

The application of the Danish Four-Space Model to the Irish academic environment: a case study

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Abstract

This qualitative study examines the applicability of the Danish four-space model for public libraries to the Irish academic landscape, using Dublin City University's Cregan Library as a case study. The model, comprising four overlapping library spaces - inspiration, learning, meeting and performative, embodies an inclusive and participatory ethos that aligns with the foundational principles governing the public library. The central argument of this project is that academic libraries must follow the example set by their public library counterparts, transforming into dynamic multi-dimensional spaces where students can learn, collaborate, create and perform. To fully serve their communities, academic libraries must provide a holistic user experience. The research design, incorporating student interviews, utilises two forms of photo elicitation - participant-driven and researcher-driven. Such a methodology captures students' perceptions of and interactions with the physical spaces of Cregan Library, while images of European public libraries prompt discussions on effective design elements and provide useful comparison with the case study site. The findings and subsequent recommendations emphasise the necessity for libraries, be they public or academic, to engage in meaningful dialogue with their users and foster an environment that is safe, welcoming and conducive to their diverse needs. The four-space model's commitment to active engagement and a user-centred design offers a valuable framework for any library considering a redevelopment of their physical spaces.

Keywords

Four-space model, academic library, public library, design, photo elicitation, user experience

1. Introduction

Academic libraries are at the forefront of students' learning experience. Traditionally, they have provided quiet study space, access to collections and the expertise of librarians. In the last decade, there has been a discernible shift to the digital arena and a new emphasis on collaborative learning. The academic library is now a facilitator, providing an environment conducive to multimodal learning. University librarians, in consultation with stakeholders, must reflect on how their physical space is utilised and how best to engage with the student population.

Public libraries, however, are rising to the social and economic challenges of the age and embracing 'concepts such as user-participation, user-involvement, user-driven innovation and co-creation' (Jochumsen, Skot-Hansen and Hvenegaard Rasmussen 2017 p. 512). Many public libraries bear more of a resemblance to community hubs than traditional libraries. This is most notably evident in the Nordic countries, which have embraced the Danish designed four-space model.

This research aims to explore whether the four-space model can be adapted to the needs of an Irish academic library. Despite its emphasis on physical design, the model fundamentally speaks to the ethos of social inclusivity at the heart of the public library and the affirmative manner in which it engages with users. It is through this orienting lens that the project will address the suitability of the model in the Irish academic context.

In terms of the literature, the model is most frequently applied to the public library. Diamond (2020), for example, explores creative spaces in Dublin's public libraries based on the four-space model, while Jochumsen, Skot-Hansen and Hvenegaard Rasmussen (2017) focus attention on performative spaces in the public library. Kawamoto and Koizumi (2023) and Cordeo et al. (2021) reference the model in relation to the public libraries of Japan and Chile respectively. Whilst there is an abundance of interdisciplinary literature exploring the use of space and design and the student experience in the academic environment, as will be explored in the literature review, little work (Leung et al. 2021) has been carried out on the use of the model in an academic context.

1.1 Research Questions

The working hypothesis is that the four-space model may provide an effective framework from which to evaluate space development, library design and student experience in an Irish academic context utilising Dublin City University's Cregan Library as a case study. Its central thesis rests on the belief that the approach taken by our Nordic public library counterparts represents the direction that all libraries must follow in order to stay at the forefront of information provision and learning. It is envisioned that the accompanying recommendations will provide valuable insight for academic libraries.

The study will explore the emergence of the model, discussion of each component and the ethos behind the vision. Moreover, the changing face of the Irish public library will be considered with recent initiatives illustrating the increasing similarities between the Irish and Nordic public library systems. Academic libraries, due to budgeting constraints and stakeholder needs, are often a step behind when it comes to shifting ideology and responding to societal cues. This is where this work will be of benefit as it explores the intersection between the public and the academic, illustrating the need to actively encourage user-participation to create a new vision of the academic library.

1.2 Aims and Objectives

In summary, the following key objectives have been identified:

- 1) Provide an overview of each aspect of the four-space model
- 2) Explore how the model can inform library strategy to create a holistic user-focused experience
- 3) Evaluate the transferability of the model to an academic library using case study methodology
- 4) Investigate student use of and reaction to the physical space through photo elicitation interviews
- 5) Examine the design and architectural features of successful library buildings
- 6) Develop a checklist of recommendations for academic libraries

1.3 A Theoretical Lens: The Four Space Model

In 2010, a public libraries committee was tasked with preparing a report for the Danish Ministry of Culture on whether a new model for the 'public library's role in the knowledge society' was needed (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2012 p. 586). The committee investigated how the public library system could best support the Danish globalisation strategy. The resulting model, developed by Henrik Jochumsen, Casper Hvenegaard Rasmussen and Dorte Skot-Hansen from the Royal School of Library and Information Science in Copenhagen, was presented and quickly gained traction.

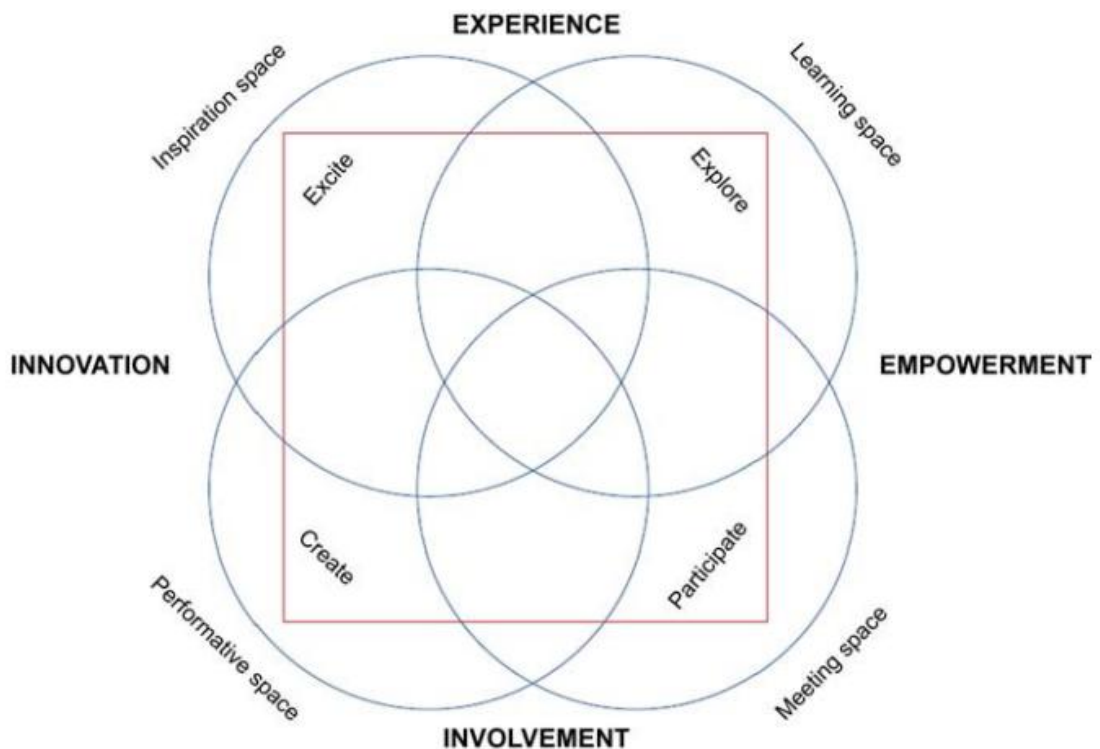


Figure 1: JOCHUMSEN, H., HVENEGAARD RASMUSSEN, C., and SKOT-HANSEN, D., 2012. The four spaces - a new model for the public library. *New Library World*, 113(11/12), p. 589.

The model built upon the work of British architect Brian Edwards and the American Library Association's vision for the modern public library (Levien 2011). It was also borne out of Skot-Hansen's earlier model, which identified four aspects of the library's role within the community: cultural centre, knowledge centre, social centre, and information centre. The resulting four-space model identifies four overlapping spaces:

- Inspiration space
- Learning space
- Meeting space
- Performative space

Moreover, these 'spaces' support the following goals:

- Experience
- Involvement
- Empowerment
- Innovation

The first two relate to the individual's quest for belonging in society while the latter two represent societal goals. Empowerment drives the development of autonomous citizens, while innovation urges problem-solving and creativity; both are fundamental for success in the global economy. The contemporary library should provide space both physically and virtually for learning, interaction, creativity and new experiences. As the authors explain,

The four spaces are not to be seen as concrete "rooms" in a physical sense, but rather as possibilities that can be fulfilled both in the physical library and in cyberspace. In an ideal library these four spaces will support each other, and thereby support the library's objectives. The overall task is to make all four spaces interact by incorporating them in the library's

architecture, design, services, programs and choices of partnerships (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2012 p. 590).

1.3.1 Inspiration Space

This is the space where meaningful experiences take place and is most closely aligned with personal experience and innovation. With the rapid proliferation of the so-called 'experience society' and our insatiable consumption of culture, libraries find themselves in competition with book shops and cafes. As Thorhauge posits, "the city is no longer planned to provide conditions for a high industrial productivity but rather [...] for human creativity and innovation as these forces are the drivers in the new economic development" (2013 p. 5). Examples of inspiration spaces include the library in the Danish city of Hjørring with its red ribbon installation and the Oodi Central Library in Helsinki with its myriad of gaming spaces.

1.3.2 Learning Space

This fulfils the most traditional function of the library and supports the goals of experience and empowerment. Adults and children can come to the library to learn through free access to knowledge. The younger generation is attracted to hands-on participation and collaboration via real-world and digital interactions. A key concern of the Danish report on libraries (2010) was to support Denmark's globalisation plan by shaping a population capable of withstanding the pressures of a post-industrial age through the promotion of learning, creativity and innovation.

1.3.3 Meeting Space

The meeting space serves as an intermediary between home and work, a 'third place' where people can meet others. Meetings can be casual or formal and take place in the physical or virtual realm, underpinning the objectives of empowerment and involvement. Amsterdam's OBA Library provides a fitting example of an ideal meeting point, facilitating serendipitous encounters as well as serving as a venue for public debate.

1.3.4 Performative Space

Here users can create artistic outputs in workshops and makerspaces, aided by new technology and supported by mentors. People are inspired by their interactions with others to unleash their creative potential and become co-creators of culture rather than passive consumers. This space is linked to the objectives of involvement and innovation. At the time, Rolf Hapel regarded this fourth, performative space as a 'new and strong perspective that prepares the ground for self-development and innovation' (Hapel 2012 p. 54). It is similar to Levien's 'creation library', defined as a "library that has extended its role and become a place where media conveying information, knowledge, art and entertainment are created" (2011 p. 5) or indeed Lankes's vision of the participatory library (2008). Moreover, the act of displaying the outputs of learning can inspire others, stimulating a desire for knowledge and participation (Bennett 2006), highlighting the integrative and cyclical nature of the model.

1.3.5 The Four-Space Model in Action

The authors intended for the model to serve as a framework from which to (re)design a physical space, but more importantly, it offers a starting point from which to discuss the legitimacy of the public library and its role in society. It can provide inspiration for those wishing to future-proof their libraries. They highlight practical examples of how the model has been utilised in different regions.

The Model Programme for Public Libraries was another off-shoot of the 'Public Libraries in the Knowledge Society' report and identified the four-space framework as "the best structural tool for describing the role of the new public library concept" (Thorhauge 2013 p. 8). The aim of this programme was to develop the public library system as a 'central institution' and to highlight how architecture can "support the public library as the central meeting place that invites the citizen inside"

(Holmgaard Larsen 2015). The programme focused on the interconnectedness of the “physical space, interior design, furniture and other facilities, as well as activities and behavioural patterns” (Thorhauge 2013 p. 10).

