures within business education.<br>• **Subthemes**:<br>o *Capitalism as default*: Viewing capitalism as the only viable economic model.<br>o *Corporate structure rigidities*: Treating traditional corporate hierarchies as the standard. |
| **4.Eurocentrism and western Dominance** | • **Description**: Highlights the dominance of European and American knowledge systems and theories.<br>• **Subthemes**:<br>o *Implicit Eurocentrism*: Unconscious privilege of western ideas as universal.<br>o *Focus on western theories*: Over-reliance on western business and financial models without global perspectives.<br>o *Absence of non-western knowledge*: Excluding indigenous and diverse economic practices. |
| **5.Epistemological Dominance and Knowledge Production** | • **Description**: Challenges the dominance of western epistemologies and encourages the inclusion of multiple knowledge systems.<br>• **Subthemes**: |

| | |
|---|---|
| | ○ *Marginalisation of non-western epistemologies*: Failure to validate other ways of knowing.<br>○ *Coloniality of knowledge*: Viewing western knowledge as superior or universally applicable. |
| **6.Historical Context and Oversight** | • **Description:** It is often ignored in traditional curriculum to address the historical impacts of colonialism.<br>• **Subthemes:**<br>○ *Colonial impact neglect:* Failure to acknowledge the impacts of colonialism on current economic systems.<br>• *Reinforcement of power structures:* How existing structures perpetuate colonial hierarchies. |
| **7.Case Study and Example Bias** | • **Description**: Identifies biases in case studies and examples that predominantly feature western contexts.<br>• **Subthemes**:<br>○ *Geographical and cultural bias*: Over-representation of US and European companies and industries. |

## Phase 2: Exploratory Development Using Langflow

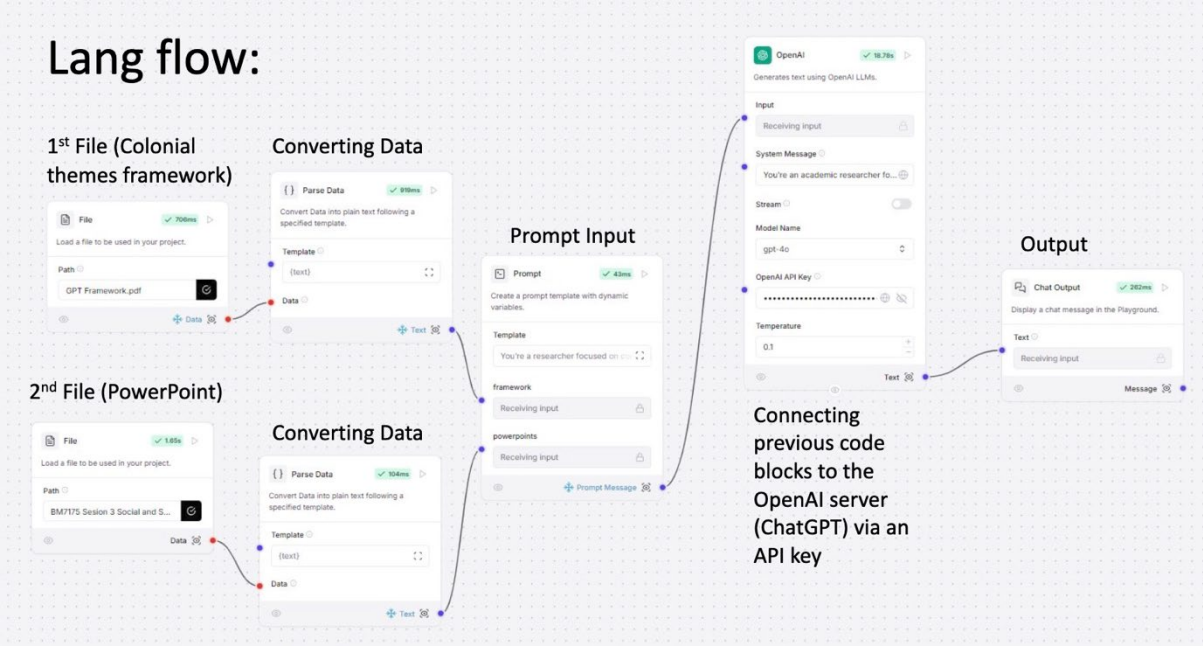
### *Developing the Langflow Workflow*

Langflow, an open-source low-code visual builder that can be used to prototype agentic AI applications, was adopted in the initial stages of developing the AI tool due to its ability to streamline the design, visualisation, and deployment of language model pipelines, thereby facilitating reproducibility and transparency in natural language processing workflows. As language models increasingly underpin complex applications, the need for intuitive and modular frameworks has grown. Langflow provides a graphical interface that allows researchers to construct, test, and iterate on prompt chains and processing logic without extensive coding overhead, reducing the barrier for experimentation and accelerating prototyping. Moreover, by representing workflows visually, Langflow enhances interpretability and documentation, aligning with best practices in computational research where traceability of methodological decisions is critical.

### *Prompt Design and Implementation*

See Figure 2 below for details on the initial development of the AI tool using Langflow.

**Figure 2:** *Langflow Pipeline*




First, the pipeline begins with loading two distinct source materials (a PDF containing the colonial themes framework, and a PowerPoint lecture), which are then parsed into clean, consistent text. Converting heterogeneous documents to a unified textual format supports downstream processing and aligns with current scholarship calling for clear data preprocessing in AI research (e.g., Sapkota et al., 2025, who critique opaque model architectures and argue for transparency in how models are trained and used).

