IDR Journal Vol. 02 (Issue 02) 2025
ISSN 3030-7139, eISSN 3030-7147
idresearch.uom.lk

LLM-Informed Mapping of Emerging Student Practice Communities for Adaptive Design Curricula

DE MAAT J.
Graphic Communication Design, Central Saint Martins, University of the Arts London, London, United Kingdom
j.demaat@arts.ac.uk

Abstract — *This paper presents an LLM-informed methodology for mapping student practice communities to enable adaptive design curricula. Using Claude 3.5 Sonnet within a curriculum-informed semantic framework, this paper analyses keyword data from BA Graphic Communication Design students (2024/25) collected through constellation mapping workshops. The methodology employs four integrated phases: curriculum framework analysis (5 GCD Practices and 5 GCD Platforms), LLM-based semantic analysis of 40 handbook-derived keywords, network visualisation using D3.js force-directed graphs, and community identification validated with teaching teams. Analysis reveals 83.3% cross-platform connectivity, suggesting hybrid practices that integrate technical skills with conceptual approaches. Unexpected alignments emerged: Strategy & Identity students engaging with immersive spatial practices typically associated with Experience & Environment, and Information & Systems students bridging computational methods with speculative design approaches. Teaching team validation (October 2024) confirmed that these patterns aligned with observed student project development. The methodology informs immediate curriculum adaptations including targeted reading lists, strategic industry connections, and guest lectures aligned with naturally emerging communities, demonstrating how computational tools can surface authentic practice development.*

Keywords: *Large Language Models; Communities of Practice; Design Education; Network Visualisation; Adaptive Curriculum*

**Contact: Phone +44-7511502065*
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

I. Introduction

Educational feedback mechanisms tend to capture surface-level satisfaction but miss deeper currents of creative practice development and community formation (Shah & Pabel, 2019). In graphic design education, this gap becomes particularly apparent when examining how established curriculum frameworks relate to students' actual perceptions of different practice areas. The field evolves constantly through new technologies, methodologies, and forms of visual communication, whilst students simultaneously bring fresh perspectives that reshape their understanding of practice possibilities and inform their own development.

Current methods remain limited in capturing authentic student interests and emerging learning communities. Lave and Wenger (1991) describe communities of practice as social formations where learning occurs through participation in shared activity, with newcomers gradually moving from peripheral involvement toward fuller engagement. While their work focused on situated, practice-based learning in apprenticeship-like contexts, this research adapts the concept to describe emergent student practice clusters that form beyond formal academic structures. Computational analysis provides one way to surface these affinities, revealing how students connect ideas and interests across disciplinary boundaries.

This research develops a methodology using LLM analysis of student-generated keywords from constellation mapping workshops. The goal extends beyond understanding toward enabling more targeted educational support, though questions remain about how to implement such insights without over-engineering natural processes. Rather than depending entirely on established curriculum frameworks, this approach appears to reveal natural affinities between students. These insights might inform community-targeted educational interventions: adapted reading lists, relevant industry connections, and guest lectures aligned with developing practice needs.

The methodology emphasises privacy through anonymised data processing and aggregate analysis of cohort patterns rather than individual profiling, in accordance with GDPR and UAL guidelines. This approach aims to provide insights for curriculum development and student support while maintaining ethical data practices.

II. Background: From Generic to Community-Targeted Educational Interventions

Educational data analysis in higher education tends to focus on quantitative metrics, while qualitative dimensions remain underexplored due to processing complexity. Shah and Pabel (2019) note there has been "success in use of quantitative data but limited prior progress in the analysis and practical use of qualitative feedback."

This challenge becomes more complex in creative disciplines where students develop individual approaches within institutional frameworks. Many design programmes increasingly acknowledge that diverse practices emerge when students combine different specialisation areas. This presents opportunities to connect students with shared interests across formal boundaries,

Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

provide targeted resources, and facilitate relevant industry connections that support their emerging hybrid practices.

Recent research highlights the scale of this challenge. Traditional approaches are described as "extremely time-consuming and labour-intensive" (Shaik et al., 2022) This complexity has prompted exploration of automated approaches for qualitative analysis, though questions remain about balancing efficiency with nuanced understanding.

Parker et al. (2024) suggests that LLMs can achieve "human or near-human level of performance across a range of tasks" in educational survey analysis. These capabilities may open new possibilities for processing semantic relationships in textual data at scale. However, educational applications require careful attention to privacy and the interpretive nature of learning communities. In this study, LLMs are employed specifically for pattern recognition in existing content, focusing on semantic analysis of student-submitted keywords rather than content generation. To maintain privacy, anonymised keywords are processed using cloud-based services with named entity recognition, designed to prevent personal information from reaching external systems.

Creative intelligence, as conceptualised here, represents the synthesis of computational capability with pedagogical expertise—technology amplifying rather than replacing educator knowledge. This approach attempts to respect the interpretive nature of design learning whilst enabling systematic analysis that might inform more targeted educational interventions.