1.3.6 Conclusion

This research explores whether the four-space model, rooted in public library practice, could be effectively adapted to an Irish academic library. By examining student experiences and the physical design of Cregan Library, the study demonstrates the model’s relevance and potential to guide more inclusive, participatory, and user-focused academic spaces. The findings will contribute to the current discourse on how academic libraries must evolve to meet changing student needs.

2. Literature Review

There are numerous approaches when conducting a literature review. Its purpose is to “evaluate the state of knowledge on a particular topic. It can be used, for example, to create research agendas, identify gaps in research, or simply discuss a particular matter” (Snyder 2019 p. 334). A systematic approach aims to identify all empirical evidence fitting the research criteria. A semi-systematic approach is more common in a multidisciplinary project where a systematic model would be unfeasible. Similarly, an integrative approach “requires a more creative collection of data, as the purpose is usually not to cover all articles ever published on the topic but rather to combine perspectives and insights from different fields or research traditions” (Snyder 2019 p. 336) with the goal of defining a new theoretical perspective.

Key words and their variations were identified and searched for across a range of academic databases. Limiters such as year published and language preference were applied, whilst priority was given to peer-reviewed and scholarly publications. From here, reference lists were scrutinised to uncover additional relevant material. Google searches proved useful for information on Danish public libraries, while architectural websites have an abundance of photographs available. Having established the theoretical framework, the literature will be divided and synthesised into the following categories:

- The Nordic Public Library
- The Irish Public Library
- The Library as Place
- The Academic Library
- User Perceptions in an Academic Setting
- Planning, Space and Design

2.1 The Nordic Public Library

In 2017 the authors of the four-space model produced a follow up article focusing on performative space in the public library. They chart the emergence of Culture 3.0 and the transformation of the public into active participants in a culture that has become increasingly pervasive. The importance of the performative space “in which the library’s users are inspired to create new artistic expressions or are given the ability to design, create and produce various kinds of products or cultural artefacts in interaction with other users and professionals” is reinforced (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2017 p. 517). They highlight the prevalence of makerspaces as evidence of growing efforts to bridge the participation gap and widen access to creativity and civic engagement. Lankes (2008) and Hvenegaard Rasmussen (2016) acknowledge the seismic shift to a more participatory culture with one-sided communication being replaced with dialogue and conversation. Collectively, the work of Jochumsen, Skot-Hansen and Hvenegaard Rasmussen present an ideology that goes beyond physical spaces and speaks to the need for the public library to play a role in the lives of its citizens through collaboration and participation.

Christian Lauersen, Director of libraries in Roskilde municipality, represents a new wave of librarians advocating for library impact to be formally recognised. He explains that key metrics “like lending numbers and foot traffic are great at saying something about the use of libraries [...] but they come short when you want to look at the value and impact the public library gives individuals and communities” (IFLA 2021). In 2021, Roskilde central library teamed up with Seismonaut agency with the aim of changing the language used when determining the worth of the public library. The result, taking inspiration from the ARC report (2014) on cultural experiences, was the Experience Impact Compass (2022), which provides a framework for an organisation to assess the impact of culture on the public. The four dimensions, which align with the four-space model, are: emotional impact (*inspiration space*), intellectual impact (*learning space*), social impact (*meeting space*) and creative impact (*performative space*). They impart a qualified language for evaluating an experience. Furthermore, its usefulness lies not only in its focus on the ‘human experience’ but also broadens the “strategic and political discourse to include more than the economics and target figures” (Linnet Jessen and Hilding Andersen 2022 p. 7).

While Danish library law centres on the provision of information, public debate puts the spotlight on the library’s role as a meeting place (Johnston et al. 2022; Audunson et al. 2019). Hapel, formerly of Dokk1, observes that amid a backdrop of social agitation and economic downturn, “the power of decision-making is increasingly being transferred to the community” (2020 p. 392). Partnerships are required to stay relevant. During Hapel’s tenure as Director, Dokk1 had more than 130 partnerships accounting for more than 60% of their programming (Hapel 2020 p. 402). Louise Overgaard, former team leader for children and family services at Dokk1, emphasised the importance of inspiration and meeting space and explained how children and families were viewed as ‘participants and co-creators’ (Overgaard 2017 p. 149).

2.2 The Irish Public Library

There are 330 local libraries in operation in Ireland providing a service to approximately 765,000 registered users. In recent years, great strides have been made to improve the library experience for users. New initiatives such as My Open Library, which provides member access outside of serviced hours, all year round, and the abolition of fines in 2019, making Ireland one of the first countries to do so, illuminate how the library is engaging in dialogue with the community and responding to their needs. The new national strategy, ‘The Library is the Place: Information, Recreation, Inspiration (2023-2027)’ with three overarching themes: people, spaces and connections, offers an Irish slant on the four-space model. The strategy confirms the importance of participatory communities. Feedback during the consultation process revealed that 87% of those surveyed were satisfied with the library service overall (Department of Rural and Community Development 2023). In terms of learning, the aim is to promote reading and literacy in the community through various initiatives such as the annual *Ireland Reads* event, extending access to Book Clubs for all age groups, the expansion of the *Right to Read* campaign and the *Skills for Life* programme. Recreation space, which bears resemblance to both the performative and meeting spaces of the four-space model, is at the heart of the new strategy and focuses on the provision of access to culture for everyone. Collaboration with local and national partners and the relevant government departments ensures a full calendar of events.

Inspiration, a key goal of the plan, is being achieved through the refurbishment of local branches, the roll-out of new ICT infrastructure as well as significant investment in sensory rooms and services for young people. The rise in makerspaces adds a further performative dimension to the Irish public library landscape. Diamond observes that creative spaces in Dublin libraries such as Ballyfermot, with its music practice room and recording pods, and the award-winning Dun Laoghaire library with its makerspace, cafe, music and IT hubs, are succeeding in drawing in a wider demographic. Diamond

explains that such spaces ‘focus on empowering individuals’ and ‘delivering a memorable experience based on creation and not solely on consumption’ (2020 p. 65).

2.3 The Library as Place

“No space quite like the public library space has managed to survive the changes wrought by an increasingly privatised and security obsessed world” (Barclay 2017 p. 270). The library as place is a recurring motif. The works of the theorists’ Lefebvre and Oldenburg are frequently cited (Gray et al. 2018; Cordero et al. 2021). Aabø and Audunson (2012) describe a third place as “a communal (parochial) arena with a low threshold, frequented by regulars” (p. 141), arguing that the library lacks certain characteristics associated with a third place given that the regulars “tend to weave a private net around themselves” as they engage in work or education related tasks, that is so-called “second place” activities (p. 148). In more recent years, the library has upped its offerings in terms of its meeting and performative spaces, thus better matching the criteria for third place endeavours. Johnston et al. note that the ‘social turn’ that public libraries have taken of late “centres on libraries serving as community hubs and inclusive social spaces, as well as supporting diversity and building social relations” (2022 p. 1110). They further observe that librarians are taking on the roles of cultural facilitators and event managers and to a lesser extent, teachers and IT consultants (Johnston et al. 2022).

The theme of playfulness also emerges in the literature. Wyatt and Leorke (2024) highlight the increasing evidence of play in public libraries in terms of their architecture, design and services. In the post-COVID landscape, libraries have adapted and become digital hubs, work-from-home sites and playgrounds for children, blurring the traditional boundaries between first, second and third places. Wyatt and Leorke pinpoint the libraries of Finland as representative of what libraries “might be like if they embrace all aspects of play, games, and gaming culture” (p. 259). In particular, the Oodi Library in Helsinki with its dedicated gaming zone serves as a meeting place for young people but also fulfils a performative function as onlookers watch the spectacle of players immersed in online battle. The inspirational children's spaces in both Dokk1 with its globe-like interactive play area and the new children’s area in Roskilde’s central library deemed “a universe for stories, imagination, curiosity and community”, were designed in collaboration with children (Overgaard 2017; Hapel 2020; Lauersen 2023). Kawamoto and Koizumi (2023) propose a new conceptual model for the public library as place, reflecting its rapid diversification since the 1990s. While including the four-space model within its framework, they believe it falls short due to its emphasis on ‘new library spaces’ (p. 390). Their model comprising three ‘symbolic infrastructures’ (wisdom, heritage and community) with 11 categories and 30 subcategories while effectively highlighting the multitudinous meaning ascribed to the public library and its evolution, is, perhaps, overwrought.

2.4 The Academic Library

A number of commonalities were observed in this body of literature. Firstly, the research all points to the difficulties facing academic libraries in the twenty-first century as they attempt to meet the evolving needs of students (Montgomery 2014; Christoffersen et al. 2021; Kim, Bosch and Lee 2020). At a pedagogical level, universities are moving towards collaborative learning (Kim, Bosch and Lee 2020; Choy and Goh 2016), while technology is more ubiquitous (Christoffersen et al. 2021; Montgomery 2014; Chan and Spodick 2014; Leung et al. 2021). The nature of the academic calendar impacts the use of space, resulting in high demand for collaborative (Kim, Bosch and Lee 2020) and relaxation (Kim 2016) areas but also quiet workspaces at exam times (Choy and Goh 2016). The library as a liminal third place also features in the research (Chan and Spodick 2014; Kim 2016).

Across the articles surveyed, a qualitative case study methodology dominated. In addition, surveys (Cha and Kim, 2015; Ojennus and Watts 2015), POE statistics (DeClercq and Cranz 2014) and unobtrusive observation (Lux, Snyder and Boff 2016) formed the majority of research designs. Frameworks from a multitude of disciplines were employed. Christoffersen et al. (2021) conducted semi-structured interviews with industry experts using Cunningham and Tabur's (2012) hierarchy of learning space attributes. This hierarchy was also applied in Chan and Spodick's (2014) case study on the redesign of Hong Kong University Library. Other theoretical frameworks include the servicescape model from the world of Marketing, highlighting a shift to a consumer-driven library (Mei, Aas and Eide 2020) and the "marketisation of higher education" (Wells and Daunt 2015). The literature consulted on the academic library can, generally, be divided into two categories: user perceptions and planning and design.

2.5 User Perceptions in Academic Settings

Kim (2017), Harrop and Turpin (2013) and Ojennus and Watts (2015) all examine user preferences. Kim finds that a 'well-designed library' is attractive to students as a 'socialising place' although users primarily regarded it as 'a place for learning and information seeking' (Kim 2017 p. 214; Kim 2016). Ojennus and Watts note that architecture has bearing on whether learning is enhanced or hindered and that access to printed collections, technology and long opening hours are still valued by students. In their case study of Sheffield's Hallam University, Harrop and Turnip discovered that students can view spaces differently than their original design purpose and that a sense of community was imperative: "shared learning spaces support the need for social and learning related conversations, both planned and unplanned. [...] Working in a shared learning environment is motivational" (2013 p. 68). This sense of 'studying along' (O'Connor 2005) featured heavily in the literature on the academic library (Crook and Mitchell 2012; Bennett 2006; Gullikson and Meyer 2016). Montgomery (2014), through the use of ethnographic surveys, concluded that "'being seen studying" or "seeing others study" appears to be a valuable stimulus in their learning behaviour' (p. 72). Numerous articles highlight the juxtaposition between students' desire to work independently in collaborative zones and their preference for quiet spaces (May and Swabey 2015; Kim, Bosch and Lee 2020). Cha and Kim (2015) chose surveys to reveal that the "amount of space, noise level, crowdedness, comfort of furnishing and cleanliness", in that order, were the main determinants of users' seating choice (p. 277).

Leung et al. (2021) investigate the extent to which academic libraries foster social capital. Their paper is one of the few that attempts to bridge the gap in the research between public and academic libraries. They conclude that the academic library is not a 'breeding ground' for social capital nor does the four-space model adequately address "users" needs well' (p. 317). The authors, however, recognise that COVID may have had an impact on results and that further research is required.

