MASTER OF SCIENCE BY RESEARCH

Design criteria for social spaces and a healthier university campus. A Coventry University case study?

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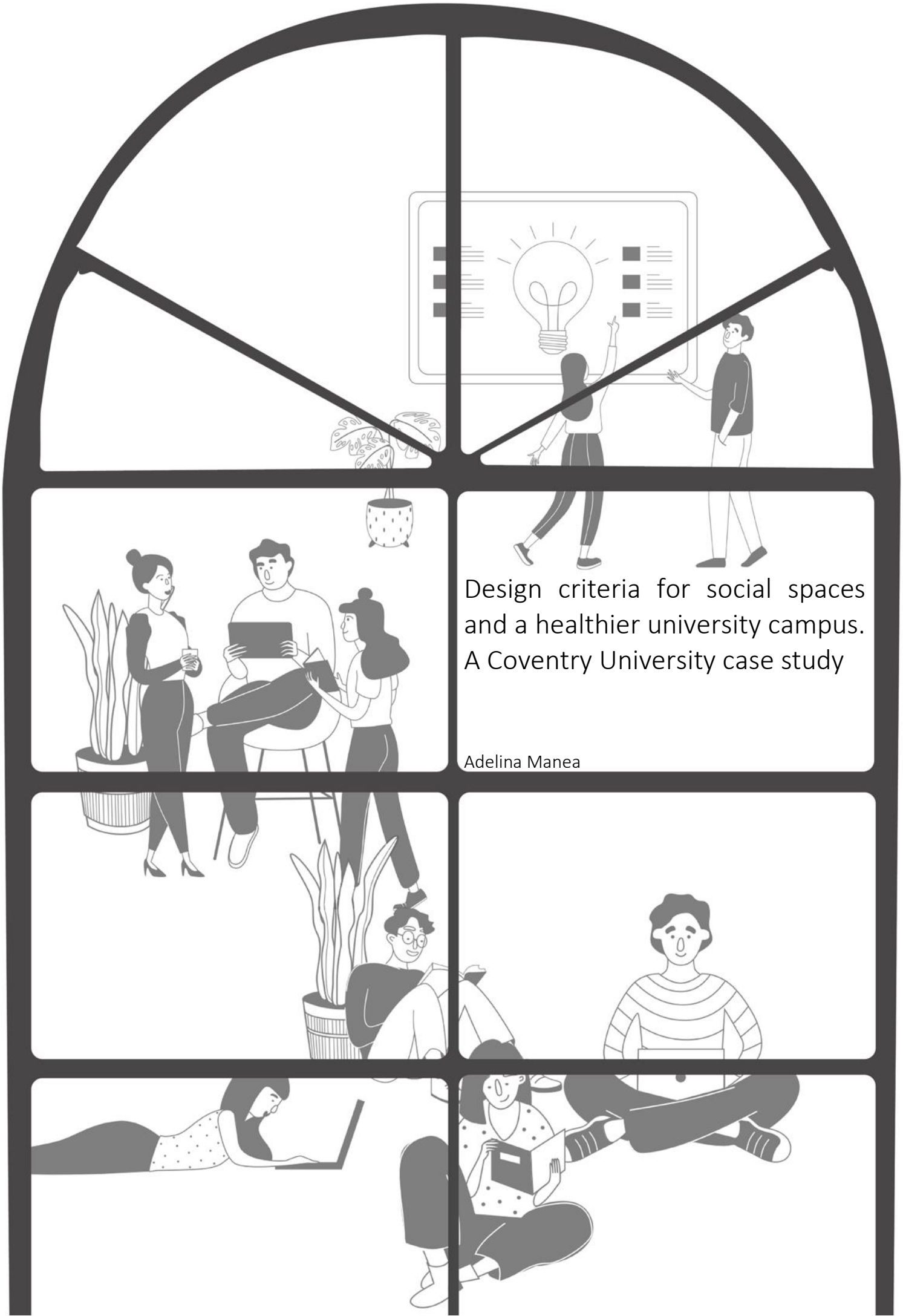

Design criteria for social spaces and a healthier university campus. A Coventry University case study

Adelina Manea

Abstract

Wellbeing has been discussed at large in the last few years, both in academic work and by the wider population, and numerous studies have been done about wellbeing in the built environment. This work aims to investigate design that promotes wellbeing in the academic environment, by interrogating methods to encourage wellbeing from psychology, investigating spaces which promote it to extract the key features, and mapping existing building rating systems to identify gaps. Primary data collection was mainly conducted during the COVID-19 national lockdowns, therefore online interview methods were used, and analysis was done using a mixed method approach, with both quantitative and qualitative methods.

Results show that buildings which have a green certification provide spaces for wellbeing, but not consistently at the same levels, therefore the Social Spaces design criteria were developed as part of this study, to assess core campus social spaces on their accessibility to campus users, the flexibility of the space, as well as access to natural features such as greenery, light and water, food and drink opportunities, and toilet facilities; to be used at all stages of the design process, for new buildings and refurbishments, in conjunction with green certification systems. The study focused on a city centre university campus, Coventry University, which found that healthy physical spaces are important in academia and valued by students and staff. This is the first time when a study of this kind has been carried out in the UK on a city centre campus. The significance of this study is to provide designers with tools to create spaces that are supportive and welcoming staff and students and therefore enhancing the value of design.

The outcomes of this study can be applied on existing and new building design to improve the quality of social spaces, whether they hold a green certification or not.

Keywords: BREEAM, LEED, WELL, wellbeing, social spaces, healthy workplaces, healthy study spaces, productivity, COVID-19, student satisfaction

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1. Introduction

The aim of this study was to investigate good campus design and its impact of the health and wellbeing of both students and staff and their ability to study and lecture in a facilitating environment. Although for students the experience is relatively short, it has been discovered it can have large ramifications into their lives (Yair, 2008) as it sets out rules and boundaries for working practice, and with more people choosing to pursue an undergraduate degree in the UK today than ever before (Clark, 2022), the university experience will impact an increasing proportion of the population. This topic has been explored through the psychology lens, but there is limited research about designing spaces to flourish, therefore this study aims to determine new ways to analyse design to enable designers and stakeholders to make informed decisions when it comes to university campuses.

The gaps in research will be outlined in the chapters to follow, examining existing research about wellbeing and design factors that influence wellbeing, analysing studies about design for education and critiquing design analysis tools such as LEED and BREEAM, and investigating the place of university campuses in or around urban areas as well as the importance of social spaces. The methods used for this study are unusual as all data collection was done during COVID-19 lockdowns, which required the use of online technologies. An in-depth analysis and critique of design scoring frameworks will also be detailed.

The focus will be on the case study of Coventry University campus, investigating user perceptions and preferences of spaces on campus, analysing these spaces from a design framework view, and aiming to determine which factors hold most importance in their design. An analysis of students' sense of community before, throughout and after COVID-19 lockdowns will also be shown, to determine the link between community and space. At the end of the study a design criteria model for social spaces will be introduced to work together with design frameworks and improve campus design for the future.

Aim

The aim of this study is to develop a scoring model for spaces on university campuses which encourages wellbeing in an academic environment to support students.

Objectives

1. Perform a systematic review of design scoring principles in relation to health and wellbeing to understand commonalities and limitations.
2. Apply design scoring principles to relevant spaces in Coventry University Campus to evaluate their quality with a wellbeing focus.
3. Investigate the perception of Coventry University campus by different user groups focusing on quality of space and its impact on wellbeing.

4. Analyse the link between wellbeing and built environment at Coventry University to develop recommendations with further application.
5. Develop a simple assessment model for social spaces.

2. Wellbeing and learning environments: design considerations

This study will investigate how university campuses have been designed, the way the spaces within them have evolved and how the quality of this design is quantified. It will assess the multiple roles spaces have in a campus, their usage patterns and impacts on those who use them, with a particular focus on wellbeing. Scholars have been interested in how spaces impact users for decades (Searles, 1960), and this study aims to investigate how these theories apply on a university campus, with a focus on teaching and learning, and productivity, for both staff and students.

A university campus is a transitional and formative place for students, the experience of coming to university along with school years is a part of the self-discovery process (Yair, 2008), studies have indicated that participation in higher education can be a predictor of political and civic involvement, as well as other measures of social participation (Ahier, et al., 2003). Yair (2008) also found that students' unexpected success in facing academic tasks of difficulty had long-lasting effects on their sense of self, largely because of self-discovery. They also make a point of second chances in academia, referring to those less integrated in society, but this is also valid for all students. The ability to reattempt or resit a piece of assessed work is immensely formative as it allows students to go through an iterative process not only with the work but also with the approach to learning.