III. Methodology: Computational Analysis of Student-Generated Workshop Data

3.1 Data Governance and Ethical Framework

This research complies with the General Data Protection Regulation (EU Regulation 2016/679), the University of the Arts London Code of Practice on Research Ethics (University of the Arts London, 2020), and the Research Data Management Planning Procedures (University of the Arts London, 2014). It follows principles of respect for persons (voluntary participation, not linked to assessment), justice (aggregate analysis, no individual profiling), and beneficence (curriculum insights improve student support).

The workshop took place on 1 October 2024. At the conclusion, students were invited to submit keywords. They were informed that: keyword submission was optional; all data would be anonymised; the anonymised data would be analysed to understand emerging practice interests in the cohort; and findings would inform curriculum development as part of ongoing pedagogic research.

Upon export from Microsoft Forms, all personally identifiable information was immediately deleted, names, emails, timestamps removed. Only platform allocations and keyword selections were retained before analysis began. The anonymised dataset is stored in a password protected file on

**Contact: Phone +44-7511502065*
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

the researcher's UAL network drive (Microsoft OneDrive, internal institutional access). Only anonymised keywords and allocations were transmitted to Claude 3.5 Sonnet via claude.ai.

3.2 Case Study: "The Incomplete Constellation of Graphic Communication Design" Workshop (1 October 2024)

This research builds upon Kira Salter's "An Incomplete Constellation of Graphic Communication Design" workshop methodology. Salter's foundational work used visual mapping to identify "the potential for interdisciplinarity" within student cohorts, demonstrating how creative exercises reveal the natural affinities and connections students make between different design approaches (Salter, 2017).

The workshop methodology is designed for second year undergraduate students at the point where they shift from exploring the broader field to identifying specific practice interests. Students begin by viewing Charles and Ray Eames' 'Powers of Ten' (1977). The film demonstrates zooming from universal scale to atomic level, establishing a framework for thinking about different scales and connections within design practice to explore their own emerging design territories.

The workshop consists of three phases:

Phase 1: Constellation Mapping

Students receive large-format paper worksheet (see Figure 1) scattered with small dots, each containing a word related to their course of study. Drawing on the Powers of Ten concept, they treat each dot as a constellation with potential to zoom in—finding specific details to explore, or zoom out to discover broader connections. Students connect dots representing their strongest interests, identifying spaces between these constellations as potential practice areas for further exploration.

**Contact: Phone +44-7511502065*
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

Figure 1

An Incomplete Constellation of Graphic Communication Design - Worksheet (2024/25)

Constellation worksheet used in the workshop. Students connect keywords representing practice interests, creating visual maps of emerging affinities.

Phase 2: Practice Horoscope

Students write a short 'horoscope' defining their current practice interests based on their constellation mapping. This process generates textual data that captures their understanding of practice relationships and future directions.

Phase 3: Keyword Submission

Students submit 3-5 keywords summarising practice interests derived from constellation mapping. Keywords typically range from technical skills ("Digital typesetting," "Animation") to conceptual approaches ("Speculative imaginings") to professional contexts ("Brand Strategy," "Exhibition design"). These keywords form the basis for computational analysis.

Students are encouraged to continue exploring their constellation map and selected keywords throughout the academic year. Follow-up workshops explicitly reference the constellation activity, supporting students in refining their practice development over time.

**Contact: Phone +44-7511502065*
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

3.3 Computational Community Analysis

Following the workshop, student-submitted keywords were analysed using Claude 3.5 Sonnet (Anthropic, June–September 2024). The goal was to identify what practice interests were emerging in this cohort at the start of Stage 2. Rather than applying a predetermined computational pipeline, analysis proceeded iteratively. Patterns were identified, visualised, and questioned against the course's Practices and Platforms framework. Interpretations developed through dialogue.

3.3.1 Curriculum-Informed Semantic Framework

The BA Graphic Communication Design course is structured around two complementary structures. Five Practices; Computation, Contexts, Lens, Print Production, and Typography—develop discipline-specific skills and knowledge. Five Platforms; Experience & Environment, Information & Systems, Narrative & Voice, Strategy & Identity, and Time & Movement. Students develop hybrid capabilities by integrating practices across platform briefs.

The handbook outlines a range of keywords relating to each Practice and Platform, establishing a descriptive linguistic framework for the course which informs the following analysis (Course Handbook 2024/25, pp. 20–44).

The 40 keywords used in the constellation workshop come directly from this handbook. This mattered significantly. Student keyword selections weren't arbitrary labels. They were deliberate navigations through a designed curriculum structure.

When student choices are interpreted, such as a student choosing "user experience" alongside "Strategy & Identity", this interpretation proceeds through the framework. That framework explains what those terms mean pedagogically. It suggests why they might cluster together or diverge.