Once text is extracted, the system structures the prompt by embedding both sources into defined slots. This design ensures that the LLM receives the materials as explicitly bound components of the prompt, increasing interpretability. The careful construction of prompts in this way is supported by the literature: for instance, inclusive frameworks for prompt engineering stress modular, source-aware design to mitigate biases and improve ethical robustness (Torkestani et al., 2025). Moreover, empirical studies of prompt engineering demonstrate how prompt quality critically affects downstream outputs; for example, Jacobsen and Weber (2025) showed that only well-constructed prompts reliably yield high-quality feedback from LLMs. Hence, our prompt design was carefully structured as outlined in Table 2 below.

**Table 2:** *Prompt Design & Justification*

| Input Stage | Prompt Part | Justification |
|---|---|---|
| Introducing AI's role | You're a researcher focused on conducting a comparative analysis of lecture slides to ascertain the character and prevalence of coloniality in university MBA programmes. | Assigning a clearly defined role to the AI situates it within the epistemic context of the research task, thereby enhancing the relevance and accuracy of its outputs. By framing the AI as a researcher, the prompt leverages role-based reasoning, which has been shown to improve coherence and task-specific responses in large language models. |
| Quick summary to instigate few-shot prompting | Business schools have been slow to engage with this discourse, often replicating Euro-American frameworks that perpetuate imperial and colonial ideologies. PowerPoint slides, as ubiquitous teaching tools, are key repositories of the theories taught in business schools. This research addresses how coloniality is embedded within the lecture slides of university MBA programmes, and how AI can be used to audit and compare the use of colonial theories across these programmes. The study aims to contribute to both decolonial theory and AI-based pedagogical research, offering innovative methodological solutions. | Providing a concise yet comprehensive context enables few-shot prompting, which can improve the precision and relevance of model. By summarizing the research objectives and theoretical grounding, the prompt reduces ambiguity, primes the model with task-specific knowledge, and situates it within the epistemological scope of the study. This approach mitigates the risk of off-target or irrelevant responses. |
| Introducing the framework (embedding) | You have been provided a framework which identifies and explains colonial themes which are most occurrent within PowerPoints. | This framework will be an embedding, which will be used to implement efficient knowledge retrieval, so that relevant information can be added, thus maintaining a level of relevance when ChatGPT creates an output. |
| Stating the task | Your task is to read through the PowerPoints and apply the provided framework to identify instances of colonial themes. During your analysis, take time to think and reason why you applied certain colonial themes from the framework to the data within the PowerPoints. With each classification you make, provide a justification as to why you have made a link between the data and cite the notes you make with the relevant slide numbers from the PowerPoint. | Incorporating explicit instructions for reasoning and justification employs a chain-of-thought prompting strategy, which improves accuracy and reduces hallucination in model outputs. By requiring citations to specific slides and referencing the framework, the prompt fosters methodological transparency, reproducibility, and traceability. This approach ensures that each classification is evidence-based and analytically defensible. |

After assembling the prompt, the pipeline passes it to an inference node where model parameters (e.g., model version = gpt-4o, temperature = 0.1) are defined, and the request is sent via a secure API. This reflects best practices articulated in recent methodological discussions of AI tools for education (Allison, 2025). Finally, the output is rendered in a display module, allowing the researcher to inspect and interpret the output as a result of both the inputs and the prompt. This was run multiple times simultaneously for outputs of PPS.

### *Langflow Findings*

The comparison between the automated analysis via Langflow was combined with educators' reflections and the results illustrate both the potential and the limitations of applying the AI-based tool to examine coloniality within business related PPS. Some comparative examples are provided below.

For instance, in the case of capital investment appraisal PPS, the AI tool identifies a possible epistemic bias in the valuation framework presented. It states that “the emphasis on Net Present Value (NPV) as a superior method for project evaluation reflects a western-centric narrative that prioritizes financial metrics over other forms of value, such as social or environmental impact.” The educator’s independent evaluation offers a closely aligned yet more contextually grounded interpretation, noting that the slide on NPV introduces “a method [that] focuses on monetary valuation, potentially ignoring non-economic values that are important in non-western contexts, which can be a colonial assumption.” This convergence is significant as it suggests that the AI is capable of identifying moments where entrenched financial methodologies may privilege certain epistemologies, while the human expert provides nuance by situating these assumptions within broader debates in critical accounting and decolonial economics.

A similar situation emerges from the discussion surrounding project appraisal processes. The AI tool asserts that “the steps of project appraisal reinforce traditional corporate structures without questioning their origins or implications, potentially perpetuating colonial hierarchies,” offering a relatively generalised critique of organisational power. Furthermore, the AI tool also argues that the same slide “reflects a top-down methodology, which can be

seen as a compliance with established western business practices." The educator's evaluation develops this further by pointing to the treatment of "wider costs such as human development and infrastructure costs," which, they note, "could be interpreted as a colonial assumption if it implies a top-down approach to development without considering local contexts." Here, the AI identifies the structural logic of hierarchy, while the educator demonstrates how this logic manifests in specific discursive choices and their real-world implications.