Many of the experiences in university years are "peak experiences" as described by Maslow (1968, 1970, 1971). They refer to episodes in one's life that denote ecstatic, highly emotional short-term experiences, and that have long lasting formative effects. They also suggest that long-term effects of peak experiences emanate from a process of identity transformation or self-discovery. These experiences are also referred to as "crystallising" experiences (Gardner, 1983, 1993; Walters & Gardner, 1986), showing that they may either uncover hidden potential or new pathways (refining experiences). Although some students make choices about career paths before the start of university, in most cases in the UK, many students learn more about themselves, forming identities and academic talents in relatively short experiences. They discover not only new abilities, new tastes, or preferences but also new interests and inclinations.

When investigating success in the academic environment one must interrogate the concept of flourishing. Flourishing is the desired development of a person in a nurturing environment, having positively forming experiences and being overall in a better situation at the end than at the start of the experience (Clements-Croome, 2000). Overall wellbeing, physical health, academic achievements, and other indicators of success can be used to define flourishing (Clements-Croome, 2000). A university campus is also a place of learning and self-development by design. Lau and Yang (2009) investigated the link between learning space and wellbeing in a university campus in Hong Kong and found that natural or green spaces were used frequently, when the weather permitted, indifferent of size, if certain design implements were used. As results, they provided formulae for comfort using depth to width ratios.

A university campus is a workplace, and successful workplaces are highly productive ones. Productivity and wellbeing are closely tied as users have shown higher satisfaction levels when working in a perceived high productivity place; those who were less satisfied showed lower levels of self-estimated productivity (Isham et al., 2020). A metanalysis by Frontczak et al. (2012) of ten studies showed that the following factors were important when it came to a place of work: air quality, thermal comfort, acoustic comfort, the view, control over own work environment, privacy and size of workspace, cleanliness, layout, and quality of furniture. The most important was availability of space and second were noise and visual privacy.

The university campus is a place of work for academics and support staff as well as a temporary place of work for students and is in this respect dissimilar to an average town where the work patterns are more varied. A good quality learning space is a resource for academics, a RIBA commissioned study found that one in twenty teachers have left a workplace due to physical working conditions, and a further one in five have considered leaving a workplace because of the same factors (RIBA, 2016). When considering universities and trends in working, similar demands were found to other office-based work, with the added requests for good teaching and learning spaces (Mulrooney & Kelly, 2020). University staff interact with learners in more ways than just the classroom, using the full depth of facilities available. Moreover, administrative staff rarely interact with students in a classroom scenario.

The campus can be seen solely as a place of work for several months outside the academic year when less students are present on campus and therefore it could be said that a university campus is primarily a place of work and secondarily a place of education. WorldGBC (2015, 2020) lead the Better Places for People campaign aiming to raise awareness of healthier building and how this impacts those using them, linking design to health and productivity. These links correlated green design to quantifiable positive impacts on the wellbeing of users, demonstrating that green buildings could improve health, wellbeing, and productivity, and can be linked to nine overarching factors: Air quality, Thermal Comfort, Daylighting and Night lighting, Biophilia and Views, Noise, Layout, Look and feel, Active design and Exercise, and Amenities and location, with significant influence on overall design and its impact on users.

Air quality is linked to natural and mechanical ventilation, the option to open windows, as well as the presence of microorganisms, asthmagens and allergens. Good solutions do not only involve a good supply of fresh air, but the careful consideration of the air's composition and health. This has been proven to be more important when involving infectious diseases that are airborne. Thermal comfort is associated with individual preference, metabolic rate, and clothing, while daylighting has been linked to comfort, health, successful communication, and safety, maintaining the circadian rhythm has been linked to good health (WorldGBC, 2014). Biophilia refers to the desire of human beings to interact with the outside world through a window or by spending time outdoors, noise can be a distraction as well as a contributor to stress and can negatively impact health, however the lack of noise can also be experienced in a negative way, therefore a balance must be found. The layout of a building's space is linked to the noise experienced.

Good layout design empowers users to choose the best environment for the task, as well as providing space for socialisation and relaxation, while the look and feel as well as active design and exercise engages minds and encourages users to move. Look and feel is also a primary factor in space identity, how emotional bonds to space are created; as well as the surrounding amenities for restaurants, walking and cycling opportunities, the provision of showers, and perceived and designed safety. The presence of good amenities encourages user participation and creates popular spaces.

The survey commissioned by the RIBA (RIBA, 2016) had with responses taken from 501 teachers and emphasised the need for good spaces to learn, 93% stated that good design leads to a good learning environment, 81% linked it to student educational outcomes and 65% to a reduction in bullying. Considering schools as workplaces, teachers need well designed spaces for positive student behaviour (93% agree), the space to carry out assessment and planning (90% agree) and flexible space (83% agree) to carry out their roles as best as they can. To also make these spaces healthy they need good lighting (92% agree), good ventilation (91% agree) and spacious i-learning areas (83% agree).

Warr (1998a, 1998b) proposed a bi-dimensional view of wellbeing, with pleasure and arousal axes, as well as an anxiety – comfort and depression – enthusiasm axis as shown in Figure 1, they also stated that personal characteristics, age, and gender can be significant. The environmental factors described were opportunities for self-control, opportunity to use one's skills, goal setting, variety, the environment, security, support system, personal contact, and status. Heerwagen's formula (1998) also shows a relationship between environment and productivity (P) which is significant to this study.

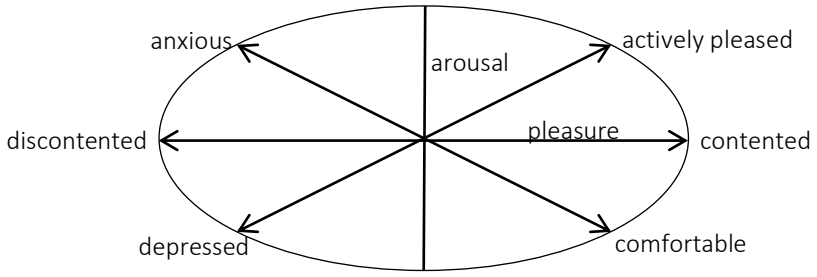

Figure 1 - Warr's wellbeing axes

$$\boldsymbol{P = Motivation\ x\ Ability\ x\ Opportunity}$$

Equation 1 - Heerwagen's productivity formula

The setting provides physical and social ambiance which can affect motivation. The RIBA (2016) study found that 20% of teachers have considered leaving their job because of the conditions and 5% have left. Effective learning spaces are not only needed for the development of students but also to help teachers deliver and assess the curriculum.

Need	Achieved by
Physiological	Good working conditions, attractive salary, subsidised housing, free catering.
Safety	Private health care, pension, safe working conditions, job security.
Social esteem	Group relationships, team spirit company sports, office parties, informal activities, open communication.
	Regular positive feedback, prestige job titles, write-up in company news sheet, promotion and reward.
Self-actualisation	Challenging job, discretion over work activity, promotion opportunities, encouraging creativity, autonomy and responsibility

Figure 2 - Achieving Maslow's Hierarchy of Needs in the Workplace (CIBSE 1999; Huczynski 1991)

Aesthetics and layout were mentioned as key influencers of productivity, and they are more important when designing creative spaces, as they need to cater to a variety of activities and users. Different levels of light and noise are required as well as different workspace sizes, which makes designing flexible creative spaces challenging. Designing spaces to encourage creativity involves not only designing for the creative disciplines but for creative problem solving and high-level critical thinking. Creative spaces could therefore be team working spaces as well as suitable for lone work (O'Bryne, 2018). Creativity and innovation are not linear processes but there have been distinct phases identified. Creativity can therefore be seen as "preparation", "incubation", "insight" and "elaboration and evaluation" (Wallas, 1926). Innovation has been depicted to contain "discovery" / "idea", "definition", "research", "development", "validation" and "diffusion" or dissemination (Cooper, 1990).

When investigating ways to measure wellbeing, natural spaces are highly desired, with green or natural spaces often seen as healing spaces (Marcus and Jones, 1999). Fu (2018) examined the link between depression and communal spaces in a Chinese society that is currently going through a shift from communal to private. A communal space is defined as a "public space within neighbourhood boundaries". Landscapes have also been considered a link to self and spirituality (Tuan, 1976), have proven to improve mental health outcomes and to boost productivity (Searles, 1960). Being outdoors has also been proven to reduce stress, even acute stress symptoms (Ulrich, 1984; Kaplan and Kaplan, 1989) and having a balance between time spent outdoors and indoors can lead to an increased sense of wellbeing (Christiansen and Baum, 1997).

