Humanising the Timetabling Process: A Human-Centred Design Exploration of Tensions Between Institutional Priorities and Student Experience in UK Higher Education

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1. Introduction and rationale

Timetabling in higher education is commonly framed as an administrative and technical activity concerned with the efficient allocation of people, spaces, and time (Burke and Petrovic, 2002; McCollum, 2007). Within both institutional practice and much of the existing literature, timetabling is primarily conceptualised as a logistical problem to be optimised through digital systems and algorithmic solutions (Oude Vrielink *et al.*, 2019). While such approaches are operationally important, they tend to overlook how timetables shape the everyday experiences of students and staff (McCollum, 2007; Page, Forster-Wilkins and Bonetzky, 2021).

In practice, timetabling plays a central role in structuring how students learn and engage, how academic staff teach, and how professional services interact across institutional boundaries (Trigos and Coronel, 2023). Positioned at the intersection of institutional strategy, operational systems, and lived experience, timetabling reflects wider organisational tensions, including efficiency versus empathy and standardisation versus flexibility (Lindahl *et al.*, 2018). Despite its significance, the human and relational dimensions of timetabling remain under-examined within higher education research (Oude Vrielink *et al.*, 2019; Chen *et al.*, 2021b).

This study addresses this gap by exploring higher education timetabling through a human-centred design perspective. Rather than treating timetabling solely as a technical workflow, the research conceptualises it as a socio-organisational practice through which institutional priorities, culture, and values are enacted. By foregrounding the experiences of staff and students within a UK university context, the study examines how more empathetic and participatory approaches to timetabling might support both operational effectiveness and student experience.

2. Research aim and questions

The aim of this study is to explore how human-centred design principles can inform the humanisation of higher education timetabling by addressing tensions between facilities management priorities and student experience needs within a UK university context. Moving beyond efficiency-led conceptions of timetabling, the study examines how organisational culture, collaboration, and digital technologies shape how timetabling is experienced by staff and students.

The research investigates stakeholder experiences of timetabling and the organisational and technological factors that influence decision-making and collaboration. It is guided by the following questions: how timetabling is experienced by staff and students; what organisational and technological factors shape timetabling practices; and how human-centred design principles can be applied to address persistent tensions within timetabling processes.

3. Literature Review

Research on timetabling in higher education has predominantly conceptualised scheduling as a complex combinatorial optimisation problem, shaped by operations research and artificial intelligence traditions (Abdipoor *et al.*, 2023). This literature frames the University Course Timetabling Problem (UCTP) as a technical challenge concerned with feasibility, constraint satisfaction, and efficiency, leading to significant advances in algorithmic approaches and commercial scheduling systems (Ceschia, Di Gaspero and Schaerf, 2023). Metaheuristic methods continue to reinforce efficiency, space utilisation,

and performance metrics as primary indicators of successful timetabling (Bashab *et al.*, 2020; Abdipoor *et al.*, 2023)

This dominant framing has been criticised for its limited engagement with the social and organisational realities of higher education institutions (Oude Vrielink *et al.*, 2019; Trigos and Coronel, 2023). Reviews note a gap between theoretically optimal models and institutional practice, with limited uptake attributed to abstraction from organisational context and the marginalisation of human preferences, negotiation, and professional judgement (Trigos and Coronel, 2023). Timetabling is increasingly recognised as shaped by organisational culture, relationships, power dynamics, and competing stakeholder priorities, rather than as a neutral or purely technical process (Trigos and Coronel, 2023).

Parallel scholarship on student experience and engagement further challenges optimisation-led approaches. Research demonstrates that timetable structures influence attendance, wellbeing, engagement, and equity, particularly for students balancing work, caring responsibilities, disability, or commuting (Larabi-Marie-Sainte *et al.*, 2021; Page, Forster-Wilkins and Bonetzky, 2021). Despite this evidence, student experience considerations remain marginal within most timetabling models, which continue to prioritise feasibility and efficiency over flexibility, accessibility, and lived experience (Ghaffar *et al.*, 2025)

Human-centred design offers an alternative perspective by foregrounding empathy, participation, and user experience in the design of complex systems (Göttgens and Oertelt-Prigione, 2021). While established within service design and organisational innovation, its application to administrative and operational processes in higher education remains limited (Patrício, Gomide and Rocha, 2023). Organisational research further frames timetabling as a socio-technical practice characterised by enduring tensions, such as efficiency versus empathy and centralisation versus flexibility, which cannot be resolved through technical optimisation alone but must be managed within institutional contexts (Oude Vrielink *et al.*, 2019).

4. Theoretical basis

This study is informed primarily by a human-centred design perspective, which foregrounds empathy, participation, and lived experience in the design and improvement of organisational processes (Göttgens and Oertelt-Prigione, 2021). Human-centred design is well suited to complex institutional contexts such as universities, where multiple stakeholders and competing priorities shape how systems are enacted in practice (Van der Bijl-Brouwer and Price, 2021).

This perspective is complemented by organisational research that conceptualises timetabling as a socio-organisational practice shaped by institutional logics, professional roles, and enduring tensions, including efficiency versus empathy and standardisation versus flexibility (Larabi-Marie-Sainte et al., 2021). Together, these perspectives frame timetabling as a relational and experiential process and provide a theoretical basis for exploring how human-centred approaches might support more collaborative and inclusive organisational change in higher education (Oude Vrielink et al., 2019; Trigos and Coronel, 2023).

5. Research design and methodology

The study adopts a qualitative, interpretivist research design consistent with the aims of a professional doctorate and the exploratory focus of the research. It is framed as a case-based enquiry within a UK university, enabling in-depth examination of timetabling as an organisational and socio-technical practice. Data generation is expected to involve semi-structured interviews with facilities management and timetabling staff, academic staff, and students, alongside focus groups and documentary analysis of timetabling policies, processes, and digital systems. Data will be analysed using reflexive thematic analysis (Braun and Clarke, 2006), with human-centred design principles used as an analytical lens to foreground empathy, participation, and lived experience in interpretation.

6. Relevance and practical importance

This study has practical relevance for higher education institutions seeking to balance operational efficiency with an enhanced student experience. By foregrounding the human, relational, and cultural

dimensions of timetabling, it challenges the assumption that scheduling is a neutral or purely technical activity and highlights how timetabling decisions shape everyday experiences for students and staff. The findings are expected to support university leaders and operational teams in identifying misalignments between policy, digital systems, and lived experience, and in developing more empathetic and collaborative timetabling practices within existing operational constraints. Although based in a single UK university, the challenges examined are widely shared across the sector, giving the study broader relevance for institutions managing complex administrative processes.

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