In PPS on personal development, the relationship between AI output and educator response is more cautious. The AI reports that "there is no explicit use of colonial terminology in the slides," observing that the language remains largely neutral. The educator also supports this assessment, acknowledging that "as this is a personal development module this one was a bit more 'difficult' to apply a decolonised lens because it is tailored to the student cohort." This exchange underscores an important point in decolonial pedagogy where not all material lends itself to overt readings of coloniality and forcing such interpretations risks flattening disciplinary specificity. The AI tools restraint and the educator's acknowledgement of contextual limits together demonstrate how automated tools may need to be supported by expert judgement.

Finally, when examining examples and case studies, the AI tool highlights a pattern of epistemic narrowing, arguing that the slides "predominantly reference western companies and cities (e.g., Microsoft, Apple, Paris, Barcelona)," which it identifies as "a lack of cultural diversity in the examples provided." The educators' response goes further in the analysis by shifting from representation to structural inequality, noting that the assumption of hybrid working as universally available fails to recognise that "because of our legacy [of] colonised structures, some students may not have equal access to what is needed for hybrid working." This reveals how the AI tool is sensitive to surface-level patterns of cultural centrality, while the educators link these patterns to material consequences shaped by historical inequalities.

### *Limitations of the Langflow Approach*

The evaluation process highlighted several concerns that hinder the initial promise shown by the Langflow model's capacity to generate outputs resembling educators' manual analyses.

Although there are moments of clear similarity, this was not consistent. Langflow frequently produced explicit, surface-level statements without engaging in the more layered or implicit reasoning that characterises human interpretation, leading to uneven analytical depth. Furthermore, technical issues deepened these limitations; for instance, the Langflow tool often failed to identify slide numbers accurately, resulting in imprecise citations which was a parsing weakness linked to inconsistencies in how PDFs were formatted. Across multiple conversations, the model repeatedly asserted that "the slides are entirely in English, which reflects the assumption that English is the default language for instruction," indicating a tendency to overgeneralise rather than adapt its analysis to specific contexts.

Additionally, structural limitations of the workflow further hindered the process where Langflow automatically cleared chat histories after each interaction, preventing researchers from revisiting or tracing analytical development unless the content was manually copied elsewhere. The generalised pipeline also struggled to handle PPS in a consistent way and the inability to reliably extract slide numbers showed how formatting variation undermined reproducibility. More broadly, the overall workflow proved quite time-consuming as organising each analysis into separate folders required manual intervention at the outset, revealing that the Langflow approach lacked the operational stability and automation needed to support large-scale or systematic decolonial review of PPS. Therefore, while Langflow showed promise, a more nuanced tool was required.

## Phase 3: Development of the LangChain-Python Workflow

### *Rationale for Transitioning from Langflow to LangChain-Python*

The transition from a Langflow based workflow to a custom LangChain–Python implementation emerged as a necessary methodological refinement. Although Langflow initially offered an intuitive, no-code interface that facilitated rapid prototyping, its structural limitations became increasingly apparent when subjected to the level of precision, flexibility, and reproducibility required. The shift was therefore not merely a matter of preference but a direct response to persistent operational issues that influenced the analytical accuracy and workflow stability.

One of the most significant limitations of Langflow related to its handling of PDF files that contain text embedded within images, a common feature of visually designed lecture slides. The built-in parser frequently failed to extract any usable text from such pages, returning null results that severely constrained the quality of later analysis. Because the pedagogical materials employed in this research (i.e, PPS) relied heavily on image-based layouts, this shortcoming was a clear obstacle that needed to be overcome. Addressing this required optical character recognition, but Langflow's environment offered no means of incorporating advanced computer vision tools. In contrast, a Python-based pipeline allows for direct integration of OCR via libraries such as pytesseract, ensuring that image-embedded text could be processed with greater accuracy. This capability alone increased the completeness and accuracy of the textual dataset from which the AI model generated its interpretations.

A second challenge concerned the inconsistent formatting of slide numbers across the PPS. When page identifiers were missing or irregular, Langflow lacked mechanisms to implement customised corrective logic, thus resulting in unreliable or absent references within the AI-generated analyses. A LangChain–Python pipeline could resolve this issue by enabling programmatic strategies to normalise slide numbers and maintain consistent referencing, even across heterogeneous document formats.

Beyond issues of parsing and formatting, Langflow also proved inefficient in its management of model outputs. AI responses generated within its graphical interface had to be manually copied, pasted, and archived which is both an error-prone and labour-intensive process. This inefficiency became particularly problematic as the volume of analyses grew. A Python-based solution, however, allows for a fully automated data pipeline that can capture, structure and export all model responses, thereby, increasing the consistency and auditability of the outputs.