Most assessments of learning environments consider light, spatial, and acoustic measures but do not consider views, proximity to certain spaces or activities, and while methods to assess the design of learning spaces have been developed, this study will focus on wellbeing. The following paragraphs discuss decisive factors that influence wellbeing, such as natural light, sense of ownership, natural ventilation, thermal comfort, colour, visual interest, flexibility, acoustics, and a simple design. While not all of these are clearly linked with design elements it shows a glimpse of what users perceive as good design. Light, air quality, temperature and acoustics are regulated in the UK by Building Regulations while ownership, colours, visual interest, flexibility, and simplicity are left to interpretation (Approved Documents, 2020).

In addition to the direct link to wellbeing, green spaces can be seen as places of reflection and introspection (Adevi and Lieberg, 2012), as well as becoming the object of attachment (Stewart et al, 2004), becoming "their

place" "the favourite place" or "the only place" for a certain activity (Lieberg, 1995; Korpela et al, 2001), forming part of human identity. This attachment helps preserve the identity of an individual, group or culture (Low and Altman, 1992). While this is true for most people, one cannot ignore that people will move around space depending on the relationship they have with it. Friedmann (2007) describes this as space getting its character and morphing to 'place' by being lived in. Therefore, participants use a communal space that is not in the vicinity of their home, but that has another appeal to it like nature, shopping or food opportunities and human relationships (Gieryn, 2000).

Wellbeing is linked to productivity, with low productivity having an impact on attendance, the taking of long breaks, lack of care over work, lack of routine, frustration with those of authority and boredom. Another aspect of wellbeing is identity, when analysing space in the context of social identity and special ownership and in turn, belonging, the concept of formative spaces must be taken into consideration, where key experiences take place (Warr, 1998). Schutz (1967) discussed the multiple realities associated with perception; the same space will be an actor and a backdrop to a multitude of stories and identities. A University campus is a space of congregation for likeminded individuals, from students interested in the same disciplines as lecturers and administrators, and is the place for permanent and temporary communities, which further shape and define identities (Lefebvre, 1994). The act of dwelling – even for short periods of time – creates place and local identity formation. Feld and Basso (1996: 11) define a sense of place:

> *"The terrain covered here includes the relation of sensation of emplacement; the experiential and expressive ways places are known, imagined, yearned for, held, remembered, voiced, lived, contested, and struggled over; and the multiple ways places are metonymically and metaphorically tied to identities"*

There are some widely agreed upon design principles that can create areas that encourage wellbeing, such as walkability with everything near to home or work, where streets are lively with activities and shops, which is closely linked with connectivity, providing multiple routes from one place to another as well as good public transport links and a focus on pedestrians, and diversity and density, with a mix of shops, office, flats and homes as well as welcoming diverse people, different ages, incomes and cultures, though a diverse housing market which includes different sizes, types and prices; good quality architecture and urban design with buildings and spaces that are comfortable, establish a sense of place, with an emphasis on beauty and aesthetics. Implementing these principles has proved to lead to a better community bond and improvement of human wellbeing (Zuniga-Teran et al., 2015). In the following chapters the application of these principles to university campus design will be interrogated, and how elusive terms such as 'connectivity' or 'good quality architecture and urban design' can be qualified.

2.1. Sustainability assessment frameworks

2.1.1. Sustainability indicators

Good design is hard to measure, and multiple schemes have attempted to quantify design measures. Most of these frameworks rely on indicators and were initially sold as sustainability frameworks. This chapter will explore Building Research Establishment Environmental Assessment Method (BREEAM), designed and run by Building Research Establishment (BRE) in the UK, Leadership in Energy and Environmental Design – Neighbourhood Development (LEED-ND), predominantly in North America, WELL (full name, not an acronym) administered by International Well Building Institute (IWBI), Sustainable Project Appraisal Routine (SPeAR) designed and run by ARUP in the UK and globally, and the Flourish model developed by Derek Clements-Croome (2016).

2.1.2. BREEAM

BREEAM pioneered environmental assessment through a framework. Starting in the UK in 1990 and initially only applied to new buildings it is an ever-evolving scoring framework. It now applied to entire areas or communities and retrofitted buildings in over 50 countries (BREEAM, 2020). The Communities aspect considers more than materials and technologies, is also tackles social change and governance. The pre assessment framework is split into 10 categories, including innovation which is distributed throughout the other nine categories. The categories are as follows: Management, Health and Wellbeing, Energy, Transport, Water, Materials, Waster, Land Use and Ecology, Pollution, and Innovation

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Table 1 - BREEAM Rating brackets (BREEAM, 2020)

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Table 2 - BREEAM credit split

The framework is easy to understand, but to get BREEAM certified, as with other certifications discussed below, a certified assessor must be engaged. The scoring is not split evenly, each section has several credits that can be achieved, and each section has a different weight. A BREEAM classification is achieved by obtaining points as shown in Table 2 and then calculating an overall score. BREEAM also allocates credits to innovation, which gives additional credits to some of the other sections. Materials and Energy have most innovation credits while Transport, Land Use and Ecology, and Pollution have none as shown in Table 3.

Table 3 - BREEAM innovation credits breakdown (BREEAM, 2020)

2.1.3. LEED-ND

LEED-ND is a scoring framework widely used in the United States of America which awards points for sustainable design. It has been observed that by implementing solutions provided by the programme designers there was also a significant impact on the occupants' physical activity levels (Lewin, 2012), observing that children in LEED-ND rated communities have shown higher levels of moderate-vigorous physical activity (MVPA) than children in other areas (Stevens and Brown, 2011); green areas have been linked to MVPA and wellbeing (Ward et al, 2016) and plazas have been known to attract more users than parks, with a significant increase in women (Soltero at al., 2015).

LEED-ND is the framework that examines most closely the impact of urban developments on wellbeing. Therefore, LEED-ND is essential to this study and will be compared with all other frameworks discussed. The areas in LEED-ND that focus on wellbeing are Connectivity, Land Use, Density and Safety, Community and Experience. Like other scoring frameworks LEED-ND gives points/credits for actions that are considered energy efficient or environmentally friendly. To be assessed for LEED-ND a project/development must first be assessed for LEED, which similarly to BREEAM is more focused on carbon reduction, therefore LEED-ND has several prerequisites in the overall areas of Location, neighbourhood pattern and design, green infrastructure and buildings and innovation. Table 4 explains the factors listed in LEED-ND which promote good urban design and wellbeing in the urban environment.

Table 4 - LEED ND (LEED, 2020)

2.1.4. WELL

Table 5 - WELL Certification (WELL, 2020)

The WELL framework takes LEED and BREEAM a step further and investigates buildings and communities that supports users' wellbeing. It focuses on 10 areas as follows: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, and community (Lowry, 2018). WELL is studied in relation to indoor spaces, however little has been done regarding outdoor spaces and how these interact together. McGee (2016) asks for a rounded approach to design to positively link built environment and wellbeing, as well as a greater involvement of medical professionals in design to ensure its sustainability; the onus is placed on architects, planners, and legislators; more involvement from medics is needed to create positive health behaviours.

2.1.5. Flourish

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Clements-Croome's (2016) Flourish mod describes experience as being a balance Physical, Economic, Perceptual as well other subjective factors. It aims to bring t influences from outdoors to indoor spaces boost creativity and productivity. A lar proportion of the model's factors are focus on wellbeing, and it uses a traffic light syste to show the status of each category as can seen from the Flourish Wheel in Figure 3. T model is a theoretical one in comparison others mentioned in this study as it does n provide a calculation matrix.

Figure 3 - Flourish Wheel (Clements-Croome, 2016)

2.1.6. SPeAR

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SPeAR was created by Arup in 2000 to demonstrate the sustainability of projects to clients. It can be used as a decision-making tool scoring themes such as Transport, Biodiversity, Culture, Employment and Skills. These are shown grouped in three overall areas, Economic, Social and Environmental, illustrated in a diagram generated by the software. SPeAR can be used at all stages of a project from Design to In-Use to continuously improve the projects it is applied to. Arup also developed ASPIRE which is aimed more at developing countries but employs similar factors. Both frameworks are more focused on wellbeing factors compared to BREEAM and LEED (including LEED-ND) (Arup, 2017).