2.6 Planning, Space and Design

From an architectural viewpoint, the trend for design-driven playful buildings that impinge on their surroundings is unmistakable as is evidenced by Dokk1, The Black Diamond and the Deichman, amongst others. Bossaller et al. (2020) explain that "buildings can also contribute to health, and beautiful buildings hint at the potential: the potential to live a good life, to feel connected, to be productive" (p. 2).

When it comes to library spaces, the fundamental needs of the user must be met (Christoffersen et al. 2021) before addressing design. Librarians are finding themselves thrust into the position of interior designers and architects (Vassilakaki and Moniarou-Papaconstantinou 2021) in a relatively sparse field of research (Ellis and Goodyear 2016). Bennett in his seminal work on the functionality of learning

spaces urges reflection on the parallels between design and behaviour before embarking on a remodelling given that “well designed spaces afford their occupants the opportunity to act in certain ways but do ensure that those activities will happen” (Bennett 2006 p. 15). The first question to ask is what type of learning is expected to happen and why does it require a physical space? Bennett’s reasoning behind the importance of the physical space is indeed similar to that of Jochumsen et al’s logic behind the four spaces. Bennett cites the importance of immersion, as well as the social, collaborative and performative aspect of teaching and learning (Bennett 2006).

Choy and Goh (2016) propose a framework for developing library space based upon their research in Singapore. Building upon previous work by Choy (1996), the authors identified four spaces - collaboration, sanctuary, interaction and community, which “work in combination to provide the student with a comprehensive selection of environments to suit their needs at different times” (p. 16). The spaces bear resemblance to the four-space model but with emphasis on the individual rather than the community.

While it’s evident that design bears impact on usage and perception and while “learning cannot be designed, some of the physical and social components of the situation in which learning activity unfolds can be” (Carvalho and Goodyear 2018 p. 35). So, what are users looking for? “Successful design requires that we listen attentively and thoughtfully to what students tell us about the behaviours they use to discipline themselves successfully for study” (Bennett 2006 p. 18).

Across the literature, a clear demand for both quiet and collaborative spaces abound (Harrop and Turpin 2013; Beard and Dale, 2010). Furniture should be comfortable (Montgomery 2014; Wells and Daunt 2015) and flexible with zones for contemplation and space large enough for group activity. Sockets and seats must be plentiful (Montgomery 2014; Kim 2017). Students should be co-creators in their environment,

learning to design and reconfigure the spaces in which one learns is an important component of becoming an autonomous, lifelong learner (Ellis and Goodyear 2016 p. 174). This is further echoed by Nguyen (2015) on stating that participation is ‘the key element in contemporary libraries (p. 476).

The creation of a conducive ambience should be given due consideration (Khoo et al. 2016; DeClercq and Cranz 2014; Choy and Goh 2016). A mix of both a ‘studious, relaxed and informal’ climate as well as an atmosphere of ‘buzz and activity’ is welcomed (Harrop and Turpin 2013 p. 66). A preference for natural lighting was common (Cha and Kim 2015; Khoo et al. 2016) as was a warm, friendly environment (Crook and Mitchell 2012) created through the use of colour, texture and greenery. Libraries can undoubtedly affect the mindset of the user (Mei, Aas and Eide 2020); they should offer sanctuary and provide a retreat from the cognitive overload of our digital age (Harrop and Turpin 2013; Bossaller et al. 2020).

Once the basic elements are in place, more experimentation is possible. “Vibrant colours, creatively designed stairways, shelves, and reading nooks instil a playful atmosphere while ambiguous, non-proscriptive design encourages exploration” (Wyatt and Leorke 2024 p. 266). Visual imagery and photo elicitation were often used to gauge the preferences of library users (Coburn et al. 2019; Abouelela 2022; van den Bogerd et al. 2018). Coburn et al. (2019) examine neural responses to architecture, revealing how environments can alter emotional states, that open spaces and high ceilings were ‘associated with higher *hominess* scores’ (with *hominess* being closely related to the Danish concept of *hygge*) (p. 235). Van den Bogerd et al. (2018) discovered that students favour greener spaces in universities and that “green environments are perceived to be more beneficial for

the recovery from stress and mental fatigue” (p. 2). These findings correlate with those of Coburn et al. who confirm the potential ‘psychological benefits’ of biophilic designs (p. 218).

2.7 Literature review conclusions

In summary, the literature reveals a clear shift toward more participatory, user-centered library environments. The adoption of the four-space model reflects libraries’ evolving roles as cultural and social agents. These insights directly support the aims of this dissertation, investigating how spatial design and user experience can shape perceptions of the library. This integrative review provides a foundation for the case study and further analysis by highlighting how space contributes to intellectual, emotional, and creative engagement.

3. Methodology

4.

Using Saunders, Lewis and Thornhill’s (2023) research model, this study employs a qualitative approach, grounded in constructivism. This was favoured as it allows for a more holistic analysis. The central question asks why the Danish model is so popular and how, if possible, it can be transferred to an Irish academic library. Having considered all available methods, it was decided that given the nature and scope of this research that a qualitative methodology would be most suitable. The following section will illustrate that the chosen approach was justified.

4.1 Epistemological Foundations

Before determining a methodology, various epistemological and ontological worldviews were considered. As Creswell and Creswell (2023) explain, “although philosophical ideas remain largely hidden in research, they still influence the practice of research and need to be identified” (p. 6). A researcher’s worldview can reveal potential biases as well as offer insight as to why a particular methodology was preferred.

A constructivist paradigm “tends to be concerned with people’s lived experiences and how they understand things” (Denscombe 2021 p. 43). This type of approach lends itself well to a study examining the behaviours of individuals as they interact with a physical space. A project concerned with the ways in which people interact with their physical environment cannot be guided by a positivist research paradigm. Returning to the research onion of Saunders, Lewis and Thornhill, an inductive approach is favoured. Such an approach is flexible and adaptable as more data is collected, themes identified and findings analysed.

4.2 A Qualitative Approach

“Researchers adopting a qualitative perspective are more concerned to understand individuals’ perceptions of the world” (Bell 2018 p. 27), with the preeminent aim being a “better understanding of phenomenon through the experiences of those who have directly experienced the phenomenon” (Castleberry and Nolen 2018 p. 807). This study has a number of broad research questions, delving into the use of space and design in an Irish academic library, using the four-space model as a theoretical lens. A qualitative approach ensures that the research goes beyond quantitative metrics to fully explore the issue, so long as it conceptualises the data rather than merely summarising it (Broom 2021). Denscombe highlights some of the advantages of a qualitative approach: the data and analysis ‘are grounded’ in evidence from ‘real-world settings’, [and] there is a ‘richness and detail to the data’ (Denscombe 2021 p. 354).

4.3 Research Design: Case Study

The central research strategy is a single case study. Yin (2018) defines a case study as “an empirical method that investigates a contemporary phenomenon in depth and within its real-world context” (p. 15). It permits a deeper exploration of a topic and makes use of multiple forms of data collection (Yin 2018). Yin further identifies three types of case study: descriptive, explanatory and exploratory. This project favours an exploratory approach as it questions the extent to which the Danish model can be applied to an Irish academic library using the Cregan Library as its case study. Gullikson and Meyer in their research at two academic libraries explain how their results differed; they, consequently, recommend that librarians should “examine how people use their own particular library spaces rather than relying on conclusions drawn from user research done at other libraries” (2016 p. 2).

Whilst single case studies are effectively utilised, there are pitfalls. Priya (2021) observes that questions around generalisability and reliability are common. Yin recommends a clear ‘case study protocol’ to safeguard against unreliability, which includes: a detailed overview of field work and data collection, clearly defined research questions and appropriate guidelines for data analysis and findings (Yin 2018). By establishing a transparent and robust case study protocol, the integrity of the research can be maintained. In terms of generalisability, a case study can produce analytic rather than statistical generalisations, especially when grounded in theoretical principles. Using the four-space model as a framing device, a project objective is to develop a checklist for other academic libraries to consult before undertaking a space review.

4.4 Cregan Library

Cregan is one of three Dublin City University library sites. It was opened in 2015 and designed by Taylor Architects in a contemporary style over four floors with a nod to brutalism and the heritage of the site with its stained-glass wall. Visually, the building is a prominent feature in the Drumcondra area. The total floor plan covers 1,224m². This library is primarily intended for students in the fields of Humanities and Education. The ground floor is accessible to the public with a cafe and a social space that regularly hosts exhibitions. The first floor is collaborative and houses a large collection of primary and post primary teaching resources. The second and third floors are quiet spaces, with print collections covering Theology, Sociology, History and English. The spaces are zoned from community to collaborative to quiet study. There are two group study rooms, a conference room, two digital labs and a mentoring suite.

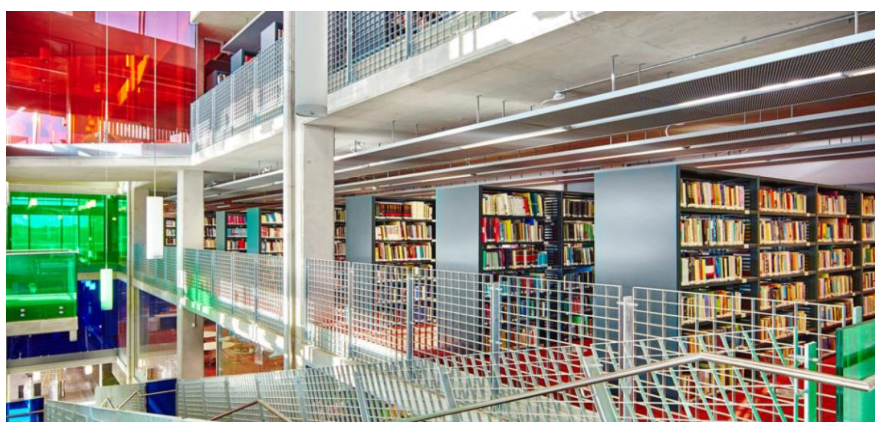


Figure 2: Second floor of the Cregan Library. Image taken from Liber Lag: Library Buildings in Europe. Available at: <https://www.librarybuildings.eu/library/cregan-library-st-patricks-campus/> [Accessed 25/ 03/ 2025].

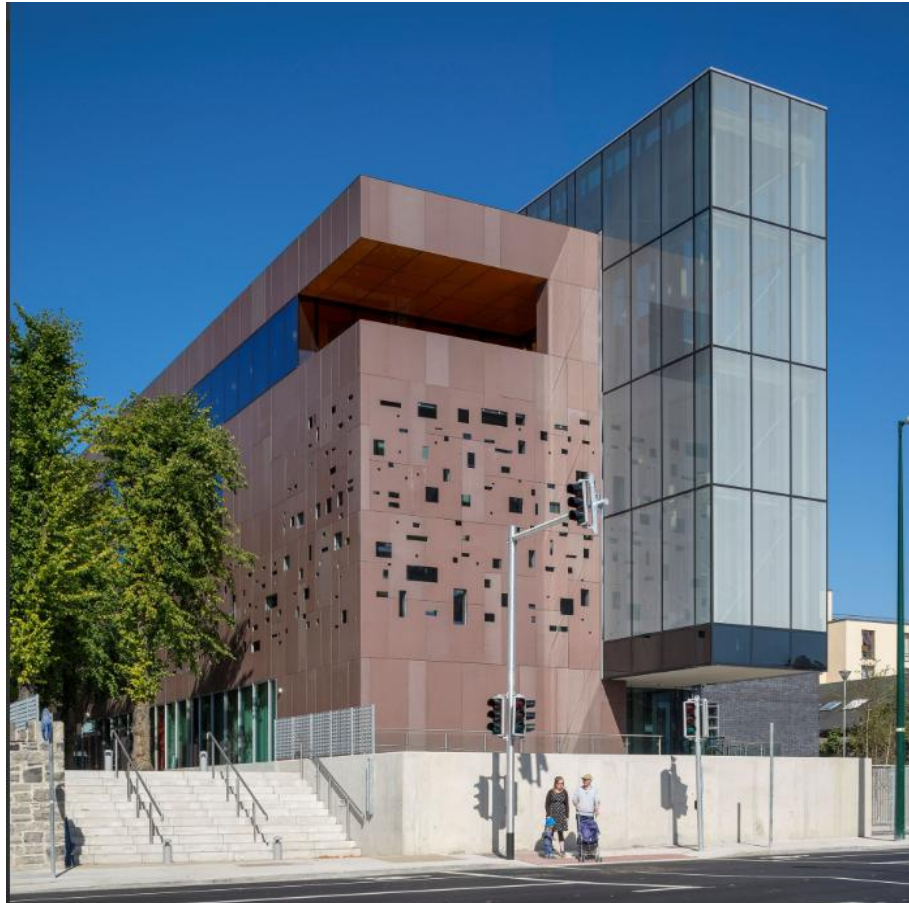


Figure 3: Street view of the Cregan Library. Image taken from: Liber Lag: Library Buildings in Europe. Available at: <https://www.librarybuildings.eu/library/cregan-library-st-patricks-campus/> [Accessed 25/03/2025].