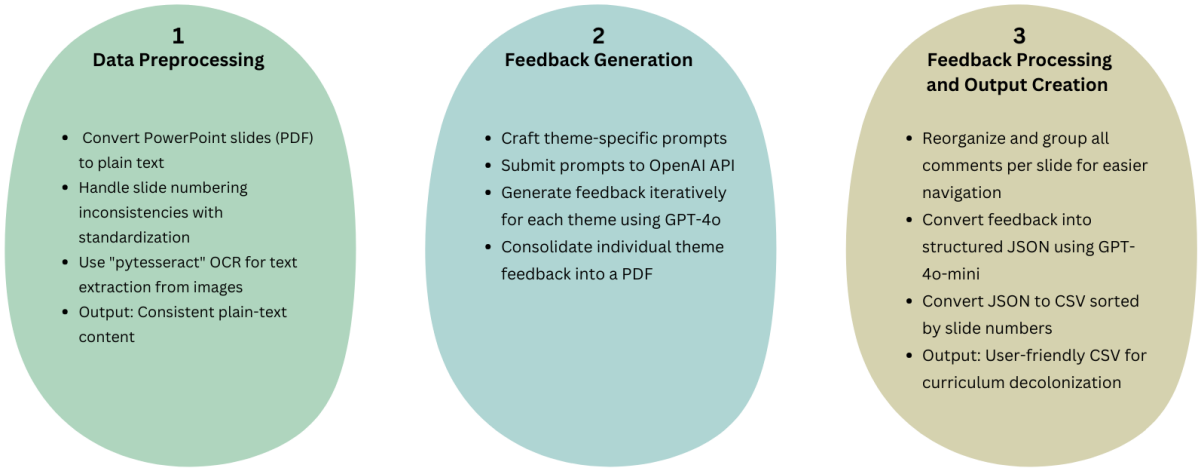
A further limitation of Langflow concerned the loss of its chat histories. Previous interactions were routinely overwritten or lost, posing a significant threat to reproducibility. By contrast, LangChain–Python could facilitate persistent storage of all interactions, enabling the reconstruction of the analysis and supporting the validation of findings.

Collectively, these limitations made it clear that Langflow could not sustain the methodological demands of the project. The adoption of LangChain–Python allowed for a far more adaptable and robust framework, supported by the extensive Python ecosystem and capable of integrating bespoke data-processing routines, tailored extraction logic, and stable storage mechanisms. The transition therefore not only resolved the technical issues encountered in the earlier Langflow workflow but also enhanced the reliability, efficiency, and reproducibility of the entire methodological pipeline. This shift was instrumental in establishing a more rigorous computational foundation for the assessment of coloniality within Business Education PPS.

## *LangChain-Python Workflow Development*

This study's methodology for LangChain-Python comprises three distinct steps: data preprocessing, feedback generation using AI, and feedback processing and output creation (see Figure 3).

**Figure 3:** *LangChain-Python Methodology*




### Step 1: Data Preprocessing.

Because the content was variously in PDF and PowerPoint formats, the first stage of the code was to establish the environmental dependencies required for robust file handling. Within the Google Colab environment, system-level libraries such as tesseract-ocr and poppler-utils were installed to support image-based text recognition and PDF processing, while Python packages including PyPDF2, pdf2image, pytesseract, and python-pptx to enable

the extraction and conversion of multimodal slide content. This guaranteed that text embedded within diverse file formats such as PPS saved as images rather than selectable text could be reliably processed. This initial stage also involved defining the PPS file Path as well as the GPT models and API Key.

The pipeline initially converted PowerPoint files into PDF format using a headless instance of LibreOffice. This step is critical because PPS files often contain layered elements, images, and formatting inconsistencies that impede direct text extraction. By standardising all materials into PDF, the script ensures a uniform foundation for later processing. Once the PDF is generated, a custom extraction function iterated through each page. The function used PyPDF2 to retrieve text whenever possible but many PPS such as those with visually designed layouts contained no machine-readable text. When this occurred, the system automatically rendered the PPS into a high-resolution image using pdf2image and applies OCR via pytesseract. This dual-strategy extraction ensured maximal accuracy while retaining the original page order. The entire corpus of a PPS deck is then stored in a structured text file in which each entry is tagged by page number, preserving positional context for later analysis.

### Step 2: Feedback Generation Using AI.

After the text had been extracted, the pipeline configured two OpenAI models through LangChain: one for producing expansive decolonial analyses and a second for translating these analyses into summarised, structured forms. Hence, this stage employed the "GPT-4o" model to generate feedback on the content of the slides. A detailed prompt template guided the interpretive model by specifying seven colonial markers informed by critical decolonial scholarship and the previous analysis conducted (see Table 1). The prompt that was provided for analysing the content thematically was as follows:

> *As a dedicated researcher in the 'Decolonising the Curriculum' initiative, you are tasked with a critical analysis of the provided business course content. Your expertise in identifying and challenging colonial biases in educational materials is crucial for this project. You will receive PowerPoint slides content from the business course, and your objective is to meticulously examine each slide for colonial themes. Based on the theme and subthemes provided, construct a detailed and comprehensive analysis of findings.*

*For each subtheme, provide a comprehensive list of all pages that contain relevant content related to that subtheme, clearly indicating both the page and the specific context within the page for easy accessibility. Please avoid summarizing the details. Your feedback is going to be the main body of our research paper. Here are themes and subthemes: [theme details were presented here]. Your thorough and insightful analysis will contribute to a more inclusive and representative curriculum. We look forward to receiving your analysis with the highlighted colonial themes and their descriptions.*

Due to the extensive number of subthemes and the considerable length of PPS content, requesting feedback encompassing all colonial markers at once proved impractical.

One limitation is that the model demonstrated reduced output length when prompted with extensive contextual material, consistent with known response-compression tendencies in large language models. Therefore, to address this limitation, the code instructed the AI to generate independent feedback for each theme in separate iterations. Each iteration involved crafting a prompt that included one major theme and its associated subthemes, which was then submitted to the OpenAI API to obtain a focused response. This process was repeated for all seven colonial markers. Once the individual feedback for each marker was collected, the outputs were compiled into a master document formatted in Markdown and subsequently rendered into a professional PDF report using WeasyPrint. This iterative approach ensures detailed feedback on each theme and its subthemes, effectively mitigating the risk of overlooking colonial elements due to the extensive context.