Figure 4 - SPeAR wheel (Arup, 2017)

2.2. Relationship between university campuses and cities

University campuses are places of gathering, learning and personal development, the spaces can become filled with emotion and memories and most university attendees have emotional links to the spaces in or around university buildings. Universities are often seen as progressive spaces, incubators for knowledge (Uhl, 2004), and have a large variety of people from different backgrounds, cultures, and ages (Olszak, 2012). University and college campuses are split into two categories in the United Kingdom, city campuses and those that are self-contained. According to The Times (2020) there are 130 universities in the United Kingdom 67.44% of which are city universities outside London, and 12.40% in London, while 20.16% are self-contained campus universities.

There are numerous universities based on standalone campuses, with all users and participants in activities being staff or students, and universities based in city centres, with a large agglomeration of universities in urban areas. For well-established universities in the UK, 48 institutions are based in or around London (studylondon, 2020). This brings universities in the public realm and will make it more difficult to measure some factors. It could prove to be more sustainable, with infrastructure being present and ready to use, and with a wider variety of users.

2.2.1. Coventry University

Coventry University is in the city centre, with its headquarters located in front of Coventry Cathedral on Priory Street, and the University teaching and learning buildings in the south-east corner, with student accommodation spread throughout the city, in a 15-minute-walk radius of any teaching and learning building, so it provides a campus type environment (Figure 5). The university has invested heavily in infrastructure from 2010 to 2020, building a new student hub and a few other teaching buildings as well as most of the student accommodation, and there are plans to invest further to provide green spaces as shown in Appendix 2 (Coventry University, 2021)

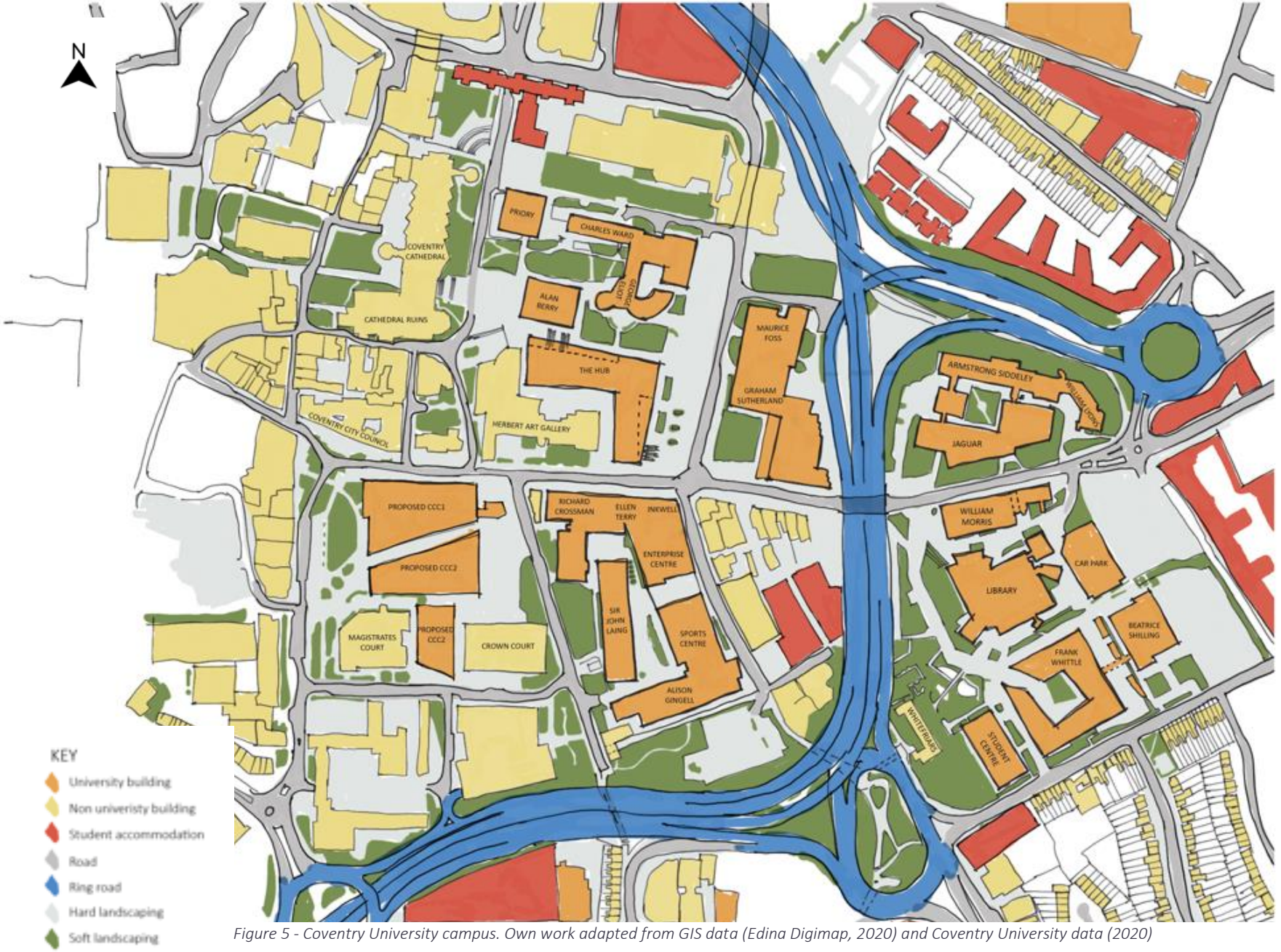


Figure 5 - Coventry University campus. Own work adapted from GIS data (Edina Digimap, 2020) and Coventry University data (2020)

2.3. Social spaces in Higher Education

Universities throughout the world have been considered central to society since their inception, and their designs reflect their importance (Rothblatt, 1997). In some countries universities are funded by government, therefore similar approaches to design have been used for teaching spaces as have been used for governmental buildings (University of Oxford, 2022). The form of the buildings and spaces is vital in portraying its integrated nature, both intellectually and socially (Temple and Banett, 2007). This links physical space to social networks where 'the physical and the emotional become inextricably intertwined to form an almost palpable "sense of place", one that has profound if not always clearly understood meaning to many members of the campus community' (Kuh et al., 2005, p 71).

Kuh et al. (2005) also show that learning is informal, not led by instruction but rather because of interaction between students; primary school design is also an example of where the focus has been on facilitating these interactions (Maclure 1984). Whisnant (1971, p 88) writes about the effects campuses can have, encouraging "division, tension, alienations and strife" and proposes giving students more autonomy to break down the barriers between campus and the "uncampus" outside. Some UK universities employed this mix in the 1960s, for example York and Kent, the former had this as a central focus: "Care will be taken to avoid the association of a particular college with a particular subject. This might ... work against the mixing of different interests and skills which is one of the chief purposes of university education" (University of York, 1962, p 10).

As discussed above, the focus of campus design was on providing teaching spaces that allowed for outside of the classroom collaboration, which has been taken a step further, by creating buildings that provide an increasing proportion of breakout space, or social space. On the Coventry University Campus, for example buildings designed and built since the 2000s have increased their circulation space to approximately 50% from the standard of approximately 20%. Also, one seen the introduction of the HUB type buildings; a single mixed-use building that belongs to students more than academics, one can be found in Coventry (pictured in Figure 6) with more in other UK and Australian universities.

Figure 6 - Coventry University HUB building June 2022

Social spaces can not only be influenced by building form, but also by micro-design spatial divisions as discussed by Strange and Banning (2001, p 31):

> *"the proxemics associated with seating arrangements in a lounge area ... can either promote or inhibit social interaction ... physical artifact messages of support or unsupport can take many forms, signalling a sense of belonging ... and a sense of role, worth and value ... such messages enhance or detract from students' ability to cope with college stress"*

The Commission for Architecture and the Built Environment (CABE, 2005) ran a study to find the influence of investment in new buildings on perceived academic performance and found that 80% of staff saw positive outcomes in academic performance while 50% of students saw this, with these improvements attributed to motivation to work, collaboration between students, and the provision of required facilities for the course content. While most of this is subjective, and motivation can be interpreted as inspiration, most respondents saw an improvement, but this is still an area that has not seen an abundance of additional conclusive reputable research.

Background research done for this study demonstrates that academic spaces must be designed with care as they can have long lasting effects on students, and therefore the wider population. The way students learn has evolved with the availability of information and technology, and providing flexible spaces is desirable, even in earlier school years. Good academic environments provide the same facilities as successful workplaces, which promote productivity, minimise stress and encourage autonomy, and while green certification systems reward design for wellbeing they need to be more transparent. The following chapter will cover the methods used to determine the areas that established green certification systems overlook and introduce a new scoring system for successful social spaces in academia.