4.5 Research Design: Interviews

Interviews were identified as the most suitable technique to meet the project objectives. Bell notes that “the way in which a response is made (the tone of voice, facial expression, hesitation) can provide information that a written response would conceal” (2018 p. 210). Lavee and Itzchakov highlight the importance of listening techniques, deeming them a ‘crucial component in the researcher-participant interaction’, with good listening said to increase the speaker’s sense of psychological safety (2021 pp. 615-619). Whilst providing a thick source of data, interviews are fundamentally ‘social encounters’; the researcher must remain aware of the dynamics of the interviewer-interviewee relationship and how it can impact the information gathered (Denscombe 2021 p. 244).

4.6 Research Design: Photo Elicitation

Visual data are often utilised in qualitative research although more commonly associated with the social sciences rather than the LIS field. This can take the form of photographs, drawings, video or film. Photo elicitation is a powerful visual tool, which can provide excellent stimulus for discussion. Harper explains that “images evoke deeper elements of human consciousness than do words; exchanges based on words alone utilise less of the brain’s capacity than do exchanges in which the brain is processing images as well as words” (2002 p. 13). As with all forms of data collection, the researcher must take note of potential disadvantages with the chosen medium. Creswell and Creswell point out that visual images “may reflect trends of the culture or society” (2023 p. 211), while Denscombe urges caution around copyright infringement (2021). In addition, as photo elicitation yields two forms of data, interview transcripts and visual imagery, it can prove time consuming. However,

the benefits do out-weigh the disadvantages and result in a more comprehensive and accurate data, the empowerment of participants, greater versatility and a richer understanding of user experience (Newcomer, Lindahl and Harriman 2016; Torre and Murphy 2015; Haberl and Wortman 2012).

4.7 Photo Prompts

Two variations of photo elicitation - participant-driven photo elicitation (PDPE) and researcher-driven photo elicitation (RDPE) were employed. These are also referred to as participatory or non-participatory elicitation (Pollak 2017). Participant-driven occurs when the camera is handed over to participants to freely take images or to follow a series of prompts (Newcomer, Lindahl and Harriman 2016). Researcher-driven occurs when the researcher provides the images to be discussed. Both methods involve discussion of the photographs in a follow-up interview. For the PDPE element, participants were asked to take the following photographs:

- Best place for collaboration
- Best place for quiet study
- A place of inspiration
- Best place for creativity and/or performance
- A community space
- Your favourite space

The photos were then forwarded to the researcher for printing. The open-ended nature of the interview empowers participants “by making them the experts and ceding control of data collection and use to them” (Torre and Murphy 2015 p. 12). Newcomer, Lindahl and Harriman (2016) employed PDPE as part of a mixed methodology to inform renovations in their library and provide a useful guide for the novice. The latter half of the interview was given over to the RDPE with images of contemporary European libraries, whose design embodies the principles of the four-space model, provided for discussion.

In combining these approaches, the resulting interviews proved to be collaborative yet informative, eliciting student perspectives on the case study library as well as their thoughts on library design in general. With photos occupying the central focus there was less pressure on the interviewees. Furthermore, with the prevalence of social media in all our lives, participants were comfortable with communicating through images (Bedi and Watts 2017). Moreover, the method ensured that ‘experiences and meanings become more tangible’ and ‘may be understood in ways that other conventional forms of communication may not allow’ (Bedi and Webb 2017 p. 85). This style of data retrieval addressed objectives four and five, which relate to student responses to the physical environment and the design fundamentals of successful buildings.

4.8 Coding and Data Analysis

At the outset, twelve interviews were to be conducted but it was decided to cease interviewing at ten participants as saturation had been reached. Interviews took place in-person at Cregan Library between January-February 2025. Interviews lasted approximately thirty to forty minutes, which was divided equally between reflection on the participant-driven photos and discussion of the researcher-driven images. Of the ten participants, seven were female and three were male; two were postgraduates (PG) and the remainder undergraduates (UG). The majority of respondents were from the Institute of Education. Interviews were recorded via Zoom to avail of the transcription function although editing and proofing were required to improve accuracy.

Once completed, the process of coding began. Coding can be described as the process of “indexing or mapping data, to provide an overview of disparate data that allows the researcher to make sense of them in relation to their research questions” (Elliot 2018 p. 2851). The researcher must pay close

attention to the data, enabling the coding process to result in “deep immersion in the data, as well as transparency in the development and presentation of findings” (Skjott Linneberg and Korsgaard 2019 p. 260).

A deductive and inductive approach was applied (Azungah 2018). The photo prompts provided a deductive starting framework, while transcripts were inductively analysed to identify common themes. The analytical strategy of Miles, Huberman and Saldaña (2014) was utilised: data condensation, data display, and drawing conclusions. They acknowledge that,

the analysis task is to reach across multiple data sources and condense them [...], in deciding what to leave in, what to highlight, what to report first and last, what to interconnect, and what main ideas are important, analytical choices are being made continuously (2014 p. 8).

Elliot echoes this sentiment noting that “coding should not be exhaustive and is in fact a process for reducing the data” (2018 p. 2854)

Broad coding allowed for the full meaning and nuance of the interview transcripts to be opened up. The resulting data was then sorted and distributed into the pre-established codes, in line with the research questions, whilst also uncovering new ones. Through an iterative process, one hundred and forty-seven pages of transcript were condensed into a single visual display. A spreadsheet was used to format the data in a systematic manner. Such a matrix enabled greater understanding of the participants’ experience and allowed for comparisons to be drawn and themes identified. Each piece of data was assigned only one code in line with Creswell’s advice rather than allowing them to occupy multiple codes as this would generate repeated iterations. A final set of twelve codes were settled on in a second cycle of coding, all of which correlated closely to key themes in the extant literature. Findings were triangulated with LibQUAL reports (2024) to enhance the trustworthiness and validity of the conclusions.

4.9 Ethical Considerations

As a staff member of Cregan Library, it was vital to remain unbiased and to employ reflexive practices to ensure impartiality whilst collecting and analysing data. Researchers must be aware of and anticipate potential ethical issues and ensure that safeguards are in place to address any such concerns. Furthermore, ethical issues do not only warrant consideration at the outset of a research project but must be reflected upon during all phases of the study including dissemination and storage. Avoiding bias and maintaining academic integrity was key as was avoiding using a case study to “substantiate a preconceived position” (Yin 2018 p. 86). As Miles, Huberman and Saldaña explain, “the apparent simplicity of qualitative data masks a good deal of complexity, requiring plenty of care and self-awareness on the part of the researcher” (2014 p. 11). The student interviews were subjected to careful ethical conduct. The purpose of the research was fully disclosed to interviewees and the relevant consent forms signed. Consent was given for the interviews to be audio recorded and participants were reminded of their right to withdraw consent at any stage. The collated data is available for consultation so that the credibility of the work can be verified. Recordings and transcripts are stored in line with the home institution’s policy and will be disposed of accordingly when required.

4.10 Methodology conclusion

This study adopts a qualitative, constructivist approach, exploring the potential transferability of the Danish model to an Irish academic library context. Grounded in epistemological reflection, the chosen methods were selected to gain rich, contextual insights into student experiences of library spaces. The

research design ensures depth and relevance through a combination of participant engagement and systematic coding, laying a solid foundation for the analysis to follow.

5. Findings

In this section, the intention is to bring all the aforementioned elements together into a structured narrative; in the words of Janice Morse, “tell the reader what the generated patterns of themes represent [...] provide recommendations and solutions to be implemented” (2020 p. 4). Findings will be broken down and analysed in two sections. Firstly, discussion of the participant-driven photos will address the transferability of the four-space model to an Irish setting, while the researcher-driven images will examine the importance of academic library design and its impact on user experience.

5.1 Participant-Driven Photographs

The photo prompts were based on the model but reimagined for the academic context as the authors recommend, in the hope that it evokes “as multiple a discussion of the library as possible” (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2012 p. 596). The aim is to join all the interdisciplinary threads of this project together, illustrating how the findings support a qualitative methodology and confirm the suitability of the model for the Irish academic landscape.

5.2 Collaboration (Meeting Space)

This space is characterised by active participation and meets the criteria for the meeting space of the model in that it serves as a ‘place between home and work’ where serendipitous meetings can occur (Jochumsen, Hvenegaard Rasmussen, Skot-Hansen p. 592). In fact, a number of students referred to the library as both ‘homely’ (Participant 5/ Undergraduate) and ‘a home away home’ (P4/ UG).

Unsurprisingly, the collaborative first floor of the library was the most popular space for group work (80%). The popularity of this floor confirms a definite pedagogical shift, highlighting how students are now learning differently. It is evident from both the literature and the interviews that students learn through group interaction (Kim, Bosch and Lee 2020). Libraries have moved from merely storing and imparting knowledge to being spaces where dialogue predominates (Hvenegaard Rasmussen 2016). Feedback revealed the extent to which learning is a collaborative and participatory process, echoing Bennett’s stance that a well-designed learning space can promote a ‘sense of community’ (Bennett 2006 p. 18):

- “I think it's good because we get a few group projects to do and [...] you can talk there [first floor], it's kind of open as well [and with] the circular table you can all be around it together helping each other” (P6/ UG).

The suitability of this floor for group study is indicative of the sense of agency created, enabling students to take on the roles of co-creators and knowledge-producers for the next generation in their capacity as trainee teachers.

Interviewees commonly cited being able to talk openly, the furniture, the layout and facing colleagues as their reasons for choosing this space for collaboration:

- “You can all be in a circle so everyone can look at each other and can chat” (P5/ UG).

Interviewees commented on how the area was good for working independently whilst surrounded by friends and peers:

- “We kind of just do individual work on our laptops and then, we need to do a bit of group work, we can do it there and discuss as well” (P8/ UG).

This concept of ‘studying along’ supports the finding of Montgomery (2021), and Crook and Mitchell (2012), with the latter noting that students seemed to “gain inspiration or reassurance from merely being among others they knew were in a shared predicament” (p. 136).

Interestingly, the group study room on this floor didn’t feature as a favoured collaborative spot although the mentoring suite and the open-plan room at the back of the floor both did. The glass-walled room at the back was chosen by a number of students as it is:

- “closed off from the rest of the library so you're not conscious of talking too loud” (P3/ UG).
- “a sense of enclosure; it feels like a separate room devoted entirely to group work, and the benches, I don't think we find them anywhere else in the library, not of that design” (P7/ Postgraduate).

