

FACILITATING MULTIDISCIPLINARYITY WHEN DESIGNING HEALTHCARE SERVICES WITH DIVERSE STAKEHOLDERS

Louise KIERNAN, Ayuko YOSHIDA and Manu THUNDATILL
University of Limerick, Ireland

ABSTRACT

This paper examines how disciplinary diversity enriches learning and innovation in design education through healthcare-based design research projects. Three multidisciplinary service design projects brought together students from engineering, business, design, medicine, nursing, pharmacy, and dentistry to address complex, real-world challenges: improving access and awareness at a community health centre; redesigning user and staff experiences in a congested hospital reception area; and improving medication transfer processes between hospital pharmacies and wards to reduce errors and increase efficiency. An iterative research and design process engaged healthcare stakeholders through observations, interviews, and co-creation activities. Using a qualitative case-study approach, student reflections, tutor observations, and project outputs were analysed to identify key themes in multidisciplinary collaboration. Findings reveal both benefits and tensions arising from disciplinary, cultural, and linguistic diversity. Complementary expertise supported systems thinking, empathy, and solution development, while challenges emerged around communication, ambiguity in open-ended briefs, unequal contributions, and assessment fairness. Service design tools—particularly journey mapping, collaborative digital platforms, and low-fidelity prototyping—functioned as boundary objects that facilitated shared understanding among diverse stakeholders. However, differences in prior design skills and the use of AI-generated representations introduced additional pedagogical and assessment complexities. The paper concludes that multidisciplinary healthcare design projects provide a powerful learning environment for developing critical capabilities such as navigating ambiguity, engaging stakeholders, and reflective collaboration. It highlights the need for clearer process orientation, targeted communication support, and robust assessment frameworks, offering practical insights for educators designing inclusive, real-world healthcare design learning experiences.

Keywords: Interdisciplinary design teams, service design, design for healthcare

1 INTRODUCTION

Design education is increasingly focused on preparing graduates to address complex healthcare challenges that cut across clinical practice, service delivery, technology, organisational systems, and patient experience. Healthcare design problems are rarely contained within a single discipline; instead, they require collaboration between designers, engineers, healthcare professionals, and managers to balance human-centred care, regulatory constraints, operational workflows, and technical feasibility. In response, design education has increasingly adopted multidisciplinary, project-based approaches that immerse students in real healthcare contexts, enabling direct engagement with patients, frontline staff, and senior decision-makers [1].

Research in healthcare design education demonstrates that multidisciplinary projects improve students' ability to frame ill-defined problems, surface latent needs, and negotiate competing stakeholder priorities [1,2]. Programmes incorporating service design methods—such as journey mapping, stakeholder co-creation, and service blueprints—have proven particularly effective in healthcare contexts, where such tools support shared understanding and alignment across diverse professional groups [3]. Within educational settings, these methods act as boundary objects, enabling students to translate ethnographic insights into service-level interventions while navigating the complexity of healthcare systems [4].

However, prior work also highlights persistent challenges in multidisciplinary healthcare design education. Differences in professional language, disciplinary norms, tolerance for ambiguity, and levels of prior design skill can hinder collaboration, particularly when clinically trained students encounter exploratory and iterative design processes [5]. Assessment fairness and facilitation workload further complicate these projects, especially when they involve external healthcare partners and live service constraints [6]. Despite these challenges, healthcare remains a powerful pedagogical context for developing systems thinking, empathy, and reflective collaboration [7].

Within this context, the present paper examines three multidisciplinary healthcare-based design research projects conducted within a postgraduate design-for-healthcare programme. It investigates how disciplinary diversity influences collaboration, the use of design tools, stakeholder engagement, and learning outcomes. By analysing both the benefits and tensions that emerge in authentic healthcare projects, the paper contributes practical insights for educators designing multidisciplinary learning experiences intended to prepare graduates to co-create inclusive, and feasible healthcare services.

2 METHOD

Three interdisciplinary team projects on an MSc in design for healthcare are evaluated. All students were divided across the three projects which ran over two modules. The first six weeks was spent on uncovering needs in a healthcare setting (module 1) and the second six weeks involved ideating solutions to those needs (module 2). The students, all co-located spent two to three days over three weeks conducting the primary research which involved observations of service users and staff interacting with the processes along with interviews with management and staff. Outside of this time the students were conducting secondary research and analysing their findings. Mid stage reviews were conducted at both the research and ideation phase of the project with the collaboration partner. Students submitted a project process book for each stage of the project which included one to two paragraphs of their reflections on the process. All field visits were facilitated by one of two design tutors as well as the studio classes. The Tutor field notes also contributed to observations of the students' progress. Table 1 provides further details on the project and the disciplinary backgrounds of the students and participants.