3. Research Methods

A mixed methods approach was used to achieve the aim of this study, both quantitative and qualitative enquiry methods were used, starting with secondary research using academic databases to find related theory, company websites as resources to investigate the frameworks discussed as well as other publications. Internal Coventry University websites and data were analysed, assessing Module Evaluation Questionnaire (MEQ) results, to understand the overall attitude of the Coventry University student population throughout the years, focusing on their sense of community.

Information also came from interviews, both in terms of design parameters, user preferences and space scoring, but also through information provided by interviewees, referring to publications or projects. A workshop was also organised and run with Architectural design students, providing information from an early designer's point of view but also from an experienced user point of view. Each element was reviewed through the prism of ethical research to ensure that not only participants and their data were treated appropriately but that the research furthered knowledge of the field. After the output was created, an online survey was also disseminated between Coventry University staff, to ensure validity. Throughout this chapter the philosophy of this study will be defined as well as the limitations, data collection methods, technology used, how the data was managed and ethical considerations. A research methods map is given in Figure 7.

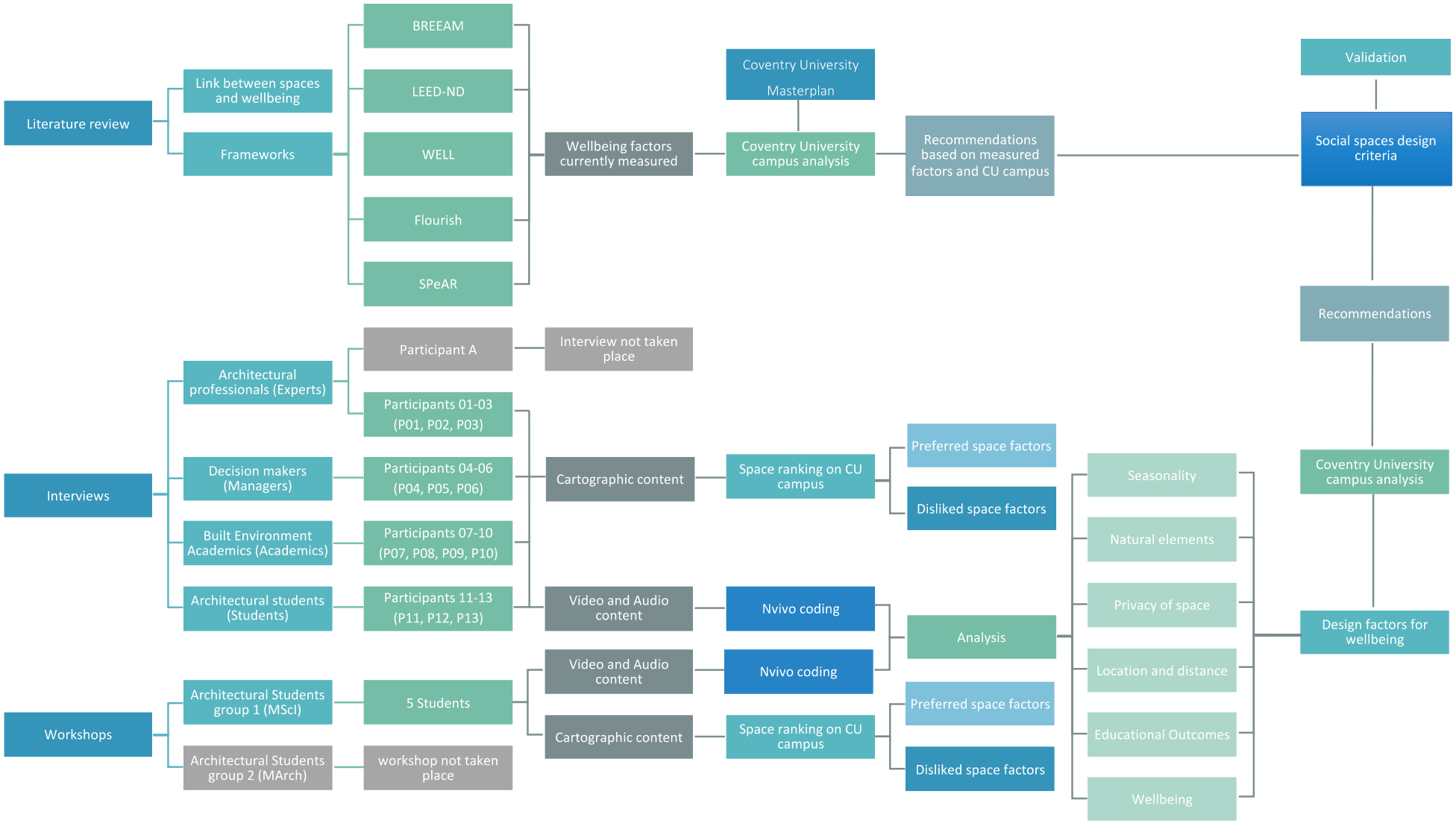


Figure 7 - Research methods map

3.1. Research philosophy

Before starting this study, the positionality of the researcher was defined, from an ontological, epistemological, and human nature point of view. Positionality "reflects the position that the researcher has chosen to adopt within a given research study" (Savin-Baden & Major, 2013 p.71) and has impact on the research procedures, outcomes, and results.

Using mixed methods data analysis, accommodated both the quantitative nature of scoring frameworks and student satisfaction questionnaires, and the qualitative nature of interviews and workshops. Qualitative inquiry theory often mixes the "*what* and the *how*" (Butler-Biesber, 2010, p5) and it was the focus of the present study, which leads to the question of validity of data or trustworthiness (Kohler Riessman, 1993) which will be explored in chapters 4 and 5. This approach is reflected in the design of the data collection using Maxwell's (2006) methodology as shown in Figure 8.

Figure 8 - Components of a study (Maxwell, 2006)

3.2. Limitations

Data collection for this study coincided largely with the beginning of the COVID-19 pandemic, and its lockdowns, which has been hindrance and advantage. Because of national rules it was impossible to visit the campus, at one point a special risk assessment document had to be written and approved to visit the outdoor spaces on campus. It also meant that the data intended to be collected initially, observing user patterns in spaces, and collecting data from users across the campus was rendered impossible, as no one was using the

campus at all. Coventry University Coventry campus fully opened for the start of 21/22 academic year on 13 September 2021, which can be observed in the Figure 9.

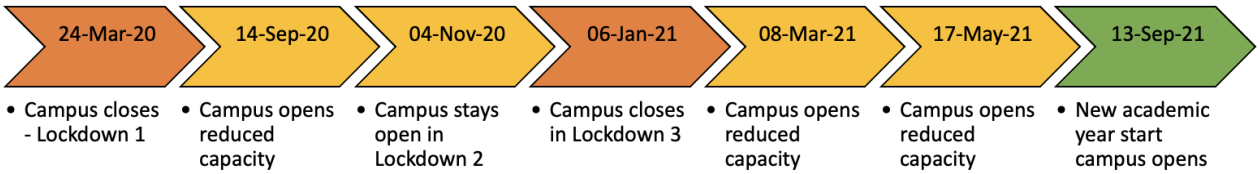


Figure 9 – Coventry Campus status throughout lockdown

The positive outcome when it came to data collection for this study, was observing the impact on students of lack of access to a campus. This would have been impossible for in person education before COVID-19 so it provided an interesting point of view.

The positionality of the researcher can also be noted as a limitation which must be accounted for, as they have completed both undergraduate and postgraduate courses in the case study university as well being a full time academic for several years, therefore they have been a user of the campus for more than a decade and have witnessed changes. In this respect, familiarity has been beneficial when conducting interviews regarding the campus, and when analysing its use and users. An in-depth process chart can be seen in Appendix 11.

3.2. Data collection

To achieve the objectives of this study both primary and secondary data were collected, primary data collection is represented by campus maps and photographs, interviews, and a student workshop, while the secondary data collection is represented by existing design frameworks and existing data collected for university wide module evaluation questionnaires as well as background research, and ultimately a validation of research outputs. To validate the output of the study an online questionnaire was created and disseminated among Coventry University staff. Further discussion regarding output and validation can be seen in section 3.6.3.

3.2.1. Student satisfaction surveys

Data was collected each semester to gauge the individual module impact on student satisfaction. The questionnaire used at Coventry University is aligned with the National Student Survey (Office for Students, 2018), it has a series of multiple-choice questions on a Likert scale where students are asked if they agree with certain statements. It also has a word box section, although this data is not centralised, therefore not available for analysis. Questions can be seen in Figure 10 and refer to the student voice, learning community, learning resources, organisation and management, academic support, assessment, and feedback, learning opportunities, and teaching. The student satisfaction questionnaire is launched whilst the module being

evaluated was being taught and is performed by clicking on a link, but in previous instances it was paper based. Data available from this survey for Coventry University is available as early as the 2016-2017 academic year, with an average number of respondents of over 33,000 students on over 1,300 modules.