### Step 3: Feedback Processing and Output Creation.

The final stage involved organising the feedback to enhance human readability and usability. For instance, a single PPS (e.g., slide 13) may contain content relevant to multiple themes, making it difficult to navigate between themes in the comprehensive feedback file in the previous stage. To resolve this, we restructured the feedback by grouping all comments corresponding to a specific theme together.

To achieve this, a second set of prompts instructs the “GPT-4o-mini” model to convert the feedback into a structured JSON format. This required the model to break down each theme into subthemes and attach descriptions and page numbers. The resulting JSON objects are collected into a Python list, then parsed and cleaned by a custom extraction function. This function iterates through each subtheme entry, extracts relevant descriptors, and appends them into a pandas DataFrame with clearly delineated fields such as page, theme, subtheme, and description. The final dataset is sorted to maintain coherence between page order and thematic grouping before being exported as a CSV. Directly requesting structured JSON output during the second stage was avoided because experiments showed that adding this additional complexity to the prompt compromised the accuracy and comprehensiveness of the model’s responses. By introducing a separate stage for structuring the feedback, the approach ensured both accuracy and completeness of the output, despite the increased methodological complexity and higher associated costs.

The final stage of the pipeline automated the downloading of both the PDF report and the CSV dataset from the Colab environment. By integrating file conversion, OCR, large-language-model inference, and structured data generation within a single workflow, this pipeline offered a reproducible and potentially scalable method for assessing colonial themes within the PPS.

To enhance the replicability of responses in this study, the model's temperature was set to 0 for both the feedback generation and JSON conversion stages. This configuration minimised response variability and promoted deterministic outputs, thereby supporting consistency across repeated analyses of similar materials. Such consistency was considered particularly important given the study's objective of developing a reproducible workflow for identifying and auditing colonial markers. However, the use of a temperature setting of 0 introduces an important methodological trade-off. While deterministic outputs improve reproducibility and facilitate comparison across analyses, they may also encourage more literal and pattern-oriented classifications, potentially reducing the model's capacity to generate nuanced or interpretively expansive readings of slide content. Consequently, the workflow was designed to prioritise consistency and traceability over creative interpretation. This decision aligns with

the study's focus on systematic auditing rather than the generation of novel theoretical insights, although future research may wish to explore how alternative temperature settings influence the depth and diversity of colonial marker identification.

## Results and Evaluation

This section presents the outcomes of the AI-assisted workflow for identifying colonial markers in MBA teaching materials and assesses its practical utility through exploratory user evaluation. First, we illustrate the tool's outputs, showing how PDF reports generated by the LangChain-Python pipeline link themes and subthemes to specific slide content, enabling precise identification of recurring colonial markers. We then discuss the methodological and technical limitations. Next, we report on a small-scale, purposive user evaluation with two MBA programme leads responsible for curriculum design and oversight. Together, these analyses demonstrate both the workflow's analytic capabilities and its practical relevance for supporting decolonisation initiatives in business education.

### LangChain-Python Outputs

Figure 4 provides illustrative examples of outputs from the LangChain-Python tool. These PDF reports demonstrate the value of the automated workflow in delivering structured, actionable feedback for educators. By linking each theme and subtheme to specific slide numbers, the reports allow precise tracing of colonial markers within the curriculum. The inclusion of multiple examples per subtheme, such as outsourcing practices alongside leadership diversity, highlights patterns and intersections, supporting nuanced analysis of how historical and structural power dynamics are embedded in the material.

The examples presented in Figure 4 should be interpreted as illustrative extracts rather than an exhaustive representation of all analytical outputs generated through the pipeline. Given the volume and granularity of the dataset, it was not feasible to reproduce full outputs for all seven colonial markers within the main body of the article. Instead, representative sections were selected to demonstrate the structure, depth, and interpretive logic of the automated analysis. Importantly, the same analytic procedure was applied consistently across all markers, including those not explicitly visualised in the figure. Markers 4, 6, and 7 were fully operationalised within the pipeline and generated equivalent thematic

outputs, which are available upon request. The intention of Figure 4 is therefore to provide a transparent snapshot of the analytical affordances of the tool rather than a comprehensive presentation of all results.The sample of reports (see Figure 4), which are produced also balance qualitative richness with usability: it provides critical reasoning that contextualises findings within broader colonial and socio-economic frameworks, guiding educators toward reflective and evidence-based curricular revisions. Furthermore, the automated generation of a consolidated, consistently structured PDF ensures efficiency, traceability, and reproducibility, facilitating both individual and collaborative evaluation. Overall, the reports translate the AI-generated analysis into a practical tool for identifying and addressing colonial influences in Business Education.

**Figure 4:** *Sample AI Reports: Colonial Marker Extracts*

## 1. Language and Terminology

### AI Response:

**Critical Analysis of Colonial Themes in Business Continuity Planning Module**

**1. Language and Terminology**

**Subtheme 1: Colonial Terminology** - **Page 15**: The use of "Tier 1 responders" could be examined for colonial undertones, as it implies a hierarchical structure that may echo colonial systems of governance and control. The term "tier" suggests a ranking system that could be seen as reminiscent of colonial administrative practices.