Students submitted keywords using varied spellings, abbreviations, and phrasings. Standardisation required mapping these expressions to official curriculum vocabulary. Claude 3.5 Sonnet's semantic understanding of the curriculum structure enabled iterative matching between student submissions and handbook terms. For example: "UX" → "user experience." The model flagged submissions that didn't correspond to any handbook keyword. These non-matching keywords were removed from the dataset. All remaining student keywords were successfully mapped to the curriculum framework.

Traditional Natural Language Processing (NLP) pre-processing standardises text through computational techniques such as tokenization, stemming, and removal of non-value-adding elements (Shaik et al., 2022). This approach would obscure pedagogically distinct curriculum concepts. Instead, student keywords were standardised by matching them to official handbook vocabulary—an approach grounded in pedagogical understanding of the curriculum structure. This preserved the deliberate distinctions the course makes between related concepts.

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

The technical approach involved student keywords undergoing semantic analysis using Claude 3.5 Sonnet to identify potential semantic relationships. The resulting co-occurrence data informed creation of a force-directed network graph using p5.js and d3.js libraries. In this model, each keyword is represented as a node, with size proportional to frequency of occurrence in student submissions. Edges are weighted by co-occurrence strength, and the layout adjusts dynamically based on attractive and repulsive forces. The results are visualised through interactive network maps that allow users to explore connections between keywords and identify potential bridge concepts linking different practice areas.

3.3.2 Iterative Dialogue and Pattern Recognition

This analysis proceeded through iterative dialogue rather than pattern identification alone. Embedding-based clustering systems are effective at converting keywords into mathematical vectors. But they operate in isolation—data in, results out, with no capacity for dialogue or refinement. For these reasons Claude 3.5 Sonnet (Anthropic, June–September 2024) was selected, which supported iterative engagement with the data. Patterns could be iteratively questioned and refined. Understanding deepened through exchange.

The iterative approach mattered because the analysis required holding two things in relationship: the course handbook (institutional knowledge domains) and student keyword selections (specific submissions). Claude's extended context window allowed simultaneous processing of both, maintaining coherent interpretation across curriculum structure and student choices. This grounded analysis in pedagogical reasoning rather than treating pattern identification as a discrete computational task separate from interpretation.

This approach privileged pedagogical meaning-making over computational automation. Other LLMs might support similar dialogue. They might process large documents adequately. But this particular workflow—iterative pattern identification, pedagogical questioning, interpretive dialogue, curriculum-grounded validation—required a model that could sustain exchange without predetermined outputs.

Claude was provided with (1) the complete course handbook defining Practices and Platforms with their associated keywords; (2) student keyword selections (typically 3–5 per student); (3) each student's formal Platform allocation; and (4) temporal context (Stage 2, Week 1, when students are beginning to identify specific practice interests).

Analysis unfolded iteratively in the actual workflow. Claude first performed quantitative pattern identification: counting keyword frequencies, spotting co-occurrence patterns, noting students selecting keywords outside their formally allocated platform. These counts generated early network sketches for interrogation.

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

Quantitative anchors then prompted pedagogical questions: How many students cross platform boundaries? Which platforms show strongest connectivity? Do students favour technical or conceptual keywords? These questions directly addressed what student choices signal about emerging practice development.

When Claude offered interpretations grounded in the curriculum framework, for instance, Strategy & Identity students selecting "Immersive practices" (typically an Experience & Environment keyword)—these interpretations could be tested against pedagogical reality. Where interpretations aligned with observed student work, inquiry deepened. Where misalignment appeared, reasoning was redirected. This dialogue meant analysis wasn't predetermined. Patterns prompted questions, questions revealed interpretations, interpretations generated new lines of inquiry. Insights emerged through reasoning grounded in this cohort's specific data, using the curriculum framework as conceptual vocabulary.

Relationships were visualised using D3.js force-directed layout. Nodes represent keywords (sized by selection frequency). Edges represent co-occurrence (thickness proportional to connection strength). Physics simulation controls positioning: charge force (−200) creates repulsion, link force draws connected nodes together, collision detection prevents overlap.

This iterative process revealed co-occurrence patterns that were subsequently visualised to enable further investigation.

Strongly connected keywords cluster visually. Weakly connected ones drift apart. This spatial arrangement emerges from physics simulation and is exploratory rather than analytically definitive. In the network visualisation, co-occurrence relationships were calculated directly from student submissions. If five students selected both "Visual identity" and "Brand strategy," the edge weight equals five. Edges connect all keyword pairs co-occurring in selections, with no minimum threshold.

3.3.3 Community Identification and Validation

Communities were identified through iterative analysis of visual clustering patterns from the force-directed network (Figure 2), cross-referencing with documented curriculum structure, and semantic interpretation of keyword relationships grounded in pedagogical understanding. Communities of practice appear to emerge visually from the network structure rather than being imposed through predetermined categories.