These comments support the findings of May and Swabey (2015) who observed that group study rooms are not needed “to create a library that successfully supports group study” (p. 785). Similarly, Harrop and Turpin discovered that the layout rather than the designation of a space was what determined its usage (2013). Students liked the round and rectangular tables as well as the benches for collaborative work. This, combined with being able to chat to friends freely, negated the need to book a room.



Figure 4: First floor collaborative space. Image taken by participant 8 for ‘Collaboration’.



Figure 5: Collaborative table on the first floor. Image taken by participant 6 for 'Collaboration'.

5.3 Quiet Study (Learning Space)

When it came to quiet study, 80% of participants chose a quiet floor carrel (second and third), with the majority (60%) favouring a window seat. Reasons for selecting such a space included: not being

distracted by others (40%), being away from people (40%), needing to focus on work (30%), looking out at the view (30%) and a general respect for silence (60%).

In many instances, a quiet space had more than just auditory connotations but also reflected a desire for a calm, distraction-free environment (Bennett 2006; Choy and Goh 2016):

- “No one's too distracting there. It's very chill” (P8/ UG).
- “You won't get distracted looking at everyone else” (P1/ PG).

For some, a library visit offered respite from the constant pressure to socialise and a sanctuary away from others:

- “Most times that I come to the library it would be to get away from everybody else” (P2/ UG).
- “On the very top floor, at the back, where the windows are [is best] because you're kind of away from other people, especially if it's early [and] there's no one really around. You're not looking out so you're not looking at other people as well” (P5/ UG).
- “Especially if you're on the third floor, I feel like people kind of understand. They try to keep to themselves” (P5/ UG).

A sense of camaraderie was apparent, while reference was also made to being motivated on seeing others studying:

- “You can have a look and walk around as well if you want so you see that you're not alone” (P3/ UG).
- “Well, if I'm not already in the study mood, I make sure I sit in front of someone, so then I have to study; it motivates me” (P10/ UG).

These findings mirror those of DeVille, in her mixed methods research of library users in Florida, who confirms that students appreciate “the feeling of being alone but being around others’; other students nearby [...] can serve as a motivator” (2024 p. 27). Furthermore, efforts were made to avoid being the source of disruption to others:

- “Sometimes it's very very quiet so you almost feel awkward taking paper out, like it's so awkward and you feel like you're going to get stared at” (P8/ UG).
- “I hate taking anything out of my bag when I'm on the quiet floor because I feel so guilty” (P5/ UG).

Desks facing the windows were most popular, providing external stimulus and helping to create a sense of momentary calm:

- “I prefer the window spot. I like looking at the different colours and all the trees” (P3/ UG).
- “It's lovely to look out the window, at the trees and just get a bit of quiet time in” (P8/ UG).



Figure 6: Second floor study carrel. Image taken by participant 3 for 'Quiet Study'.

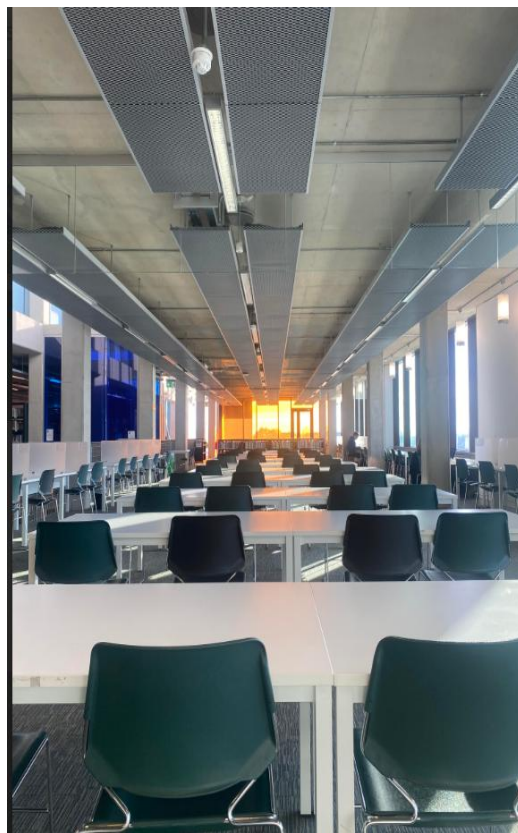


Figure 7: Third floor workstations. Image taken by participant 9 for 'Quiet Study'.

5.4 Inspiration

This space, according to the four-space model, should offer a “multitude of aesthetic experiences” (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2012 p. 590). The fact that no one space stood out for interviewees here highlights how inspiration can be found in any seemingly small or insignificant space in the library. This exact sentiment was expressed by a student:

- “I feel like that's [inspiration] kind of what you make of it because it's, you know, it could be anywhere in the library and you could just feel inspired by it” (P8/ UG).

A small majority (30%) chose the lantern spaces of the second and third floors as the most inspirational spaces. Other spaces included the shelving bays (20%) and certain desk spaces (20%), while others chose the educational resources on the first floor, the ground floor exhibition space and a beanbag nook overlooking the city. Common sources of inspiration included watching others work, looking at books and looking out the window. Such spaces were highly regarded for their ability to provide respite from the arduous task of studying or writing and to restore a sense of vitality. For the most part, interviewees would take short breaks from their study and retreat to a space they found restorative. These findings echo those of Song et al. (2024) who observe that “people achieve restoration of attention by withdrawing from tasks that require sustained attention and shifting to activities that do not require active control of attention” (p. 6). A pervasive theme throughout the interviews, regardless of the particular photo prompt, is that students take comfort in seeing their peers studying around them:

- “I put it into the inspiration space because you see other people working” (P2/ UG).
- “Come exam season everyone is kind of in solidarity. All heads down at the desk. You do see people, friends studying alongside each other and even if you're there and you need a pen, someone will just give you one” (P4/ UG).

Books provided inspiration for some:

- “If I need inspiration then I go to the shelf” (P1/ PG).
- “It is the area of History I'm most passionate about so I do find a lot of inspiration [there]” (P5/ UG).
- “Facing books, that does inspire me in a way” (P4/ UG).

Another common thread that emerged was the importance of windows, natural light and views of nature:

- “It's inspiring to see the city moving” (P4/ UG).
- “[to] see the trees and watch some birds or something, sometimes having a bit of nature to look at is nice or get a bit of inspiration” (P6/ UG).
- “It's nice to look at everything that's going on; you're not just kind of stuck. It's kind of hard to get inspiration if you're just staring at the desk in front of you” (P9/ UG).
- “I like this [photo of the lantern] because you can see more of a view and it's completely open. When I think about inspiration, it's not necessarily like stuff on your laptop or doing work, it's just sitting there and taking a moment to be inspired by something” (P10/ UG).

For the inspiration prompt, repeated references were made to ‘having something to look at’, ‘coming up with ideas’, taking a ‘time out’, ‘brainstorming’ and ‘daydreaming’, all of which support the research around ‘immersion learning’ (Bennett 2006) and ‘learning as participation’ (Ellis and Goodyear 2016).



Figure 8: Third floor shelving bay. Image taken by participant 1 for 'Inspiration'.

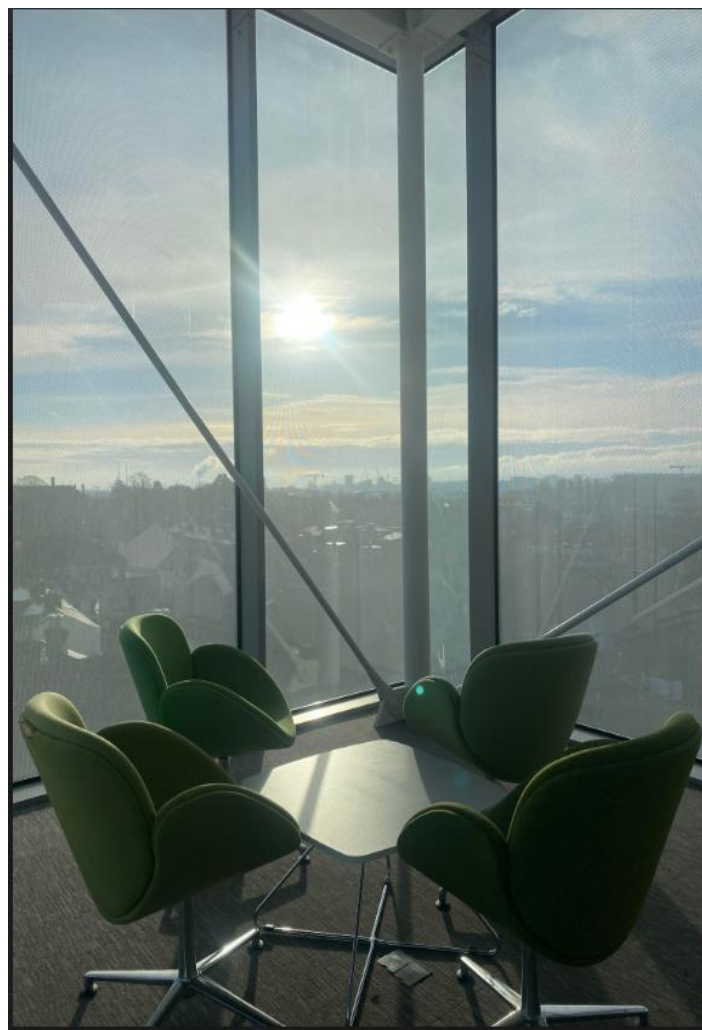


Figure 9: Third floor lantern space. Image taken by participant 8 for 'Inspiration'.

5.5 Creativity/ Performance (Performative Space)

As the four-space model creators attest, for a library to be relevant to younger generations it must provide “performative spaces in which creation and co-creation are possible” (Jochumsen, Hvenegaard Rasmussen and Skot-Hansen 2012 p. 593). This photo prompt proved the most problematic for students and speaks to the lack of a dedicated performance space within Cregan. However, interviewees were open to the idea of a performative space:

- “I suppose maybe a room for performance or something if you were doing a different course or if you wanted to do something for our drama module. Or even just a room to sit down to practice different musical instruments” (P3/ UG).
- “I don't know how it would work [a performance space]. Maybe in the college in general there should be more spaces, especially because the Arts are kind of neglected. I think if there could be a way to figure it out so it could work in the library that'd be great” (P5/ UG).

Despite the lack of a defined space, participants were vocal about how various spaces sparked their creativity, which is a first step toward bridging the participation gap (Hvenegaard Rasmussen 2016). Moreover, digital developments such as the introduction of LibChat and a playful approach to social media offer glimpses into an emergent online participatory culture in Cregan

The third floor was the most popular choice for creativity/ performative spaces (50%) with the views and the stained-glass areas dominating. The first floor with its open layout and collaborative zones was also popular (30%). As Christoffersen et al. (2021) explain “academic libraries need to start viewing their space as a performance enhancing tool for students, [libraries] should no longer be a static experience but a dynamic one” (p. 2).

The majority of participants (60%) noted interaction with others and people watching as having a performative element, which further reinforces the social dimension of learning and the importance of community, both of which underpin the four-space model:

- “That whole area [first floor] is great for that [performance/ creativity]. And for talking and going through it with other people. That's the good thing about being able to talk even between the groups; if you saw someone you knew doing a different book or a different group, you could go over and ask them and then use it after them” (P3/ UG).

In the last decade, the academic library has ‘caught up’ with its public counterpart and has taken ‘a social turn’ (Johnston et al. 2022) and can now be designated a ‘third place’. This is clearly reflected in the students’ comments describing Cregan as ‘a home away from home’, a place where they can study alongside their peers be that collaboratively or individually but always communally.



Figure 10: Third floor view. Image taken by participant 9 for 'Creativity/ Performance'.