**Subtheme 2: English Dominance** - **Page 3**: The assignment instructions are provided solely in English, assuming proficiency in English as a default. This reflects an implicit bias towards English as the primary language of instruction, potentially marginalizing non-native English speakers. - **Page 31**: The independent study activity references materials available on Moodle, which are presumably in English, reinforcing the dominance of English in academic resources.

**Subtheme 3: Technical Jargon** - **Page 7**: The explanation of "risk management" and "risk appetite" includes technical jargon that may be inaccessible to those unfamiliar with business continuity terminology. This could create barriers for learners from diverse backgrounds who may not have prior exposure to such specialized language. - **Page 29**: The use of terms like "Maximum Acceptable Outage (MAO)" and "Recovery Time Objective (RTO)" without lay explanations can be exclusionary, as they assume a level of pre-existing knowledge that not all students may possess.

**Summary of Findings**

The analysis of the Business Continuity Planning module reveals several areas where colonial themes are present, particularly in the language and terminology used throughout the course materials. The reliance on English as the sole language of instruction and resource availability underscores a colonial bias that prioritizes English-speaking students and may disadvantage those for whom English is not a first language. Additionally, the

## 2. Inclusivity and Representation

### AI Response:

**Critical Analysis of Colonial Themes in Financial Accounting Module**

**2. Inclusivity and Representation**

**Subtheme 1: Lack of Cultural References** - **Page 1**: The introduction to financial accounting is presented without any cultural context or references that reflect global diversity. The authorship and content focus on a Western-centric view of accounting principles. - **Page 18**: The discussion of international financial standards highlights the historical use of different accounting standards by countries but emphasizes the superiority of U.S. GAAP, which can be seen as a Western-centric perspective. - **Page 19**: The role of the IASB and the convergence of national accounting standards are discussed without acknowledging the diverse cultural and economic contexts in which these standards are applied.

**Subtheme 2: Single-sided Narratives** - **Page 3**: The definition and objectives of financial accounting are presented from a Western perspective, focusing on economic decisions without considering alternative economic systems or perspectives. - **Page 18**: The narrative around the development of international standards by the IASB and the past consideration of U.S. GAAP as the strongest set of standards reflects a single-sided narrative that prioritizes Western accounting practices. - **Page 19**: The focus on the investor group and their needs reflects a Western capitalist perspective, without considering other stakeholder perspectives that might be relevant in different cultural contexts.

**Subtheme 3: Limited Author Diversity** - **Page 1**: The textbook authors, Andrew Thomas and Anne Marie Ward, are likely Western scholars, and there is no indication of diverse authorship or perspectives in the reading list or course content. - **Page 18**: The emphasis on U.S. GAAP and IASB standards suggests a reliance on Western scholarship and frameworks, with limited inclusion of diverse global perspectives in accounting standards.

## 3. Capitalist and Economic Focus

### AI Response:

**Critical Analysis of Colonial Themes in Financial Accounting Module**

**3. Capitalist and Economic Focus**

**Subtheme 1: Capitalism as Default** - **Page 3**: The definition of financial accounting emphasizes the facilitation of economic decisions, implicitly assuming a capitalist framework where financial performance and economic decision-making are central. This reflects a view of capitalism as the default economic model. - **Page 4**: The slide titled "The Language of Business" suggests that business activities are inherently tied to financial outcomes, reinforcing the notion that economic success is the primary measure of business activity. - **Page 5**: The distinction between financial and managerial accounting highlights the focus on providing information to investors, creditors, and the public, which are key stakeholders in a capitalist economy. - **Page 18**: The discussion of international financial standards and the role of the IASB in converging national standards underlines the global dominance of capitalist economic principles, as these standards are designed to facilitate international investment and economic decision-making.

**Subtheme 2: Corporate Structure Rigidities** - **Page 7**: The description of business organizations, particularly companies, emphasizes traditional corporate hierarchies with shareholders, boards of directors, and limited liability, which are hallmarks of rigid corporate structures. - **Page 10**: The explanation of companies being formed under state law and having a board of directors to set policy and appoint officers reflects a rigid corporate hierarchy that is often seen as the standard. - **Page 11**: The regulation of companies by legislation and stock exchanges further reinforces the rigidity of corporate structures, as these regulations are designed to maintain a certain order and predictability in business operations. - **Page 12**: The concept of limited liability and the protection of owners' private wealth within corporate structures highlights the entrenched nature of these hierarchies, which prioritize shareholder interests and risk mitigation.

## 5. Epistemological Dominance and Knowledge Production

### AI Response:

**Critical Analysis of Colonial Themes in Business Course Module**

**5. Epistemological Dominance and Knowledge Production**

**Subtheme 1: Marginalization of Non-Western Epistemologies** - **Page 3**: The definition of an entrepreneur is solely based on Western scholars (Schumpeter, 1934; Bolton & Thompson, 2010), which marginalizes non-Western perspectives on entrepreneurship. There is no mention of indigenous or non-Western entrepreneurial practices or theories. - **Page 6**: The definition of intrapreneurship is attributed to a Western source (Haller, 2014), without acknowledging similar concepts that may exist in non-Western contexts. - **Page 10**: The quote from Bill Drayton, a Western figure, emphasizes a Western-centric view of social entrepreneurship, without considering non-Western approaches or philosophies. - **Page 19**: The examples of social innovators are predominantly from Western or Western-influenced contexts, with limited representation from non-Western countries, which could marginalize non-Western contributions to social innovation.