The network visualisation revealed practice interests clustering within platform structures, crossing multiple platforms and bridging formal curriculum boundaries in pedagogically meaningful ways. Notably, larger nodes indicate high-frequency keywords—such as 'User experience' and 'Visual identity'—around which multiple connections cluster. The density of edges connecting nodes across platform boundaries demonstrates the extent to which students' emerging practices

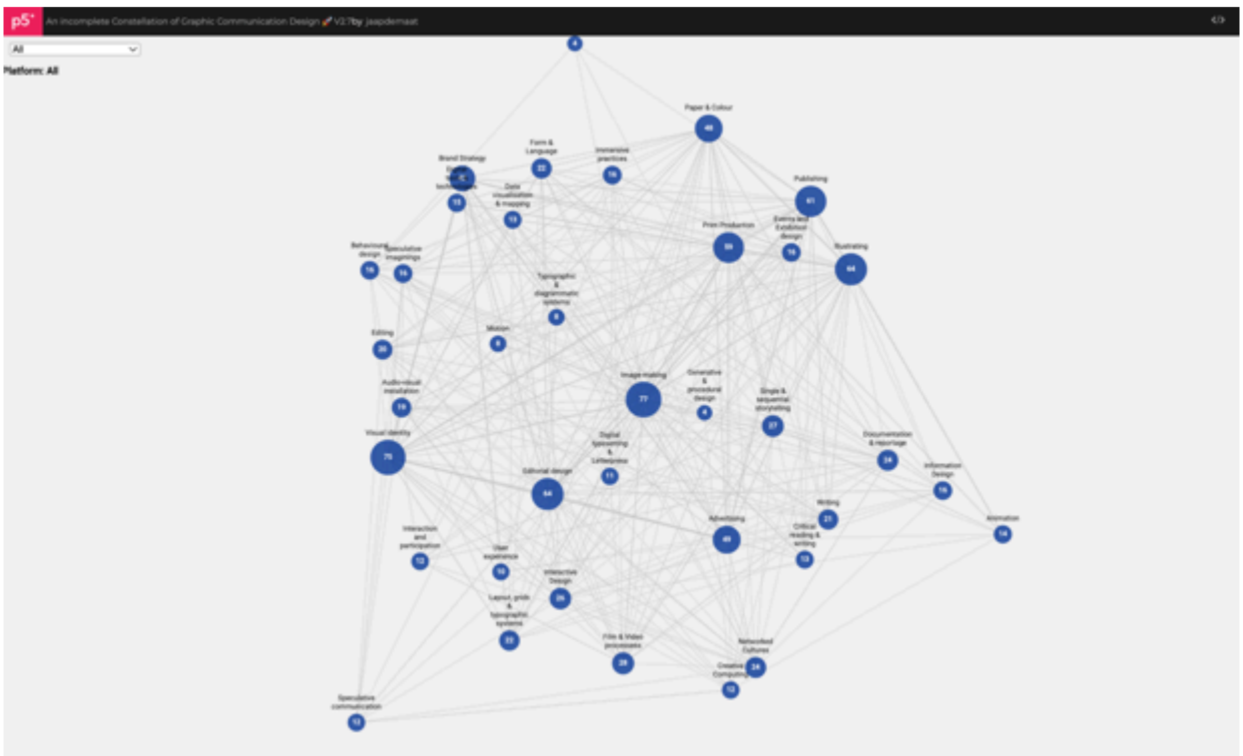
*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

transcend formal curriculum divisions. The iterative semantic analysis was conducted before visualisation, informing how visual patterns were interpreted and providing context for understanding what clusters represent in terms of actual practice development.
In October 2024, the maps were shared with Unit 5 and Unit 6 teaching teams. Tutors confirmed the identified clusters aligned with their observations of student project development. The visualisation revealed cross-platform connections not previously recognised, particularly Strategy & Identity students' engagement with spatial and immersive approaches.

Discussion focused on which keywords students had selected beyond their formally allocated platform boundaries and whether project briefs could better support students' emerging practice interests. These findings directly informed curriculum adjustments: targeted reading lists for identified practice clusters, strategic industry connections aligned with emerging hybrid practices, guest lectures addressing natural student communities rather than formal course divisions.

Figure 2

Force-directed network visualization of student practice keywords



Interactive network graph created using p5.js and d3.js libraries. Node size indicates keyword frequency; edge weight (line thickness) represents co-occurrence strength. [interactive website].

IV. Results: Understanding Student Practice Development

Analysis of one cohort of 150+ students (2024/25) suggest developing communities of practice that appear to transcend formal platform boundaries. These emerging communities reveal natural

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

student affinities that may enable more responsive curriculum development, though implementation questions remain.

4.1 Revealing Unexpected Practice Connections

Computational analysis of student keywords appears to reveal connections that cross established curriculum frameworks, some of which were unexpected. These findings suggest natural student affinities that differ from formal platform boundaries, potentially enabling more responsive curriculum development aligned with authentic practice development needs.