Table 1. Case study descriptions and research approaches

	Project	Disciplinary and country of origin of team members	Disciplinary background of research participants
1	To improve access and user experience at a health centre with services including GP visits, occupational therapy, physiotherapy, speech therapy and dental care. The students focused on access to the site with signage, website, and social media. Space was also reimagined.	Team of six with: 1 nursing - Africa 1 Pharmaceutical engineering, - China 1 Mechanical engineering - Brazil 1 Hospital and Health Systems management - India 1 Industrial engineer - Ireland 1 marketing consultancy - Ireland	Community Healthcare Network Manager, Staff officer, Receptionist Nurses, Physiotherapist Speech therapist Occupational therapist, Smoking cessation consultant
2	To improve the user experience for users navigating the reception area of a local hospital with a focus on: privacy, congestion, a multitude of functions and balancing customer facing tasks with other administration. The students focused on new space layout, redirecting service flows, signage and a new café space	Team of 4 with: 1 nursing - Ireland 1 Product Design - Ireland 1 Dentistry - India 1 Biotechnology - India	Nurse and Quality and Patient Safety Facilitator Nurse manager Hospital CEO Senior hospital manager Receptionists Porter Nurses
3	To improve the pharmaceutical processes and journey of delivering medicines from the hospital pharmacy to the wards and delivery to the patient. The students focused on solutions to prevent error in prescription transcribing, error prevention and	Team of 4 with: 2 Pharmacy - India 1 clinical Pharmacy- India 1 Dentistry - Africa	Hospital senior manager Chief pharmacist Senior pharmacist Pharmaceutical technician Porter Ward Nurse Nurse manager

	dedicated medicine management at the patient bedside		
--	--	--	--

3 FINDINGS

Eight themes were identified in relation to interdisciplinary collaboration with multiple stakeholders:

Language and cultural differences

Language and cultural barriers were challenges to varying degrees amongst the students. This had a number of positive and negative impacts. During the research phase of the project in particular the students most impacted tended to rely on other team members to conduct the primary research such as approaching people and conducting interviews when on location doing the field research. The projects also relied heavily on the tutoring staff to manage the partnerships, direct the primary research along with fluent English-speaking students to take the lead on communication.

“I was able to support Alex, you know, where he was lacking in a language challenge or a cultural challenge of that type of understanding.” Team1

While this maximized efficiency with shared data, it created an inequality around the student workload and made grading difficult for staff as the submission was an individual assignment. Presentations back to the partners were also challenging and these students relied on visuals and models to explain both the research and ideas. On one project the client was pitching for funding and requested to have a fluent English speaker to present on behalf of the project which elevated that student’s profile while potentially disadvantaging the other non-native English-speaking students. One advantage of the diversity of the teams was that they worked closely and supported one another.

“I know she struggled a little bit to communicate as well, so we kind of did empathise with her that it's like coming from her background would be very difficult.” Team1

Confidence in speaking was another aspect of the ability to communicate and by the end of the project through other students support this student became more able to communicate in English.

Complementary expertise from diverse disciplines

Placing the students in teams meant that they could learn from each other’s diverse knowledge and skills.

“But then, likewise, vice versa, I've probably learned how to approach work and projects, you know, from an engineering background also.” Team1

The pharmacy team were a group of healthcare professionals but really valued the sharing of the expertise of each other.

“A is a pharmacist, there were a lot of things that I didn't know from that end, like I would understand things from the doctor and nurse's end but like he provided so much insight. B as well-being a dentist like it was nice to have a group of diverse professions.” Team 3

While the healthcare professional’s expertise was really valued during the research phase the solution generation phase was a steep learning curve for them and they in turn relied heavily on the design and engineering disciplines on the teams.

“Like C has the product design and she's like amazing, it's really nice to see. And I think the mixture of the group is nice to see people with skills like that.” Team 2

The teams were encouraged to brainstorm together and that drew upon different experiences, approaches and modes of thinking in a complimentary manner.