**Subtheme 2: Coloniality of Knowledge** - **Page 3**: The reliance on Western scholars to define entrepreneurship suggests a coloniality of knowledge, where Western definitions are seen as universally applicable. - **Page 10**: The use of a Western source (Stanford School of Business) to define social innovation implies that Western institutions are the primary authorities on the subject. - **Page 13**: The source for innovation management models is a Western consultancy, which may imply that Western models are superior or more applicable universally. - **Page 24**: The description of sustainability and sustainable development does not include perspectives from indigenous or non-Western cultures, which often have long-standing traditions of sustainability. - **Page 30**: The discussion of a paradigm shift for sustainability is framed within a Western context, focusing on Western managerial and technological systems without acknowledging non-Western systems or approaches.

## Methodological Limitations

Although the automated pipeline developed in this study offers a systematic and reproducible method for identifying colonial markers within Business Education PPS, it also presents several methodological limitations that warrant consideration. One recurring challenge concerns the model's tendency to categorise the same content under multiple themes or subthemes. Because colonial features such as Eurocentrism, epistemic dominance, and capitalist framing often intersect conceptually, the model frequently assigns the same extract to several thematic categories. This produces redundancy within the final dataset: certain slides appear repeatedly, albeit paraphrased, across disparate themes. Such duplication may reflect both the thematic overlap inherent in the Colonial Marker Framework and the tendency of recent GPT models, including GPT-4o, to "hedge" their classifications when boundaries between categories are not sharply defined.

A further limitation arises from the model's decreasing capacity to produce extended analytical outputs in response to longer PPS content. Contemporary GPT models often exhibit a preference for concise responses, even when prompted explicitly for greater depth. This behaviour constrains the model's ability to identify and elaborate on multiple colonial markers within dense or text-heavy PPS. The sections of content most likely to contain rich colonial dynamics, such as complex theoretical definitions or multi-layered case studies, are paradoxically, those at greatest risk of being under-analysed due to this brevity bias. As a result, some outputs risk becoming partial rather than comprehensive, which may limit the reliability of the method for materials requiring nuanced critical analysis.However, the paper's position was to systematically identify and audit the presence of colonial markers, rather than a substitute for educators' interpretive judgement, which remains essential for contextual evaluation and critical interpretation of the outputs.

## Exploratory User Evaluation

Given the exploratory scope of the study, a small-scale user evaluation was undertaken to examine its perceived usefulness, interpretability, and feasibility within routine pedagogical practice. Two MBA programme leads at the host institution participated in the evaluation. Both participants held senior responsibility for curriculum design, module

oversight, and teaching material approval within their respective programmes. Their inclusion was therefore purposive rather than representative. As decision-makers with direct oversight of programme content and pedagogical direction, they were well positioned to assess the workflow's potential relevance to curriculum review processes, staff development, and programme-level implementation. In this sense, their perspectives were analytically valuable for examining feasibility and interpretive reception at the level where curricular change is most likely to be enacted. Both MBA programme leads engaged in a semi-structured interview with the lead researcher for approximately forty minutes. In advance of the first interview, participants were provided with a short case-study extract and one AI-generated report derived from their programme's slide materials. Interviews were audio-recorded, transcribed, and analysed using inductive thematic coding.

Both participants consistently characterised the reports as accessible prompts for reflection rather than evaluative judgements. The outputs were described as concise and usable starting points for identifying omissions or representational imbalances within lecture materials. One participant noted that the reports could function as "a good detection tool" for initiating staff reflection on gaps in content, as noted below:

> "What I like about it in the first instance…is it could be a really useful, quick and easy tool…a good place to start for them [educators] to reflect on the gaps identified by the tool…It's short, it's punchy, it creates some points of interest, some jumping off points. "

Meanwhile the other participant emphasised that the tone operated "like an aid and not at all shouty", suggesting that the workflow's design supported engagement without eliciting defensiveness. Such reception is significant in the context of decolonising initiatives, where concerns about critique and accountability can inhibit staff participation.

Discussion of programme-level activity indicated that decolonising efforts were perceived by participants as ''negligible,'' ''sporadic,'' and ''superficial'' and largely dependent on individual initiative. Competing workloads and limited institutional guidance were identified as key barriers to sustained curricular revision. For instance, one participant noted:

> ‘‘We expect staff to go do it for themselves. So, when you say, *have any inroads been made?* I think no, because nobody’s really helping us.’’

Within this context, the AI-generated reports were viewed as potentially useful scaffolds for reflective practice. Both participants reported that the outputs enabled them to recognise potential issues in slide content without feeling personally criticised, thereby creating space for engagement with what was described as an uncertain and sometimes uncomfortable area of pedagogical development. For example, one participant stated:

> ‘‘I think there’s quite a lot of uncertainty around how to tackle it…I want to do more, learn more. It can be quite an uncomfortable space…[But] when I read it [AI report], I thought, actually if I gave you slides and that came back, I’d be like, oh, OK, yeah, I see the point. I don’t feel like I’ve been kind of criticised, if that makes sense.’’

This indicates that the workflow may be most effective when positioned as a supportive diagnostic instrument rather than an evaluative mechanism.

From a technical perspective, the workflow was designed to support reproducibility and transparency. Outputs are automatically stored in structured directories and generated in both narrative PDF and tabulated CSV formats. This dual-format structure enables educators to engage with qualitative commentary while allowing researchers to conduct cross-course comparisons using structured data. The capacity to trace identified markers to specific textual excerpts enhances auditability and methodological transparency. Participants noted that deployment requirements were minimal and that the workflow’s relative simplicity increased the likelihood of adoption among staff without extensive technical expertise.