Students appear to bridge formal platform boundaries in ways that weren't anticipated. Analysis of keyword connectivity shows that over 70% of submitted keywords appear across multiple platforms. Concepts such as 'Visual identity,' 'Print Production,' and 'Image-making' demonstrate the highest cross-platform connectivity scores.

Students enrolled in Strategy & Identity platforms demonstrate alignment with installation and immersive practices—connections that weren't anticipated. Similarly, Information & Systems students combine speculative approaches with user experience methods in unexpected ways. These cross-boundary connections suggest students are developing hybrid practices that span traditional curriculum divisions.

This aligns with broader research demonstrating that design students increasingly form hybrid practice interests across formal curriculum boundaries. Studies show up to 80% of curriculum can be delivered through collaborative cross-disciplinary projects that promote "high-quality, pedagogically sound, 'authentic' learning" (Bailey & Smith, 2016). Similarly, Byrne et al. (2022) argue that "cross-trained students in higher education need to be able to creatively respond and adapt to these emerging landscapes" through training that bridges design, architecture, art, interactivity, and computation.

Understanding these organic connections may enable more targeted educational support that enhances rather than replaces existing approaches. This approach might contribute to transforming curriculum delivery from institutional assumptions toward student-centred insights, though careful implementation appears necessary.

4.2 Dynamic Curriculum Responsiveness in Action

The constellation workshop methodology enables ongoing assessment of student community formation, potentially allowing educators to adapt support structures dynamically rather than only relying on static curriculum assumptions. This approach acknowledges that each cohort—comprised of different individuals with varying cultural backgrounds, experiences, and aspirations—appears likely to generate distinct practice communities and collective interests.

Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

This temporal sensitivity may prove crucial for educational responsiveness. Unexpected community formations appear to emerge that weren't anticipated in formal curriculum planning but seem to represent significant student interests requiring specific resources and industry connections. By applying the LLM methodology annually, educators might be able to identify such emergent communities and adapt resources accordingly.
Such adaptive approaches demonstrate how systems can "create a set of quantitative recommendations for each student depending on their individual data" through methodologies that are "flexible to include any number of parameters and their various combinations" (Akbaş et al., 2015).

Understanding these organic connections may enable more targeted educational support that enhances rather than replaces existing approaches. This approach might contribute to transforming curriculum delivery from institutional assumptions toward student-centred insights, though careful implementation appears necessary.

Students within identified communities frequently share references, tools, and resources with peers who share similar interests. These organic exchanges potentially become valuable sources. Student-shared references often represent more current and relevant materials than traditional academic sources. Computational analysis might track these reference-sharing patterns, potentially enabling educators to build reading lists that better reflect authentic student interests and contemporary practice developments.

Table 1

Analysis of the student keyword submissions reveals the frequency and distribution of practice interests across the cohort. Table 1 presents all keywords that matched the official GCD Platforms and Practices vocabulary from the course handbook, showing both selection frequency and cross-platform connectivity.

Keyword	**Handbook Category**	**Selections**	**% of Students**	**Selected by Student Platforms**
print production	Practice: Print Production	26	37.7%	All 5 platforms
visual identity	Platform: Strategy & Identity	18	26.1%	All 5 platforms
advertising	Platform: Strategy & Identity	18	26.1%	4 platforms
image-making	Platform: Narrative & Voice	17	24.6%	All 5 platforms
publishing	Platform: Information & Systems	17	24.6%	4 platforms
editorial design	Practice: Typography	16	23.2%	All 5 platforms
brand strategy	Platform: Strategy & Identity	15	21.7%	3 platforms
illustrating	Platform: Narrative & Voice	14	20.3%	All 5 platforms
paper and colour	Practice: Print Production	12	17.4%	All 5 platforms
layout grids and typographic systems	Practice: Typography	9	13.0%	4 platforms
single and sequential storytelling	Platform: Narrative & Voice	7	10.1%	3 platforms
immersive practices	Platform: Time & Movement	6	8.7%	3 platforms
speculative imaginings	Platform: Narrative & Voice	6	8.7%	2 platforms