“When we did the group brainstorm where we all had our sheets and then passed them on and then you've got clinical experience that I don't have so that's like a really nice perspective and then you can sort of bounce ideas off each other and kind of debate it out, like sort of say like, oh, what if this, why would this be bad? And then like by sort of saying all the way something won't work, you can kind of come to an idea that might help or not.” Team 2

Ambiguity of open briefs & need for clearer orientation / process mapping at the outset

During the ideation phase it became clear that the students with healthcare backgrounds struggled with ambiguity and the openness of the brief. Their disciplines had trained them to be systematic logical thinkers where one solution was sought for quickly to solve a problem. This was at odds with the design approach of exploration and iteration and the alteration of divergent and convergent thinking. They were not used to challenging the status quo but were used to sticking with strict rules and guidelines.

“I think in my experience I'm so used to working with limitations and very strict limitations and there are only so many options and the process is very clear and with this it's almost like give me some rules, give me some limitations because are we allowed? Can I think like that? Am I allowed?” Team 2

In contrast those with both design and engineering backgrounds embraced the need for exploration and iteration

“When you go out in industry, my own experience is that you'd be dealing with ambiguity all the time. So, like one thing that, like on reflection on this, like this project compared to other academic projects I would have done for the undergrad, this is probably the closest to what it would be like to do an actual project out in industry. Because sometimes you get given no brief at all in the industry.” Team 1

Through practice and close facilitation by staff and peers, the healthcare students began to appreciate the design approach.

“My background is very structured and formal, and things are a certain way, and you know this immersion has really tested that and stretched that in so many ways, especially the ideation stage. There were many times, where I was stumped on a lot of things and I just had to like to shut my brain down and restart to like to give myself the chance to explore outside of what I've always known” Team 3

However, to support all students in the process the students felt it would have been helpful for them to have clearer mapping of the process from the outset so that they could be better prepared. They stated that a small taster project in advance of the project that hit on the milestones would have prepared them better for this project.

Acquisition of new skills; Use & limits of design tools

Several tools helped with communication, the ability to capture data, understand the issues and generate and communicate solutions. Miro was a very useful tool to leverage off the diversity of the groups, to share and organize material, pool ideas and educate those new to the process.

“Miro, I really liked it. It's easier to put your thoughts, whatever you're thinking. Later, you can just come and organize them, I think Miro's the best thing for group work for just like dumping out all the work you're doing as a group and annotating every idea.” Team 2

Journey mapping was a powerful tool during the research phase to visualize the research and identify pain points along a service system flow. They were also a jumping off point for idea generation.

“We made journey maps, so we find that each and every small step matters. It's very important. It's like a branching kind of thing. We'll find multiple problems and their solutions and ideas. So, it's like a good thing to have this kind of thinking. It's like you'll think broadly.” Team 3

These were printed out in full scale and discussed in person with the partners to confirm the service flow and the ruling out of assumptions and biases. Another advantage of the journey maps was that when left in situ other stakeholders who were not available during the interviews could add to them at another

time with sticky notes to confirm the research and propose ideas. Brainstorming on sticky notes was as already outlined was a good means of leveraging the diversity of the teams, however many of the students new to the process needed staff facilitation to think divergently and generate multiple ideas. The students tended to settle for limited ideas and required the experience of tutors to support the fluency of ideas. There was a strong learning curve for the students that did not have design representation skills and in service design projects there are multiple methods to convey solutions creating a further demand.

“My design skills are really lacking and being able to interpret ideas visually is like a real barrier for me and like the affinity classes and the sketching and all those, like it's really nice to have access to those. But I think like in hindsight, I mean, it's easy to say you should have or whatever. I feel like I should have maybe put more kind of emphasis on like the practical skills for myself that would help me interpret things like to be able to visually explain things a bit easier.” Team 2

One notable difference between those with design backgrounds and those that didn't was that the non-designers relied much more on AI but managed to create some reasonable representations. The students were facilitated to learn both Affinity and Procreate to help with story boarding and line work and Figma to create UI solutions. Many of the students created line work over photos to represent their ideas which helped with communication. The non design background students were slow to prototype and build models and did so only when they were prompted by tutors to do so. These models, while low fidelity, were helpful to explain and discuss solutions with the clients and were created to explain both space and product solutions. However, the use of AI and the variation in design skills amongst the team members created challenges for staff in the grading of the projects. A further variable in the grading was to consider if students who produced reasonable representations using AI deserved higher or similar grades to someone who tried design tools but produced less polished results. Equally the students from a design background deserve higher marks because they had those skills at the beginning of the project. Students were required to disclose all tools used in the project and produce a process book of every aspect of the project including AI prompts.