The findings from this small-scale exploratory user evaluation indicate that the workflow is interpretable, acceptable to intended users, and capable of prompting reflection within existing time constraints. However, the study does not claim comprehensive validation or generalisability. The small sample size, single institution setting, and qualitative design limit the extent to which conclusions can be extended beyond the immediate context. Rather than

replacing educator judgement, the workflow is best understood as a scaffold for reflective curriculum review. By enabling rapid scanning of teaching materials and highlighting recurring patterns in representation and framing, it may assist educators in identifying areas requiring further contextualisation or revision. Future research should examine the workflow's application across multiple institutions, compare AI-assisted and human coding outcomes, and explore whether sustained use contributes to measurable curricular change.

## Conclusion

This study set out to address the peripheral and provisional nature of Decolonising the Curriculum (DtC) within Business Education by examining how coloniality is embedded within PowerPoint lecture slides (PPS) in MBA programmes, and assessing the extent to which AI-assisted analysis can support the identification of colonial markers. In doing so, it directly responds to the research question: " How can a reproducible AI-assisted workflow be developed to identify and audit colonial markers within MBA PowerPoint lecture slides?""

By conceptualising and operationalising a framework of seven colonial markers and demonstrating the capacity of a custom AI workflow (LangChain Python pipeline) to detect them, the study contributes both theoretically and methodologically. Drawing on Shahjahan et al. (2022) the current paper conceptually, highlights PPS as an under-recognised but materially significant 'site' of knowledge production, dissemination, and epistemic suppression in Business Education, complementing existing critiques of Eurocentric theorising and epistemic homogeneity (Abdallah, 2024; Śliwa et al., 2025; Jammulamadaka et al., 2021). The findings demonstrate that the discipline's deep-seated reliance on western frameworks actively marginalises and renders invisible non-western knowledge. Taking its lead from Banerjee (2022), this research shows that the decolonial research agenda must indeed focus on analysing the colonial dimensions within its theories, as these structures lead to the systematic occlusion of alternative theory-making. By exposing these markers, this research offers educators and institutions an objective foundation for challenging the non-inclusive, theoristic-universalism that disincorporates history, place, and diverse epistemologies from theory-making.

Methodologically, this paper illustrates how AI, when guided by a human-designed framework and prompt-engineering, can reliably support the systematic review of teaching materials, providing structured, reproducible, and interpretable outputs. The high degree of convergence between AI-generated and human-identified themes, particularly in markers such as “Eurocentrism and Western dominance,” “Capitalist framing,” and “Case study and example bias,” validates the workflow as a feasible diagnostic tool for curricular reflection.

The study also has practical implications. By automating the identification of colonial markers, educators and programme leads can more efficiently audit content, pinpoint gaps or imbalances, and scaffold reflective discussions within their teams. The outputs function as prompts rather than evaluative judgements, mitigating defensiveness and supporting constructive engagement with decolonial goals (Govender & Naidoo, 2023; Hoadley & Galant, 2019; Mbhele et al., 2024). In this sense, the AI pipeline acts as an augmentative instrument, enhancing human capacity to detect and interrogate embedded colonial assumptions without displacing professional judgment.

Nonetheless, the methodology is subject to limitations. First, the coding and validation process did not employ formal inter-rater reliability measures such as Cohen’s kappa or Krippendorff’s alpha. While the analytic approach prioritised interpretive consensus across a multidisciplinary research team rather than statistical agreement, the absence of a quantified reliability metric limits the ability to assess the consistency of manual coding in conventional positivist terms. This reflects a deliberate methodological choice aligned with interpretivist and decolonial traditions, but nevertheless reduces comparability with more standardised content analysis approaches. Second, outputs depend on the quality of the human-defined framework and the prompts used (Arora et al., 2023; Sicka, 2024), and the multi-step pipeline introduces additional resource requirements and some redundancy. Hence, the AI pipeline should be viewed as an augmentative tool for educators, not a replacement for human critical engagement and ethical oversight. The final responsibility for DtC remains with the academic community, who must continuously refine the framework and actively implement any changes accordingly. Moreover, the findings are drawn from a single institutional context with a limited sample of MBA programmes, so despite positive user evaluation, generalisability remains constrained. An additional limitation concerns the decision to employ

a temperature setting of 0 throughout the workflow. Although this enhanced reproducibility and reduced variation across analyses, it may also have constrained the model's ability to identify more subtle, ambiguous, or context-dependent manifestations of coloniality. Future studies could investigate whether modest increases in temperature yield richer interpretive outputs while maintaining acceptable levels of analytical consistency. Overall, these limitations highlight the need for future research to test the approach across multiple institutions, refine prompt design, and explore scalable implementations that balance analytical depth with operational efficiency.

In conclusion, this paper demonstrates that PPS are both a significant vector of coloniality in Business Education and a tractable target for AI-supported analysis. Overall, the paper contributes a framework of colonial markers, a scalable methodological approach, and practical guidance for educators seeking to advance DtC efforts. While recognising the indispensable role of human critical engagement, the study provides a replicable pathway for moving decolonial practice from conceptual discussion to actionable review, supporting more inclusive, reflective, and epistemically diverse MBA curricula.

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