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

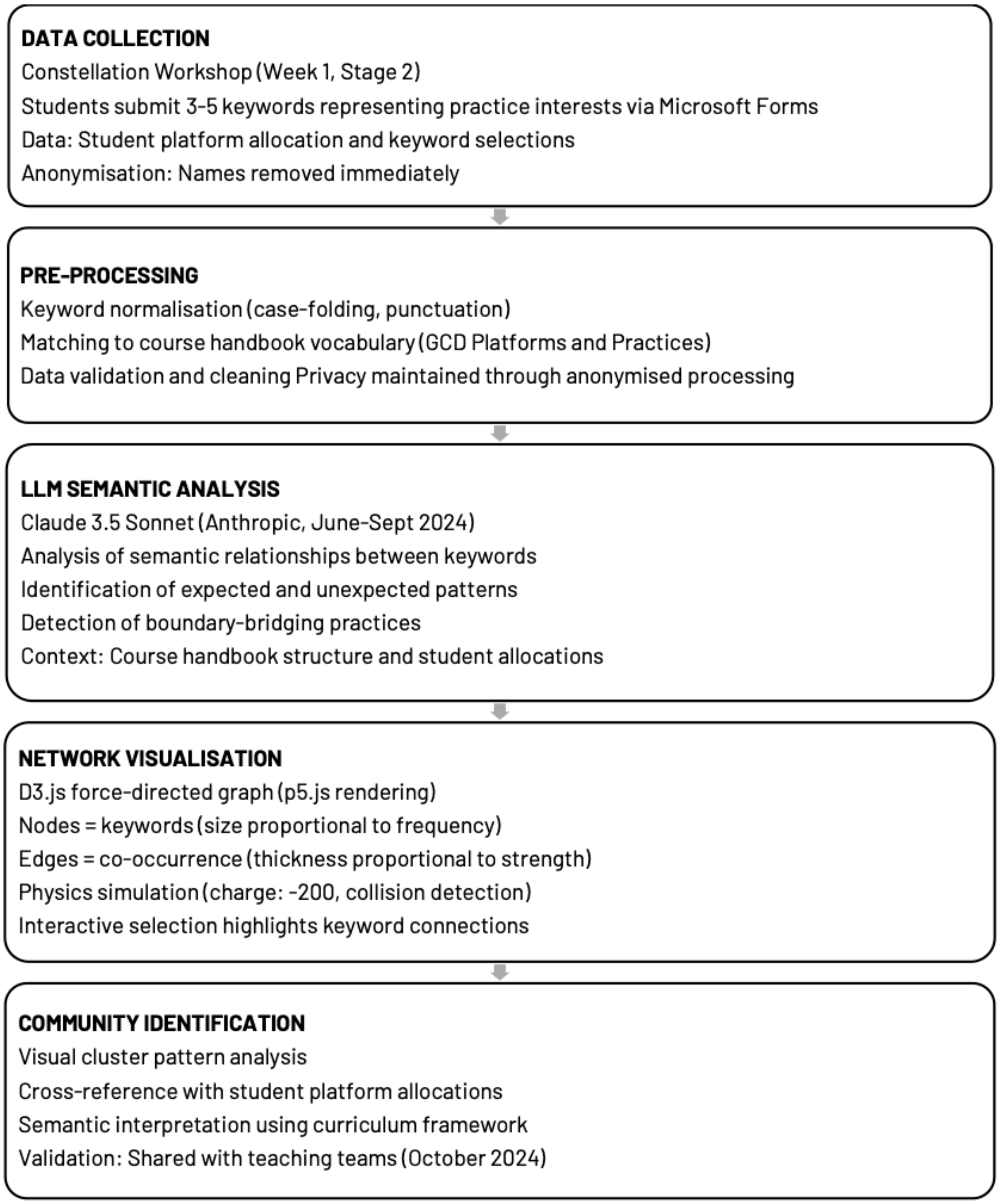
animation	Platform: Time & Movement	6	8.7%	3 platforms
editing	Practice: Lens	6	8.7%	4 platforms
Events and exhibition design	Platform: Experience & Environment	5	7.2%	2 platforms
writing	Practice: Contexts	5	7.2%	3 platforms
digital tools and technologies	Practice: Computation	4	5.8%	3 platforms
film and video processes	Practice: Lens	4	5.8%	4 platforms
speculative communication	Platform: Experience & Environment	4	5.8%	2 platforms
behavioural design	Platform: Strategy & Identity	4	5.8%	2 platforms
audio-visual installation	Platform: Time & Movement	4	5.8%	2 platforms
digital typesetting and letterpress	Practice: Typography	4	5.8%	3 platforms
networked cultures	Practice: Computation	4	5.8%	3 platforms
documentation and reportage	Practice: Lens	4	5.8%	3 platforms
form and language	Practice: Typography	4	5.8%	3 platforms
interaction and participation	Platform: Experience & Environment	3	4.3%	3 platforms
information design	Platform: Information & Systems	3	4.3%	2 platforms
data visualisation and mapping	Platform: Information & Systems	3	4.3%	2 platforms
creative computing	Practice: Computation	3	4.3%	2 platforms
critical reading and writing	Practice: Contexts	2	2.9%	2 platforms
generative and procedural design	Practice: Computation	2	2.9%	Experience & Environment
user experience	Practice: Computation	2	2.9%	2 platforms
motion	Platform: Time & Movement	2	2.9%	2 platforms
typographic and diagrammatic systems	Platform: Information & Systems	1	1.4%	Information & Systems
reflective writing	Practice: Contexts	1	1.4%	Information & Systems

Note: The quantitative analysis demonstrates substantial cross-platform connectivity, with 83.3% of keywords appearing across multiple student platform allocations, exceeding the anticipated 70% threshold. Five keywords appear across all five platforms: print production (37.7%), visual identity (26.1%), image-making (24.6%), editorial design (23.2%), and paper and colour (17.4%). Students selected more Practice keywords (56.2% of total selections) than Platform keywords (43.8%), suggesting that hybrid practices integrate technical skills with conceptual approaches rather than developing within isolated disciplinary boundaries.

Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

Figure 3

Visualises the complete analytical pipeline, from constellation workshop data collection through anonymisation, computational community analysis, network visualisation, and final validation with the teaching team.



Note: Computational analysis pipeline showing the five-stage process: (1) constellation workshop data collection from 150+ anonymised students, (2) pre-processing including keyword normalisation, (3) LLM semantic analysis using Claude 3.5 Sonnet, (4) network visualisation using D3.js force-directed layout, and (5) community identification with teaching team face-validity confirmation. Privacy maintained through anonymised processing at all stages.

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

V. Discussion: From Analysis to Educational Action

5.1 Enabling Targeted Educational Support

Understanding natural communities of practice may enables targeted support aligned with authentic interests. The methodology enabled identification of cross-year communities of practice, potentially allowing strategic support through curriculum design and resource allocation. This approach might facilitate adaptive reading lists specific to community interests, strategic industry connections and relevant guest lectures that could maximise engagement. Research suggests that when such partnerships are structured effectively, "company employees, students and academics work together as co-creators of generative research, the results for the company can be dramatic" (Bailey & Smith, 2016).

5.2 Supporting Individual Development

The methodology reveals students bridging multiple communities. Network analysis shows 'Visual identity' connecting Strategy & Identity students with Experience & Environment students exploring spatial communication. Students enrolled in one platform frequently demonstrate interests that seem to align with different communities, potentially enabling more targeted pastoral support that respects authentic practice development.

5.3 Dynamic Curriculum Responsiveness

Unlike static curriculum frameworks, computational community analysis can be repeated throughout academic progression, potentially revealing how student interests evolve and communities' shift. This approach might enable more dynamic responsiveness—adjusting support structures as communities emerge, merge, or develop new focuses.

The methodology appears to enable course teams to identify cross-year communities of practice and potentially support them more strategically through curriculum design and resource allocation. For instance, recognising the apparent centrality of Visual Identity might prompt the creation of shared workshops across years. Similarly, identifying thematic communities (such as activism) could inform partnership opportunities beyond the classroom.

5.4 Limitations

This approach carries inherent constraints requiring explicit acknowledgement.

5.4.1 Vocabulary Bias and Frame Constraints

The constellation workshop operates within predefined keyword sets, which frame how students represent practice interests. Computational analysis thus reflects student choices within constrained vocabulary rather than fully organic definitions. Keyword submission also depends on individual ability to articulate interests concisely, a capability varying significantly across cohorts. Some students find linguistic expression challenging, particularly those for whom English is not their first language. Future iterations will integrate open-ended workshops inviting student-articulated definitions, enabling richer data reflecting authentic student voice.

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

5.4.2 *Cohort and Demographic Limitations*

This analysis draws from a single Stage 2 cohort (2024/25) within one institution. Findings may not generalise across different cohorts, academic levels, disciplines, or settings. Stage 2 represents a particular developmental moment; earlier or final-year cohorts might reveal different community formations. Cohort composition reflects Central Saint Martins' specific intake and may not represent diverse global populations. Longitudinal validation across multiple consecutive cohorts would clarify whether observed communities represent stable pedagogical phenomena or cohort-specific patterns.

5.4.3 *Model and Semantic Interpretation Bias*

LLM-based semantic analysis is neither theoretically neutral nor assumption-free. Large Language Models encode semantic relationships based on training data, inevitably embedding biases and dominant discourse patterns. LLM outputs are substantially prompt-dependent; alternative prompting strategies may generate different semantic relationships. Domain-specific design education terminology may not be robustly represented in general-purpose training data, potentially leading to subtle misinterpretations. The interpretive layer, where computational outputs are converted into pedagogically meaningful insights, remains subjective and reflects particular perspectives of those reviewing the analysis.

5.4.4 *Visualisation and Spatial Interpretation*

Force-directed network layout appears exploratory rather than analytically definitive. Spatial proximity reflects mathematical layout properties rather than categorical evidence. Layout algorithms are sensitive to initialisation conditions and iteration parameters; different seeds may produce substantially different spatial configurations of identical data. Two-dimensional visualisation compresses high-dimensional semantic relationships. Educators interpreting these visualisations should treat visual clustering as an exploratory tool rather than analytical proof.