MEQ - Survey Questions

The survey consists of 20 'core' questions which are divided into the following categories:

Teaching and learning (questions 1-4)
1. Staff on this module are good at explaining things clearly.
2. Staff on this module make the subject interesting.
3. This module is intellectually stimulating.
4. This module has challenged me to achieve my best work.

Learning opportunities (questions 5-7)
5. This module has prompted me to explore ideas and concepts in greater depth.
6. This module has provided me with opportunities to apply what I have learned.
7. I can see how this module relates to the rest of my course.

Assessment and feedback (questions 8-10)
8. Marking criteria have been clearly explained in advance.
9. Marking and assessment have been fair.
10. I have received helpful and timely feedback on my work.

Academic support (questions 11-12)
11. Sufficient academic advice and guidance are available on this module.
12. Staff respond to module queries in a helpful and timely manner.

Organisation and management (questions 13-14)
13. This module is well organised and running smoothly.
14. Any changes to the module have been communicated effectively.

Learning resources (questions 15-16)
15. The library, IT and specialist equipment (where appropriate) support my learning well.
16. Online learning environments (such as Aula, Moodle, or Future Learn) are used effectively to support my learning.

Learning community (questions 17-18)
17. I feel part of an academic community of staff and students.
18. I have had the right opportunities to work with others to enhance my learning.

Student Voice (question 19)
19. Staff value and respond to my views and opinions about this module.

Overall satisfaction (question 20)
20. Overall, I am satisfied with the quality of this module.

Figure 10 - Module Evaluation Questionnaire 2021

3.2.1.1. Community

As part of the Module Evaluation Questionnaire students are asked about whether they feel part of an academic community of staff and students, as observed in Figure 10. Students use a Likert scale to answer all questions as follows:

Definitely Disagree
Mostly Disagree
Neither Agree nor Disagree
Mostly Agree
Definitely Agree

“Mostly Agree” and “Definitely Agree” are considered positive while “Neither Agree nor Disagree”, “Mostly Disagree” and “Definitely Disagree” are considered negative. The statement “75% of students considered themselves to be a part of a community of staff and students”, is read as 75% of students selected one of the two positive options, while 25% of students selected one of the three negative options for the community question. Data from 2016 to 2022 was analysed, to determine patterns and influencing factors. In this period, new buildings were opened, and students were required to study from home for a short while. These events were charted on the time graph which can be observed in section 3.2, Figure 9.

3.2.2. Framework metanalysis

To create this analysis the five frameworks discussed in chapter 2.1 were investigated to determine how much weight each gave to health and wellbeing actions, by marking each of these actions on their scoring sheets. The actions were then counted against the overall maximum possible score and a proportion for health and wellbeing was then determined. To best show this a colour coding system was implemented, by using shades of green of any wellbeing credits and shades of grey for all other credits, as can be observed in section 4.3.

3.2.3. Universities in the UK

Secondary research was undertaken to determine the general university campus typology in the UK, using university databases to class a university as campus or city. These classifications were then tabulated, and a simple statistical analysis applied.

3.2.4. Interviews

3.2.4.1. Interview design

The interview process was designed to allow respondents to critically analyse the Coventry University campus before discussing factors influencing social space. All interviews were done online using video conferencing software Microsoft Teams or Zoom and recorded through the same means.

During each interview whiteboard software Miro was used to show photographs and maps of Coventry University Campus during videocalls, and to allow each respondent to interact with the map and photographs; an example of these is given in Figure 11. The interview is split into two sections, the first analysing the campus and the second answering a set of questions as shown in section 3.3.1.

Figure 11 - Interview maps and photos A to D

The campus analysis was undertaken over 4 areas of the campus A, B, C and D, as shown in Figure 11 and in appendix 2. These areas were largely linked to the different Faculties on campus which allowed the interviewer to quantify responses and focus the interviewees' minds on each space. In the beginning of the interview the respondent's familiarity with the campus was established, and then each space taken individually and analysed, with a focus on those spaces that are seen as positive from the framework analysis. At the end of the first section of each interview the best and worst spaces were named by respondents and factors for this classification discussed.

The second part of each interview discussed the university campus from a wider perspective, discussing comfort factors, and focusing on perceived seasonality of space, nature, perceived privacy and ownership over space, connectivity and walkability, perceived influence of space on educational outcomes, and perceived influence of space on wellbeing. Seasonality was discussed to assess the impact of thermal comfort on the success of a social space, which has a great impact on the useability of each space as the campus is in the northern hemisphere at 52.4 degrees latitude North parallel (Met Office, 2021), with warmer weather expected to be in the spring and summer seasons and colder weather expected to be in the autumn and winter seasons.

The impact of nature on the success of social spaces was also discussed, showing that nature can be used to improve the effects of stress and aid with relaxation as shown in chapter 2; privacy was also considered in the prism of a city centre university campus, investigating ownership over spaces, and situations where it is appropriate or necessary to have members of the public on a university campus, as well as the link to the city centre and all its facilities. Lastly the impact of social spaces on education and educational outcomes was investigated, as well as the link between social spaces and mental wellbeing. An in-depth analysis and discussion of these interviews is given in chapter 5.

3.2.4.2. Interview sample size and technique

Sixteen respondents were selected for interviews based on their occupation and expertise as shown in table 6, with thirteen of those selected participating, making the response rate 81.25%. The selection process used for this study was non-probability convenience sampling. This allows the researcher to use their networks and judgement to determine the sample unit (Campbell et al, 2020). A more purposive interview and questionnaire sampling technique as well as observation were desired at the start of the study (Ames et al, 2019), but this was abandoned due to limitations and restrictions discussed in 3.2. which limited the access to campus and a wider cohort of students and staff.

The convenience selection method has its limitations which will become evident in the analysis chapter, as most respondents used certain Faculty determined spaces more because of the course they were associated with, this will be considered. Respondents were classified as can be seen below as Experts, Academics, Managers and Students, they were all from an architectural, construction or geography background due to the limitations discussed in 3.2.

Table 6 - Interview participants

Role	Description	Number
Expert	Academic or experience of practicing design of social spaces Previous or current user of case study campus Designer of theoretical or real-life projects on case study campus	3 participants
Manager	User of CU campus Has managerial responsibilities over Academics Academic	3 participants
Academic	User of CU campus 3 out of 4 have expertise of Architectural or Urban Design Academic	4 participants
Student	Student or recent graduate of architecture or architecture related course	3 participants

Figure 12 Profiles of interview participants and their intersectionality.

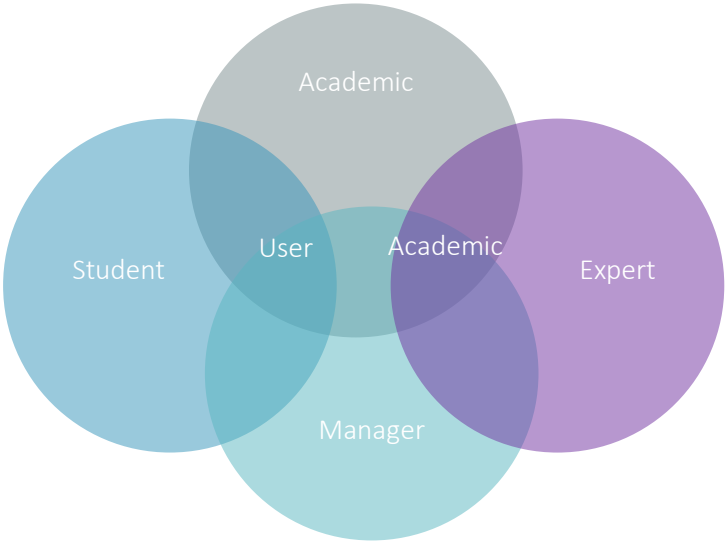


Figure 12 - Interview participant profiles

Table 6 shows attributes of interviewees and their split across the four predetermined categories.