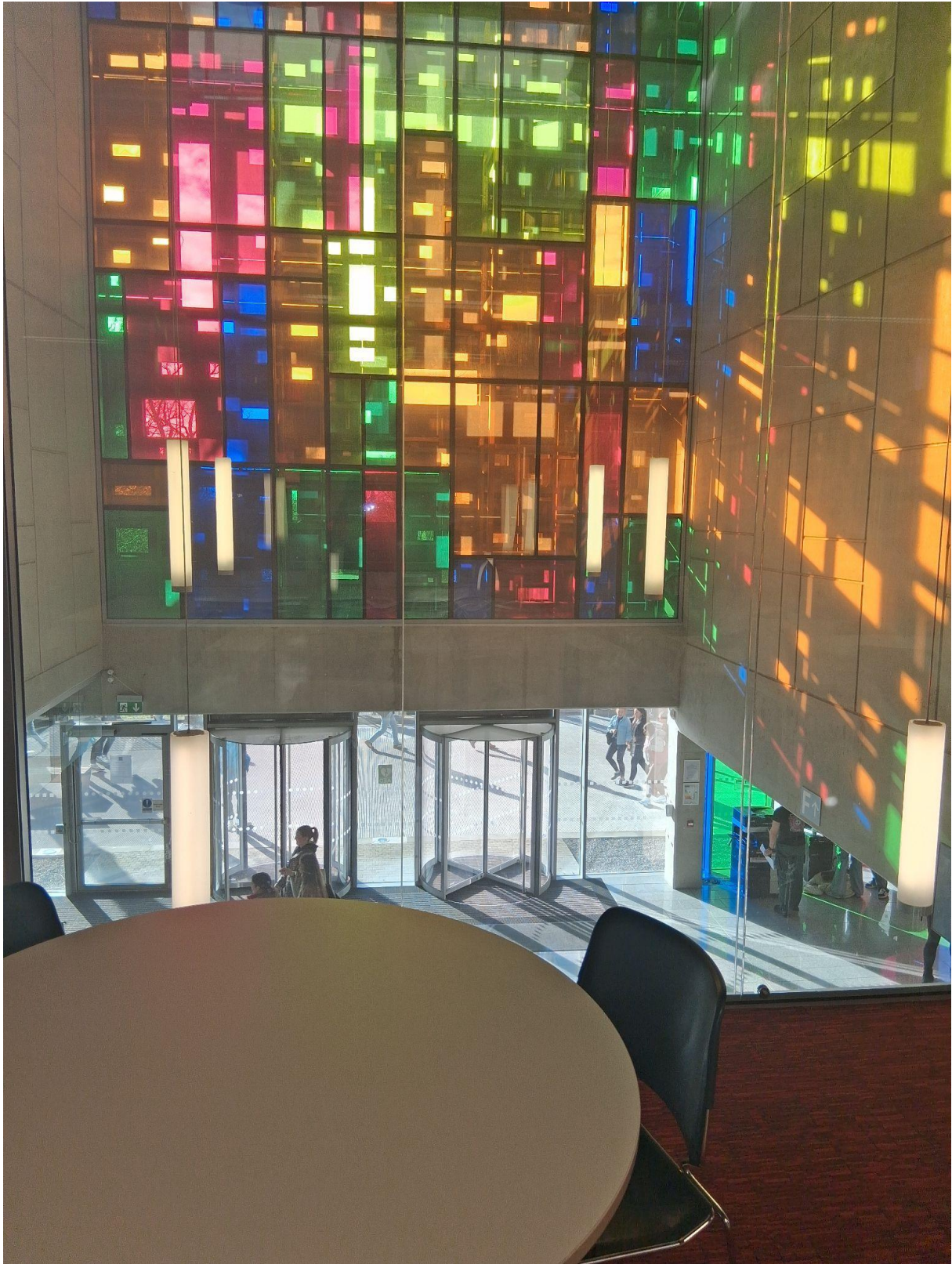


Figure 11: View of the foyer from the first floor. Image taken by participant 6 for 'Creativity/ Performance'.

5.6 Community Space

Although community space is not featured in the four-space model, it forms an integral element of the model's ethos. It was therefore deemed appropriate to add it to the list of photo prompts. An

array of photos was presented here with no one space taking the spotlight, which is testament to the diversity of communal spaces within the library.

The top floor lantern space was favoured (30%), as were the various informal seating areas spread between the second and third floors (30%). Other areas mentioned include the ground and first floors. The most repeated words and phrases were: 'relaxed', 'casual', and 'being with friends', and were most frequently applied to soft seating areas. For most, a community space in the library meant somewhere that was more informal, providing sanctuary from college work:

- "It's more casual [foyer] than the collaborative space" (P1/ PG).
- "You can sit on the couch and just relax a bit" (P9/ UG).
- "Go on your phone if you're taking a break from studying; there's no judgment or anything, it's just taking a break for yourself" (P10/ UG).

A community space represented somewhere they could be in the presence of friends without having to socialise due to the noise restrictions in place on the top floors:

- "We end up all sitting together there; it's a nice space to be with your friends and be able to have a little whisper [...]" (P3/ UG).
- "If you just want to read in a group, in each other's presence but still not getting distracted like being on the collaborative floor" (P9/ UG).

Participant two spoke of 'an isolated community' as everyone is working toward the same goal without actually interacting with each other.

Furthermore, it was clear from the interviews that participants were aware of the interplay between the design and their use of a space, confirming that, as Cavalho and Goodyear (2017) point out, "while learning cannot be designed [...] design affects learning indirectly" (p. 35). The small coffee-style tables in the lantern and beside the couches are commented on as follows:

- "The little tables are nice because you can put your coffee there" (P3/ UG).
- "The lower table always seems a little less formal and a bit more, you know, put your coffee down or whatever" (P7/ PG).

The limited soft seating in the lantern spaces was appreciated despite the fact that it made it difficult to get a seat there during busy periods:

- "Obviously, you could put more chairs there, but I actually think it's a benefit to not [...]. The fact that there's not too many is a good thing because it would be visual clutter and it would take away from looking at the window" (P8/ UG).

Another common motif was the importance of visual stimuli. This was apparent in one participant's discussion of the foyer space on the ground floor:

- "I like the exhibitions that are shown there; it's nice when you come in, there's something to look at and they change it out sometimes in different spaces. I really like looking through it. It's kind of like a mini museum" (P8/ UG).

This resonates with the research of Chan and Spodick (2014) who urge academic libraries to leverage stakeholders, artists and members of the community so that the library can also "serve as a mini gallery, museum and art centre" (p. 257). A strong sense of community fosters empowerment, which in turn, enhances experience and ultimately, investment and participation (Nguyen 2016).

One interviewee, on speaking of the mentoring suite on the first floor, noted how well the room would lend itself for community events:

- “You can have these [curtains] drawn or not drawn and these tables move. These chairs are very [moveable], so you can kind of bounce around and get really involved with people. I think it'd be great if you're doing a workshop [...] like an event for the community” (P5/ UG).



Figure 12: Ground floor foyer. Image taken by participant 1 for 'Community Space'.

5.7 Favourite Space

In terms of favourite spots, the third floor lantern space (30%) and window views away from desks (20%) made up half of the photographs. Comments on the lantern included:

- “I like this mainly because of comfort, you can see three-fourths of everywhere, it's nice and that's something that I really like about this library, the height, the verticality of it all” (P2/ UG).
- “I like the mixture of chairs. It definitely feels a bit more relaxed if you're not too worried about doing things. You just want to chill for a few minutes” (P6/ UG).

In terms of window spaces, the following was said:

- “A nice place to stand, enjoy the view, especially in the summer, get away from the chair for a while and try to gather my thoughts” (P1/ PG).
- “I do like standing there. It's another one of those [places] where you can kind of people-watch. There's a big window and I think it's nice if you want a breather [...] a moment to yourself, [to] have a look at what's going on and just relax” (P5/ UG).

The prevalence of windows in the favourite spaces of participants further supports the extant research that nature and the natural environment can have a restorative impact on people (Song et al. 2024; van den Bogerd 2018).

Ideally, a library should be a safe haven for students, a place to learn, be creative and ultimately, feel a sense of belonging. Taken together, the collected participant-driven photos create an image of a welcoming environment that addresses many of the needs of the student-body.



Figure 13: Third floor lantern space. Image taken by participant 3 for 'Favourite Space'.

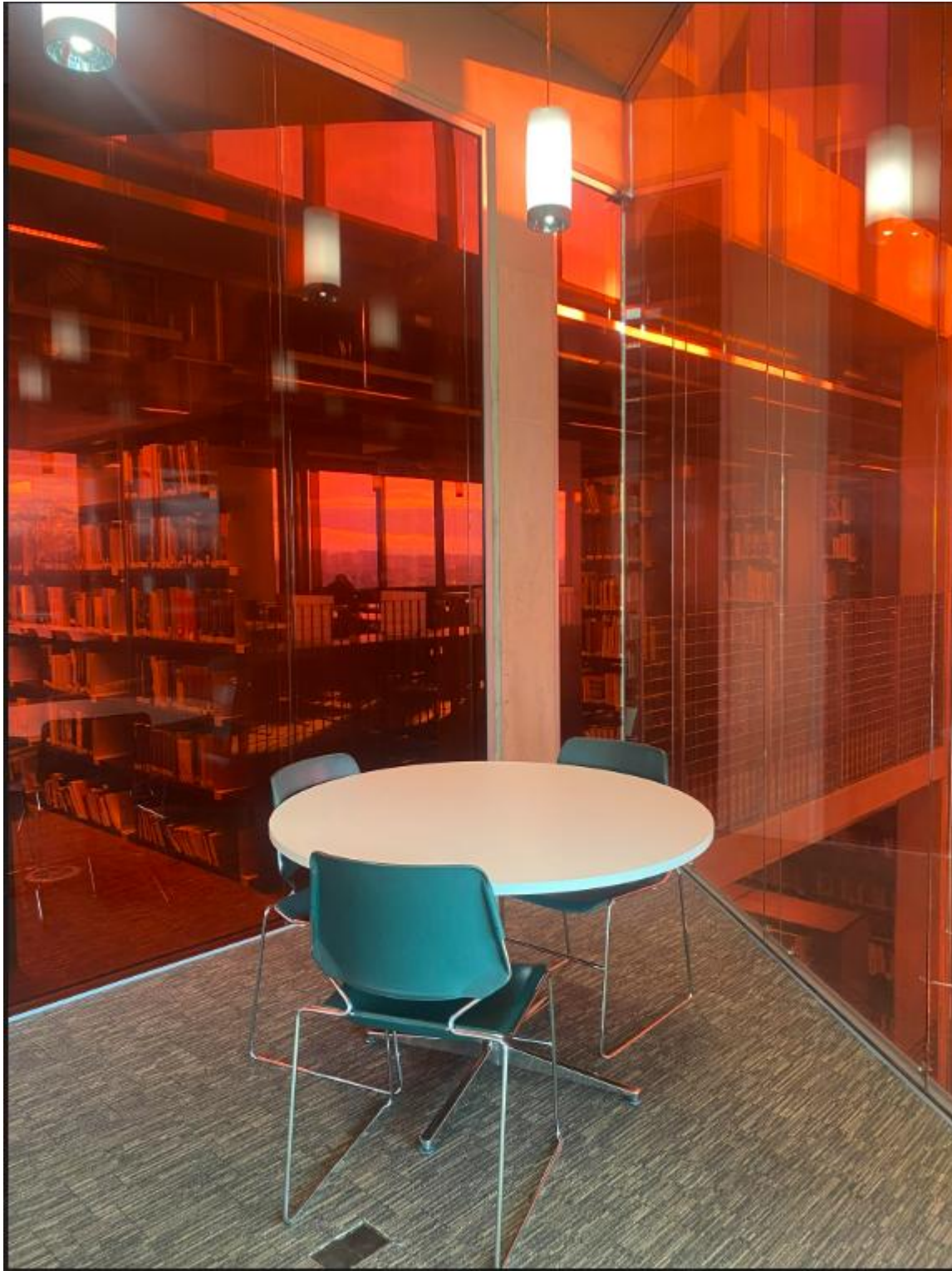


Figure 14: Third floor workspace. Image taken by participant 9 for 'Favourite Space'.