Figure 1. Journey maps, AI storyboarding and Procreate sketching over a photograph

Communication & rapport with stakeholders

The ability of the teams to communicate with the stakeholders varied. The pharmacy project was the most difficult one as it involved observing and interviewing frontline staff in a busy clinical area from the pharmacy dispensary to the ward. The fact that most of the students were from healthcare backgrounds helped them to achieve a rapport with the hospital staff in trusting their understanding of the problems. One of the students had worked as a clinical pharmacist previously in a hospital so he was able to compare practices in pharmacies in Indian hospitals with the chief pharmacist. Hospital environments are multicultural, so diversity of nationality was very normal and accepted.

However, due to the pace of the work at times it was difficult to get the attention of frontline staff and observations worked best when they were too busy to respond to questioning.

“She couldn't answer all the questions, but we were just following her. And she was going on getting the medications.” Team 3

The students found that it was often those that were not frontline staff who also had a lot of knowledge and information about the entire service system.

“So, I was with the porter for the most part and there was a plethora of information that I was able to get from him that I probably wouldn't have otherwise gotten from the chief pharmacist who was busy or the nurses, but he knew so much about everything.” Team 3

4 CONCLUSIONS

This study demonstrates that embedding multidisciplinary, healthcare-based design projects within design education meaningfully enriches student learning and innovation. Diversity in disciplinary, professional, and cultural backgrounds introduced challenges—particularly in communication, managing ambiguity, and assessment—but these tensions also acted as catalysts for reflection, skill development, and collaborative growth. Healthcare contexts, characterised by complexity and diverse stakeholder groups, provided an authentic environment in which students were required to negotiate human, organisational, and technical considerations, effectively preparing them to address real-world societal challenges. The findings indicate a need for institutional-level support to address language and communication barriers, ensuring that students with English language difficulties are supported without overburdening peers. Multidisciplinary teamwork proved highly effective for sharing disciplinary knowledge and delivering coherent outcomes for external partners; however, individual assessment structures are better suited to addressing imbalances in team contribution and ensuring fairness. Students from non-design backgrounds benefited from clearer orientation to design processes and short preparatory projects that introduce both design skills and design modes of thinking. Many such disciplines are not accustomed to alternating between divergent and convergent thinking, making explicit process scaffolding essential. Service design tools such as journey mapping and collaborative platforms supported all students, while advanced design tools and prototyping presented a steep learning curve for non-designers. AI-enabled visualisation tools helped bridge this gap but introduced additional complexities for assessment. Overall, the study highlights the importance of emphasising critical thinking, problem framing, and decision-making over technical design polish. Further research is required to develop robust assessment frameworks that fairly reflect learning across diverse disciplinary backgrounds, while careful tutor facilitation remains essential to the success of externally engaged healthcare design projects.

REFERENCES

- [1] Blandford A., Gibbs J., Newhouse N., Perski O., Singh A. and Murray E. Seven lessons for interdisciplinary research on interactive digital health interventions. *Digital Health*, 2020, 6, 1–13. <https://doi.org/10.1177/2055207619897495>.
- [2] Patrício L., Fisk R. P., Falcão e Cunha J. and Constantine L. Multilevel service design: From customer value constellation to service experience blueprinting. *Journal of Service Research*, 2011, 14(2), 180–200. <https://doi.org/10.1177/1094670511401901>.
- [3] Stickdorn M., Lawrence A., Hormess M. and Schneider J. *This Is Service Design Doing: Applying Service Design Thinking in the Real World*. O'Reilly Media, Sebastopol, CA, 2021.
- [4] Bucolo S. and Wrigley C. Design-led innovation in complex healthcare systems: The role of visual artefacts as boundary objects. *Design Studies*, 2023, 84, 101147. <https://doi.org/10.1016/j.destud.2022.101147>
- [5] Kolmos A., de Graaff E. and Du X. Diversity of problem-based learning in engineering education: Curriculum, cases and cultures. *European Journal of Engineering Education*, 2020, 45(2), 1–17. <https://doi.org/10.1080/03043797.2019.1707637>.
- [6] Lauff C. A., Kotys-Schwartz D. and Rentschler M. E. What is a good stakeholder? Understanding stakeholder influence in design education. *Design Studies*, 2021, 74, 101012. <https://doi.org/10.1016/j.destud.2021.101012>.
- [7] Norman D. A. and Stappers P. J. DesignX: Complex sociotechnical systems. *She Ji: The Journal of Design, Economics, and Innovation*, 2016, 1(2), 83–106. <https://doi.org/10.1016/j.sheji.2016.01.002>