5.4.5 *Actionability and Implementation Risk*

Identifying communities computationally does not automatically generate appropriate educational interventions. Over-engineering support structures risks destroying the informality that makes communities pedagogically valuable. Targeting interventions raises ethical questions about student categorisation and potential reinforcement of limiting identity positions. Computational analysis should inform educator decision-making rather than replace it. Implementation requires continuous feedback loops, assessing whether interventions genuinely enhance student experience and iterating based on qualitative student feedback.

VI. Conclusion: Creative Intelligence in Educational Practice

This research suggests how computational tools might enhance educational understanding when designed to serve pedagogical goals. By analysing natural student communities through constellation workshop data, educators may be able to move beyond generic cohort management

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

toward more targeted support aligned with authentic interests. However, the effectiveness of such approaches likely depends on careful implementation that preserves the organic nature of community formation.

Rather than imposing predetermined structures, this approach appears to reveal how students actually perceive their field and connect with peers. The challenge lies in using this understanding to enable more responsive curriculum development without disrupting the natural processes that create these communities.

The approach appears to scale from small cohorts to large student populations, potentially making it applicable across diverse educational contexts. This work positions creative intelligence as collaborative synthesis between computational capability and pedagogical wisdom. The potential for educational innovation appears to lie not in automation replacing human insight, but in technological tools amplifying educator understanding to better serve student development and community formation. To encourage broader adoption of these approaches, all workshop materials and computational code will be made available as open-source resources.

Yet caution appears necessary about over-relying on these tools. Computational analysis approaches are not neutral—they inevitably influence how researchers approach and understand their data. The constellation workshop may favour certain learning styles, and semantic clustering still requires careful pedagogical interpretation to generate meaningful interventions. These considerations suggest that while computational tools offer possibilities for educational understanding, their implementation requires careful attention to preserving the human elements that make learning communities valuable.

Acknowledgment
I wish to thank Laura Knight, Kira Salter, and Andrea Lioy for their critical feedback, support, and thoughtful discussions that substantially improved both the research and the paper. I gratefully acknowledge the 150+ students whose practice submissions formed the foundation of this analysis. I wish to thank CSM Research for supporting this work through internal research funding I wish to thank CSM Research for supporting this work through internal research funding related to the IDR 2025 Conference.

References

Akbaş, M. İ., Basavaraj, P., Georgiopoulos, M., Garibay, Ö., & Garibay, I. (2015). Curriculum GPS: An adaptive curriculum generation and planning system. In Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC) 2015, Paper No. 15369.

Bailey, M., & Smith, N. (2016). Making it work; integrated academic practice. In 20th DMI: Academic Design Management Conference Inflection Point: Design Research Meets Design Practice, Boston, USA, 22-29 July 2016.

Byrne, D., El-Zanfaly, D., Rosenberg Munoz, D., Peters, D., & Scupelli, P. (2022). Here and There, Now and Then: Creativity, Design and Instruction for Hybrid Environments. In Creativity and Cognition (C&C '22), June 20–23, 2022, Venice, Italy. ACM, New York, NY, USA. https://doi.org/10.1145/3527927.3531208

Eames Office (1977) Powers of Ten. Film. Available at: https://www.youtube.com/watch?v=0fKBhvDjuy0 (Accessed: 25.10.2025)

**Contact: Phone +44-7511502065*
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3

European Commission (2016) Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons regarding the processing of personal data and on the free movement of such data. OJ L 119, 4.5.2016, pp. 1–88.
Lave, J., & Wenger, E. (1991). Situated Learning: Legitimate Peripheral Participation. Cambridge, MA: Cambridge University Press.
Parker, M. J., Anderson, C., Stone, C., & Oh, Y. (2024). A Large Language Model Approach to Educational Survey Feedback Analysis. International Journal of Artificial Intelligence in Education.
Salter, K. (2017). Research through practice: Positioning statement. Central Saint Martins, University of the Arts London.
Shah, M., & Pabel, A. (2019). Making the student voice count: Using qualitative student feedback to enhance the student experience. Journal of Applied Research in Higher Education, 12(2), 194-209. https://doi.org/10.1108/JARHE-02-2019-0030
Shaik, T., Tao, X., Li, Y., Dann, C., McDonald, J., Redmond, P., & Galligan, L. (2022). A Review of the Trends and Challenges in Adopting Natural Language Processing Methods for Education Feedback Analysis. IEEE Access, 10, 56720-56739. https://doi.org/10.1109/ACCESS.2022.3177752
University of the Arts London (2014) Research Data Management Planning Procedures. Annex A. Available at: https://www.arts.ac.uk/research/research-standards-and-ethics (Accessed: 25.10.2025).
University of the Arts London (2020) Code of Practice on Research Ethics. October 2020. Available at: https://www.arts.ac.uk/research/research-standards-and-ethics (Accessed: 25.10.2025).
University of the Arts London (2024) BA (Hons) Graphic Communication Design Course Handbook 2024/25. Unpublished institutional document.

*Contact: Phone +44-7511502065
DOI: https://doi.org/10.31705/IDR.v2(2).2025.3