ID	Role	Gender	Age
P01	Expert	M	50-69
P02	Expert	F	50-69
P03	Expert	M	70<
P04	Manager	M	50-69
P05	Manager	F	50-69
P06	Manager	M	50-69
P07	Academic	F	50-69
P08	Academic	M	30-49
P09	Academic	F	30-49
P10	Academic	M	30-49
P11	Student	M	<30
P12	Student	F	<30
P13	Student	M	<30

Table 7 – Interviewees attributes

3.2.4.3. Interview questions

The baseline for the interview questions was the Building User Studies (BUS) (BUS, 2022) methodology, which is considered a reliable and tested method for assessing user perceptions of the built environment, (Thatcher & Milner, 2016).

Interview Part 1 Questions

1. How familiar are you with the Coventry Campus?
2. Looking at the photos, are there any spaces you don't recognise

Interview Part 1 Outcomes

1. Social space quality determining factors
2. Best to worst social space on campus

Interview Part 2 Questions

1. How do you think seasons influence social spaces? Are certain spaces useable just in certain weather conditions?
2. What is the impact of nature on social spaces? Indoor and outdoor
3. What do you use to define the level of privacy in a space? Public, all staff and students, certain staff, and students
4. What is the importance of connection to facilities? How important is the link to the town centre?
5. How do you think social spaces impact education?
6. How do you see the relationship between social spaces and mental wellbeing?

Interview Part 2 Outcomes

- Design factors for a successful cold and wet campus
- How much nature is needed in a university campus social space
- Ownership over space at university and the link to more public spaces
- The importance of diversity on campus
- Are successful social spaces encouraging education
- Social spaces' impact on mental wellbeing

3.2.5. Workshop

The workshop took place over MS Teams in March 2021, as part of a timetabled online session for a year 4 architectural design and technology course, where 6 students attended and took part. The virtual whiteboard tool Miro was used to display maps and diagrams, students were encouraged to collaborate on the whiteboard by drawing, writing, or annotating the maps and diagrams. Miro is a live collaborative tool where participants can add annotations with the use of a smart pen on a tablet or mouse, or type comments. Participants have access to the entire board, so the researcher led by sharing their screen, to point all participants to the relevant area of the board.

Questions asked during the first part of the workshop were designed to define factors for successful/ unsuccessful social spaces. The participants communicated these through typing or writing on the Miro whiteboard and gave examples by giving examples if spaces or adding photographs, an example of this is shown in Figure 13.

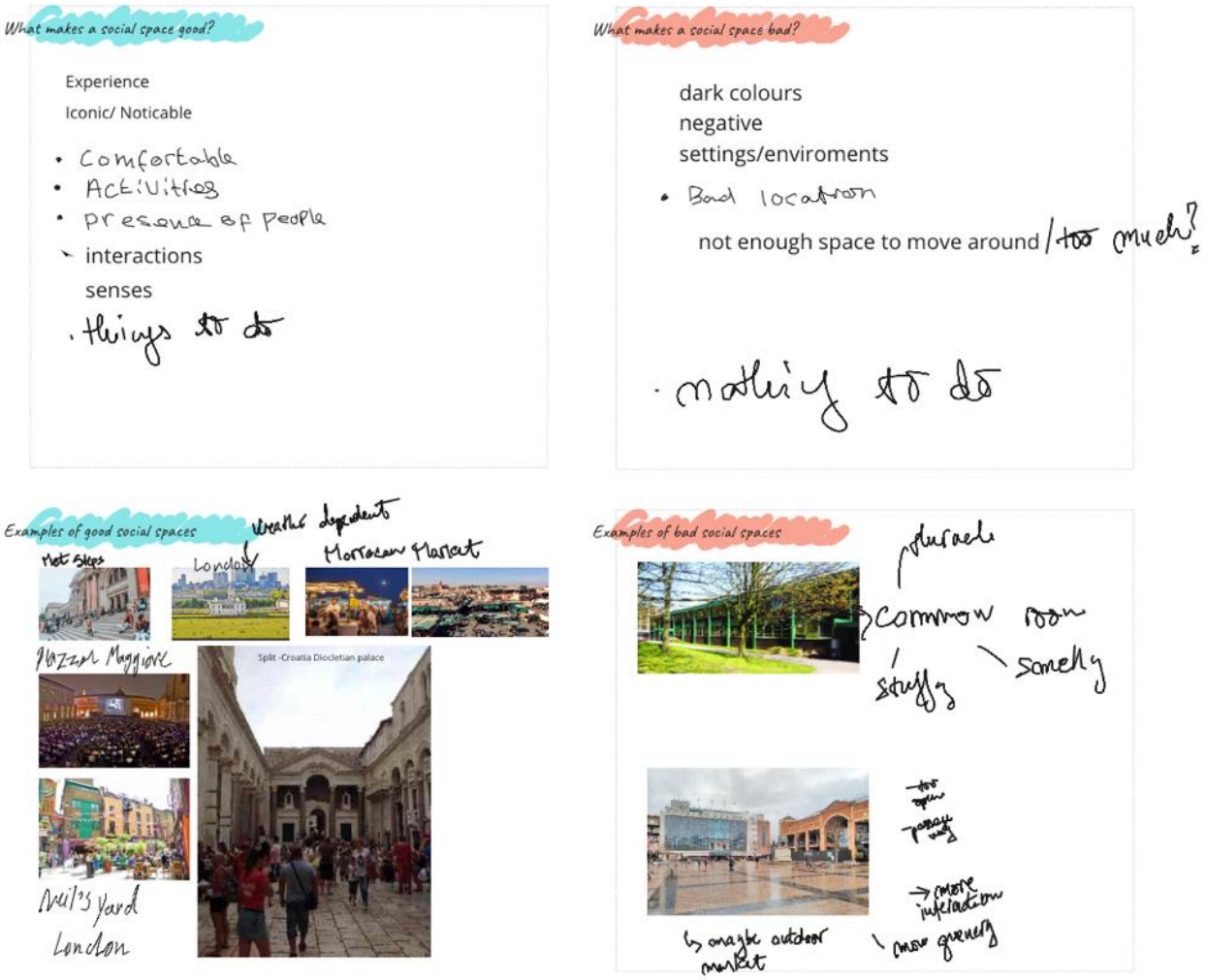


Figure 13 - Whiteboard from workshop - good v Bad social spaces – student responses

The second part interrogated usage patterns by asking the students which buildings they had used the most, which they had used sometimes, and which they had never used.

Figure 14 - Extract from Workshop Miro whiteboard showing usage patterns

The last part of the workshop involved students ranking the spaces on Coventry University Campus based on their experience from worst to best as shown in Figure 15

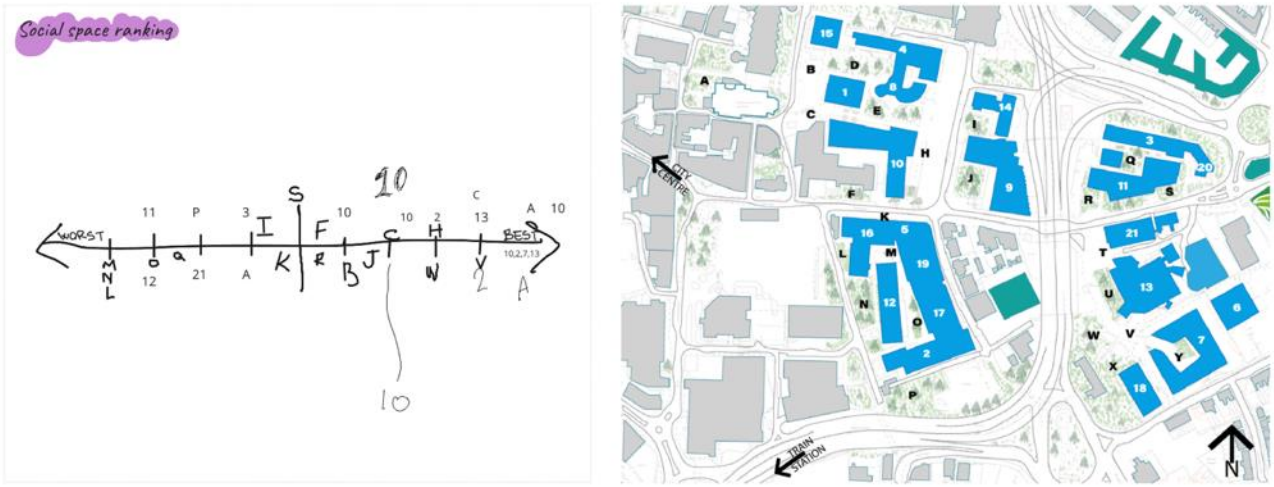


Figure 15 - Whiteboard from workshop - Social space ranking

3.2.5.1. Workshop participant demographic

To run the workshops student groups were required to participate, and due to the circumstances described in section 3.2, access was limited. Two workshops were planned, one with year 5 Architecture students, and another with year 4 Architectural Design and Technology students, with no other courses being involved due to previously stated limitations. The Architecture workshop did not take place due to lack of engagement from the students.