5.8 Researcher-Driven Images

This section analyses the reactions and opinions of interviewees to the images provided by the researcher. This will link the literature review, in particular Section 3.6 (Planning, Space and Design), to the collated primary data and address, in particular, objectives four and five. As the four-space model stems from the public library sphere and based on the hypothesis that the public library model throughout Europe is more customer-focused than its academic counterparts, it was deemed

appropriate to present images of public libraries around Europe for discussion. Emphasis here is on design and the aesthetics of the libraries rather than whether they are suitable for the needs of academic students. The photos offer a starting point (Bedi and Webb 2017) into the design preferences of the interviewees and sparked interesting conversation about how the case study library fared in comparison.

5.9 Space, Design and Furnishings

Library layout, workstations, seating arrangements, lighting and nature were the most cited aspects of design, which corroborate literature review findings (Cha and Kim 2015). There was a general preference for a simpler design that was more conducive to study rather than an overly elaborate aesthetic, a finding supported by the research of Crook and Mitchell (2012) and Chan and Spodick (2014).

- “I really like the Drumcondra one because it's humble, and a nice big open space” (P6).
- “[with] the colours I feel like I would be productive there. It just looks nice and quiet and calm and everything. And I feel like there aren't any distractions” (P6 on Dun Laoghaire).
- “I understand that they're probably, you know, very expensive buildings. But I'm not sure if it's that they're over-designed but they wouldn't inspire me to read a book like Drumcondra would” (P7 on Oodi/ Dokk1).

Wayfinding was important for some students; one participant observed that the case study university could benefit from the ‘red ribbon’ design of Hjørring library:

- “The college could do with some system like that, not necessarily just the library” (P2).

The need for more electrical charging points was a recurring issue, even when it came to looking at images of other libraries, which is in keeping with the literature as well as in-house LibQUAL results:

- “I think the only thing is, there's probably just not enough plug sockets. That's probably it. Yeah, it's like a free-for-all with the plugs” (P8 on Cregan).
- “We're all very happy with the library except for the plugs” (P3 on Cregan).
- “I don't really see any plugs there?” (P10 on Dun Laoghaire).



Figure 15: Drumcondra Public Library. Image taken from Dublin City Council Libraries. Available at: https://www.dublincity.ie/residential/libraries/find-library/drumcondra-library?utm_source=HeyDublin [Accessed 25/ 03/ 25].

5.10 Colour and Ceilings

Warm colours were preferred by a majority as well as light wooden interiors. The use of colour as well as soft furnishings contributed to a sense of *hygge* and coziness (Coburn et al. 2019):

- “I really like the colours in the library. I think it's cozy” (P4 on Cregan).
- “I like that it's primarily wooden, I think that looks nice [and] inviting because woods are quite warm” (P5 on Dun Laoghaire).
- “I'm not a huge minimalist kind of Scandinavian-style person. It's beautiful but not as cozy, you know, in the way that I would expect” (P4 on Deichman).
- “I like the carpet. I'll be honest, the stark walls, not a fan. I like colour and pattern” (P8 on Cregan).

Ceiling height was another factor determining how positively or negatively a library was rated. The work of Coburn et al. (2019) highlights that people feel safer in more open spaces. In the interviews, high ceilings were linked to a sense of openness and overall, were deemed more attractive:

- “The roof is a good height. It's far away from you [...] you feel like you can breathe” (P2 on Deichman).

Those with lower ceiling height were associated with a feeling of enclosure:

- “[A] claustrophobic room like that would freak me out” (P10 on Dublin Central).

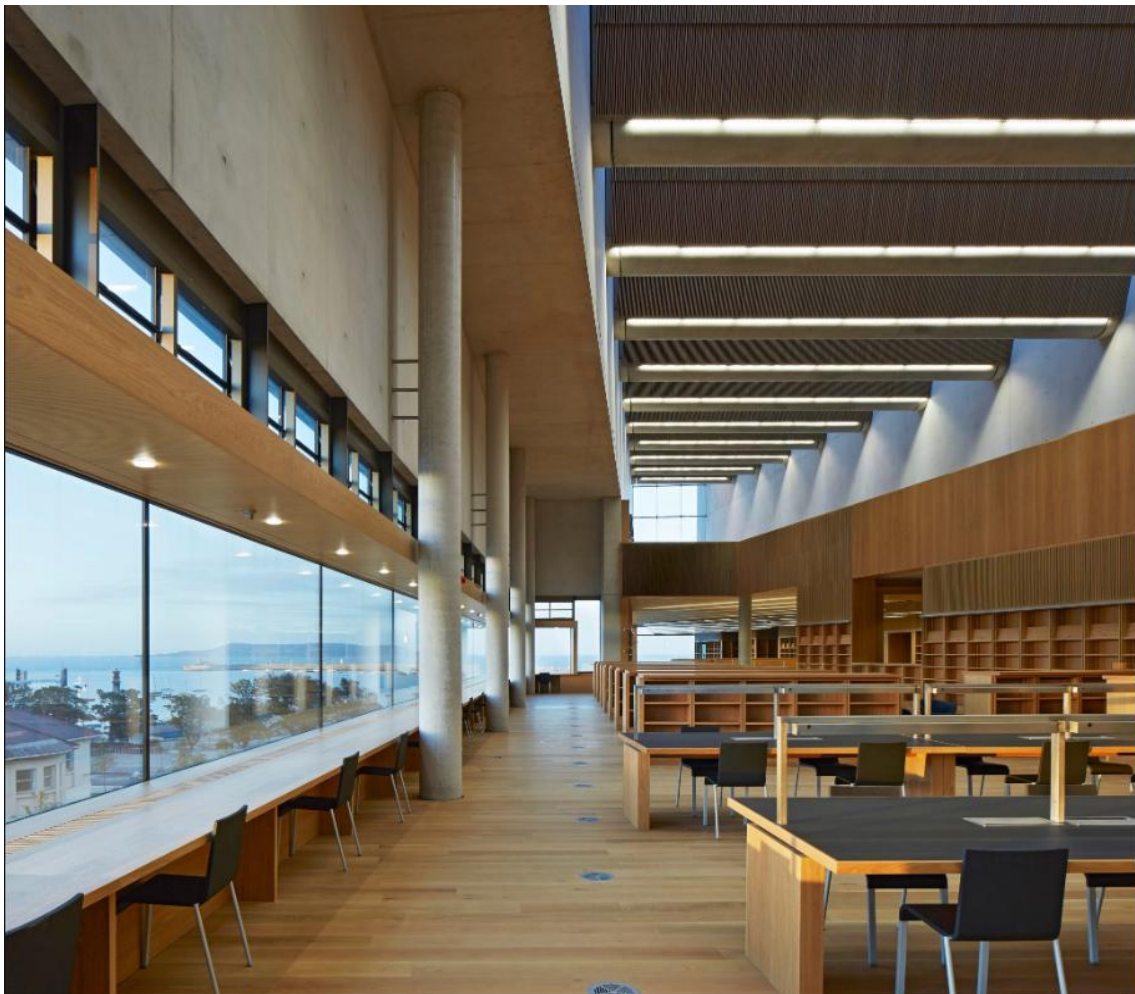


Figure 16: Dun Laoghaire Rathdown Library. Image taken from Archilovers. Available at: <https://www.archilovers.com/projects/143329/dun-laoghaire-rathdown-library.html> [Accessed 25/ 03/ 25].



Figure 17: Dublin Central Library. Image taken from Dublin City Libraries. Available at: https://www.dublincity.ie/residential/libraries/find-library/central-library?utm_source=HeyDublin [Accessed 25/ 03/ 25].

5.11 Seating

The need for a wide variety of seating that was functional yet comfortable was made abundantly clear. Soft seating was associated with relaxing and chilling in communal or community spaces; benches and round tables were considered collaborative, while upright chairs and carrels were linked with learning and quiet study. Seating along the periphery was generally favoured over aisle carrels (DeClercq and Craz 2014). Comfort was key for the majority (80%):

- “It's [couch] comfortable, but it keeps you focused. It's not a beanbag. You're not getting too comfortable” (P2 on Cregan).
- “I love those chairs [swivel]. You can really sink into them” (P3 on Cregan).
- “I think they're cool [chairs], not sure if they'd be comfy though. Can't tell that from a picture” (P4 on OBA).
- “I think the chairs in Amsterdam look a lot more comfortable, cozy. These [sofas] are more office-y [in the Oodi]. This [OBA] gives more of a living room relaxed vibe” (P5).

The modern pink seating displayed in the Hjørring library image was least favoured by participants who viewed it as impractical, uncomfortable and more like a ‘waiting area’. Aside from comfort, a number of people commented on the ergonomics of the seating and displayed a preference for back support:

- “Again don't like these [backless benches and stools]. I think you can tell a theme here! Yeah, I'm really pro-backs on chairs. Back support is very important. I wouldn't want to go

here to study; [it] would be uncomfortable and I'd end up coming out like the hunchback of Notre Dame" (P5 on Dokk1).

- "I've never sat on a bench doing work. I need some support. I always feel like my back is slouching or something" (P10 on Dokk1).

DeClercq and Cranz in a 2014 paper highlight the importance of postural support and argue that academic libraries should offer a multitude of seating options and dispense with the outdated notion that studying should be conducted in straight-back chairs.

One participant with ADHD appreciated the swivel chairs in the lantern space in Cregan as spinning helped ease anxiety:

- "It doesn't affect me too much, but I do tend to move when I'm working, so it's nice that my hands can stay still, my brain can focus but I can be spinning" (P4).

Flexible and adaptable seating was popular as was cushioned chairs (Choy and Goh 2016; Chan and Spodick 2014):

- "I prefer the chairs [to benches] because you can move them around as you want" (P3 on Cregan).
- "I think [the benches are] good. They're not too heavy to move if you want to scooch them in a bit closer" (P6 on Cregan).
- "So maybe ones that have some sort of cushioning or something especially for people with disabilities. I have hypermobility and sometimes chairs like these [plastic, un-cushioned] mean I have to get into really weird positions to be comfortable" (P5 on Cregan).
- "It would probably be nicer to have seats that are a bit more cushioned" (P10 on Cregan).

The pod-style seats in the Oodi in Helsinki, offering privacy and comfort were popular with a number of participants who felt they could work well in Cregan:

- "I like these egg chairs. I think they'd be very cozy if you were just reading and relaxing. They would probably be cute in DCU library" (P5).
- "I quite like these pods. I think that a variant of them here could be quite cool" (P7).



Figure 18: Magazine area of OBA. Image taken from Jo Coenen Architects & Urbanists. Available at: <https://icau.nl/portfolio/oba-amsterdam-public-library-renovations/> [Accessed 25/ 03/ 25].



Figure 19: Hjørring Central Library. Image taken from Archilovers. Available at: <https://www.archilovers.com/projects/158411/hj%c3%b8rring-central-library.html> [Accessed 25/ 03/ 25].

5.12 Desks

In terms of workspaces and in keeping with findings in the literature, students liked to spread out their things. The generous spacing between the window-facing desks in Dun Laoghaire proved popular with many interviewees, however, not at the expense of losing workstations:

- “Those look like they're a bit bigger, like they're wider spaced than our ones. I'd say it's fine for there [with no dividers] but I wouldn't say you need that much space, so I'd say for here it's better for them to be closer together and get more people in” (P6 Dun Laoghaire/ Cregan).

Round tables and larger rectangular workspaces were preferred for collaborative work.

Desk dividers were considered useful as a means of maintaining a level of privacy, as were the individual desk lamps of the Black Diamond:

- “I definitely think they [dividers] can help because it creates an individual space for each person” (P5 on Cregan).
- “Lights on the desk would [be] useful” (P1 on Cregan).
- “I like how the dividers are actually built into the desk. You can tell the furniture was built for that [purpose] and the little lamps, you can control your own lighting” (P8 on Black Diamond).



Figure 20: Black Diamond Reading Room. Image taken from Book Jelly. Available at: <https://bookjelly.com/top-literary-destinations-in-denmark/> [Accessed 25/ 03/ 25].

5.13 Lighting

Lighting is an important factor when it comes to creating a conducive ambience. Students' preference for natural light has been well established (Cha & Kim 2015; DeVille-Holly 2024; Khoo et al. 2016) and is evident in the comments of interviewees too. In terms of the case study library, the majority of respondents were happy with the lighting although the addition of individual desk lamps was suggested on a number of occasions. The most popular library images were those with ample natural light (Deichman in Oslo, Dun Laoghaire in Dublin and The Black Diamond in Copenhagen):

- "The window is huge so I'm sure the light is good" (P1 on Black Diamond).
- "I like the bright ones with natural light; you can look out the windows" (P3 on Deichman).
- "Here it makes great use of natural light" (P7 on Dun Laoghaire).

The least preferred images were those with less natural light:

- "It looks a bit dark there" (P3 on Dublin Central)
- "The lack of natural lighting, it's all artificial lighting" (P10 on Dublin Central).
- "I think I would need to go for a few movement breaks and walks with that light" (P3 on OBA).
- "I prefer more of a natural kind of light. Yeah, it just looks a bit industrial" (P6 on OBA).

Bossaller et al. (2020) explain that natural light is not only beneficial when it comes to concentration levels but on a deeper level, it 'regulates the body's production of cortisol and melatonin'; a lack of natural light can have 'negative effects on mental health' (p. 5). Windows were referenced over 50 times throughout the ten interviews. Students expressed a preference for sitting at window desks, getting inspired by nature, and watching the city outside the windows, as well as stretching their legs and gazing out of a nearby window. The stained-glass windows of Cregan sparked creativity, inspiration and visual interest for users.



Figure 21: Deichman. Image taken from ArchDaily. Available at: https://www.archdaily.com/942813/deichman-library-atelier-oslo-plus-lund-hagem/5efca5b1b35765a0a60004f3-deichman-library-atelier-oslo-plus-lund-hagem-photo?next_project=no [Accessed 25/ 03/ 25].

5.14 Nature

Participants, as well as positioning themselves near windows for natural light, also liked to look out at nature or a nice view (70%) and appreciated the calming effect of nature:

- “nature would always calm me down” (P2).

Studies suggest that “naturalistic architectural spaces may confer some of the same psychological benefits as natural landscapes” (Coburn et al. 2020 p. 220). Seventy percent of interviewees commented positively on the greenery displayed in the researcher-driven images:

- “The plant is a nice touch” (P1 on OBA).
-
- “I like this sort of thing, like a very small bush. Everything's not just plastic, stone or wood” (P2 on Dokk1).

Opinion was split, however, on how much greenery was too much. This was very much the case with the image of the Oodi in Helsinki:

- “There's a lot more greenery. Like whole trees there... Maybe they overdid it a little bit” (P1 on Oodi).
- “Plants would be nice, actually. Yeah, the plants in the Helsinki one are lovely” (P3 on Oodi).
- “I like that they've put some plants in. That's always nice” (P5 on Oodi).

Biophilia represents a growing body of research as we seek respite from an increasingly technologically driven environment. “Effective contact with nature can lead to the fulfilment of biophilia, triggering physical and mental restoration in turn” (Song et al. 2024 p. 2). Moreover, van den Bogerd et al. (2018) found that simulated nature can evoke feelings of restoration. Interview

findings confirmed that participants displayed a preference for libraries with touches of greenery and, in absence of greenery, they chose ones with large windows and views of nature. The least favoured image was Dublin Central Library, which lacks both greenery and natural light.



Figure 22: Dokk1. Available at: <https://jeanyvesgilg.com/wp-content/uploads/2015/08/p1020908.jpg> [Accessed 25/ 03/ 25].



Figure 23: Oodi Central Library. Image taken from Love that Design. Available at: <https://www.lovetthatdesign.com/project/oodi-helsinki-central-library/> [Accessed 25/ 03/ 25].

5.15 LibQUAL

LibQUAL, a web-based survey helping libraries assess and improve their services and based on the perceptions of staff and students, is regularly utilised by DCU Library. It measures library users' minimum, perceived, and desired levels of service quality across three domains - 'affect of service', 'information control', and 'library as place'. In 2024, the library had 1,291 responses. Results found that the library as place topped users' priority list, with the 'library as a haven for research and study' being the key concern for undergraduates, closely followed by 'quiet space for individual work' and 'a comfortable and inviting location'. These results corroborate the findings of the researcher that library space and design is of fundamental importance to students and furthermore, that the four-space model is a suitable framework from which to examine library strategy and any potential redesigns. The majority of comments also fell within the 'space/ building' category (374 out of 877), reiterating the significance of space and design as found in the researcher interviews. In keeping with the findings of this study, LibQUAL feedback was largely positive and constructive. Negative comments centred around charging points and the need for more seats, both of which are common in the literature and were frequently mentioned in the project interviews.

6. Recommendations and Conclusion

6.1 Recommendations

6.1.1 Overview

The following recommendations reflect the final outcome of this project, outlining how the four-space model can be meaningfully applied within an academic library context. Building upon the various aspects of this work - the methodology, the literature review, and the findings, the checklist provides a practical blueprint for an academic library wishing to instigate change using the four-space model. The implementation of these suggestions, based on the four-space framework, signals more than a redesign, it reflects a commitment to inclusivity, participation and user-centred learning.

Crucially, these recommendations all stem from consultation with students. Their insights into what they need to progress academically and to flourish socially are invaluable for both librarians and decision-makers. By actively listening to students and remaining attuned to changes in pedagogy, technology, and user behaviour, academic libraries can continue to foster meaningful learning environments. Above all, this work encourages library professionals to listen more closely to student voices and to remain inspired by and open to innovation within academic libraries and in the broader public library landscape.

6.1.2 Checklist

- **Recognition that the academic library is a 'multi-purpose venue'** (Goy and Choy 2016 p. 26). Libraries are no longer just storehouses for information but places to study, socialise, and share in a communal experience. They clearly represent a 'third place' between work and home.
- **Meet multiple needs simultaneously.** Modern libraries must strive to satisfy not just the basic physiological needs of users but have strategies in place to address the equally important higher needs of belonging, self-actualisation and aesthetics (Maslow hierarchy). As librarians we have a responsibility to understand the impact our environment can have on our users.
- **Increased community involvement.** By encouraging stakeholders and community partners to avail of library spaces for events, we are providing a gateway to a more participatory culture and increased user engagement. Inspiration and creativity can be sparked directly and

indirectly through interaction with exhibitions, student displays, and library outreach activities.

- ***Listen to students' voices.*** Students appreciate an aesthetically pleasing library and feel a sense of pride in 'their' library. This was made very clear in the interviews.
- ***Flexible design.*** Customisable furniture and a variety of seating options give users a sense of agency in designing their own workspaces. Learning how to create a conducive learning environment is key to creating life-long learners. Students were vocal in their need for a diversity of spaces to study, collaborate, socialise and to unwind.
- ***Innovative design.*** Interview data revealed that students like a 'traditional' library yet needed visual stimuli for physical and mental relaxation. Small pockets of the unexpected can bring joy and whimsy - cozy nooks, board games, interactive displays can all add a much-needed element of playfulness.
- ***Inclusive design.*** Incorporating a design that enables neurodivergent and disabled users to have the same user experience is paramount. Small design touches such as customisable lighting, an array of ergonomic seats and sensory additions to open relaxation areas (weighted blankets, stress balls, tactile cushions etc) would confirm a commitment to inclusion.
- ***Adding a performative space.*** Students should be supported in unleashing their creative potential, helping them to become active producers in an experience-led culture and preparing them for future workplaces. Makerspaces, podcasting rooms, and weekend workshops can make a space more dynamic.
- ***Greenery.*** Empirical data supports the addition of plants and greenery in indoor spaces to make them more welcoming and to create a healthier environment for staff and visitors.

6.1.3 Future Studies

While this study fills a gap in the current empirical literature on library space and design, it acknowledges that there is room for further research. In particular, discussion of the application of the four-space model to the online domain of the academic library and its impact in growing an online community was beyond the scope of this project.

6.2 Conclusion

"Communities lie at the heart of the modern library" (Lankes 2024 p. 601). This project began with a set of interrelated objectives: to critically examine the Danish four-space model, evaluate its relevance and applicability to academic libraries, and explore how it might facilitate a more holistic, user-centred library experience. It aimed to assess the model's transferability to an academic context, investigate students' interactions with the case study library alongside public libraries across Europe, and ultimately to develop a set of practical, evidence-based recommendations aligned with the model. Over the course of this research, each aim has been addressed systematically, resulting in insights that are both academically relevant and practically applicable.

From a scholarly perspective, this study fills a clear gap in the existing literature. While public libraries have long been explored as dynamic, participatory cultural spaces, and interest in understanding university students' needs within academic libraries is growing within the LIS field, limited research has considered the intersection between these domains. The potential for academic libraries to draw inspiration from the public library sector remains under-examined, especially in the context of planning and design. With the exception of Leung et al., there is a distinct lack of research applying the four-space model to academic environments. This project therefore represents a timely contribution to research, particularly within the UK and Ireland where the model remains relatively unknown. Through the application of the four-space model to an academic context, this project will open new avenues for both theoretical exploration and practical application.

The chosen methodology, grounded in qualitative, user-centred research, enabled the study to be led by the voices of students themselves. Photo elicitation interviews allowed for rich, detailed insights into how students experience and interpret library spaces, while also reflecting broader pedagogical and social shifts. The interdisciplinary nature of the objectives, drawing on education, architecture, design, and sociology, demanded a flexible, integrative approach that remained responsive to the data. In doing so, the theoretical framework was embedded with the lived experiences of students into a cohesive and structured analysis. What emerges is a confirmation of the four-space model's relevance and adaptability.

The findings support the hypothesis that the model's emphasis on learning, meeting, inspiration, and performance is not only compatible with the academic environment but in many ways essential to its future sustainability. The academic library of today must go beyond information provision, becoming a truly participatory space, supporting creativity, collaboration, and community, while still encouraging learning and academic achievement. Students expressed a strong desire for flexible, inclusive, and aesthetically pleasing environments, and their input highlighted how physical space influences not just learning outcomes but emotional wellbeing, identity, and a sense of belonging. As Bedi and Webb (2017) observe, 'students' experiences are interwoven with particular spaces and objects' (p. 27).

The culmination of this research is a set of recommendations, weaving all the evidence together into a practical toolkit. It is hoped that this checklist will not only inform the design of physical spaces but also guide institutional policies, aligning them with the model to create a holistic user experience. Ultimately, this study demonstrates that, despite being developed over a decade ago, the four-space model remains both innovative and highly relevant. It has been implemented in public libraries across Europe, including Ireland, and can be readily adapted to meet the specific needs of academic libraries. In fact, for university libraries to retain their standing as educational beacons, they must look to the public library sector and actively listen to their user communities. Once this has been achieved, the physical spaces can evolve in a way that reflects the inclusive and participatory ethos of the four-space model.

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