The students who took part in this workshop were all enrolled in year 4 Architectural Design and Technology, and they participated in the workshop during an online class. They had limited expertise around urban and architectural design, but they were selected as they understood spatial design and had the skills to be critical of design. Due to all students being enrolled in the same course the data must be analysed with care. The

demographic population was split unevenly across the sexes, with one female and 5 males, with similar ages and experiences. Most students were local, within an hour of Coventry, with one two hours away, however, all were UK based.

3.2.6. Case study – Coventry University

When considering the Coventry University campus, it can be observed that it is mainly situated within the Coventry city centre, with the morphology of Coventry ingrained in the campus. Although Coventry is popularly seen as a modernist city, older examples of architecture can still be found within the city fabric, especially around the Cathedral, the small burgage plots are evident as well as small scale connecting routes. Medieval Coventry is then underlying with Gibson's early modernist architecture and town planning, enclosed by the Ring Road in the 1960s. Some notable buildings from around the 1900s are the Herbert Art Gallery, 1938 (which was later extended), and what is now called the Ellen Terry building, 1880, a former Art Deco cinema, and what is now called William Morris building, 1910, a former car factory

The campus is situated in the east of the ring road, starting in front of the cathedral, and ending in Far Gosford Street. The university has a prominent space in the Cathedral/ University square, with its main administrative building overlooking the cathedral. The focal point of university life for students on all courses are two buildings: the student HUB, situated on the southeast of the cathedral, and the library, which is just outside the ring road.

There are 4 faculties at Coventry University, Arts and Humanities, Business and Law, Engineering, Environment and Computing and Health and Life Sciences, and each faculty has two or more buildings as a base, as detailed in table 7.

FACULTY	BUILDING	DISTINCTIVE ELEMENTS	YEAR
Arts and Humanities	George Eliot	7-storey building, brutalist style	1960
	Charles Ward	3-storey modernist building, linked to George Eliot	1950
	Maurice Foss	3-storey modernist building, linked to Graham Sutherland	1978
	Graham Sutherland	7-storey building, brutalist style	1959
	Ellen Terry	Converted cinema	1880
Business and Law	William Morris	Converted Morris car factory	1917
	Jaguar		1970
Engineering, Environment	Frank Whittle	BREEAM Excellent, 7- storey building	2012
	Beatrice Shilling	BREEAM Excellent, 4 storey building, linked to Frank Whittle via bridge	2020

and Computing	Sir John Laing	10 minutes away from other two buildings, modernist style	1970
Health and Life Sciences	Richard Crossman	4 storey building, modernist style	1971
	Alisson Gingell	BREEAM Excellent, 4 storey building	2018

Table 8 - CU buildings

Coventry University campus was chosen as a case study due to the familiarity of the researcher, and access to users and data as well as being representative of most university campuses in the UK, being a city centre campus, as shown in 2.2. The campus and selected areas around campus were analysed, with the areas around campus being included if they were deemed significant as a social space and were frequently used by campus users as reflected in the interview results. Spaces which are not on the campus but were included in the analysis were the Coventry Cathedral ruins (1) and green space (2), the area surrounding the Herbert Art Gallery (3 & 4), the park south of Alison Gingell (5) and the area around Whitefriars priory (6), as shown in Figure 16.

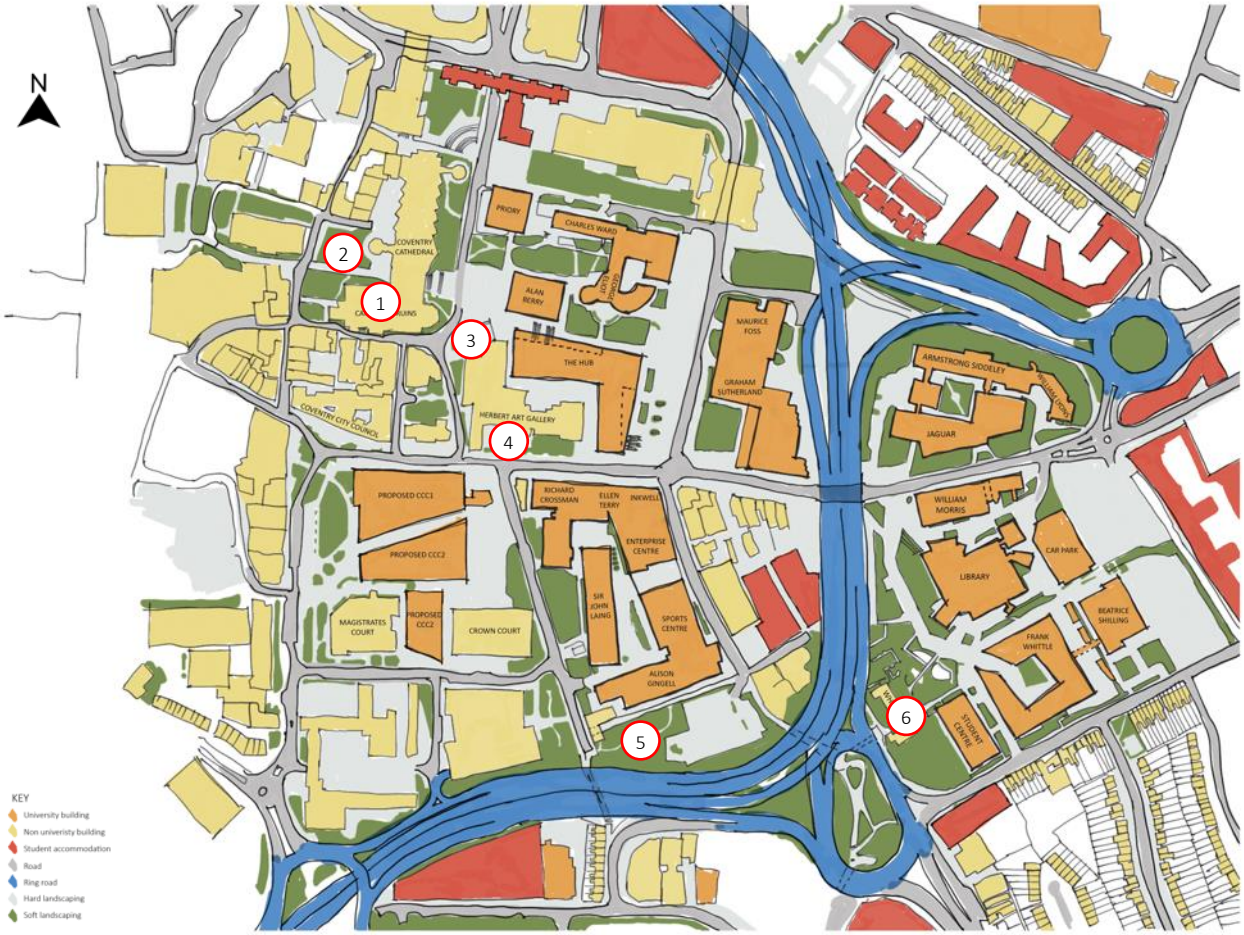


Figure 16 - Coventry University campus and significant areas

Indoor and outdoor spaces were analysed to determine the proportion of social space on the campus, outdoor spaces were analysed in terms of soft and hard landscaping while building floorplans were analysed to

determine the proportion of social space and private social space in each building across all storeys. Table 20 in Appendix 6 shows the building calculations while Figure 79 in Appendix 6 shows the outdoor and indoor spatial distribution. CAD plans from Coventry University Estates were used to calculate these areas (Coventry University, 2021).

To further the study, historical, current, and proposed maps of the campus were investigated and a campus map for this study was created as was shown in section 2.2.1, Figure 5. The maps analysed are available in Appendix 2 Figures 50, 51, 52 and 53 along with a tracker of changes from each version.

3.3. Software

3.3.1. Teams and Zoom

Primary data collection took place during the COVID-19 lockdowns in 2020, therefore all meetings were done remotely through Zoom or Microsoft Teams. Both are videoconferencing software which enabled video and audio calls using a computer or mobile device, as well as screensharing and recording. Microsoft Teams was used in most cases, with a few exceptions when it was ruled out due to its requirement for installation on a device and account creation, and this ultimately meant that those who were less accustomed to video calling were invited to a Zoom call, which allowed participants to join without installing any software or creating additional accounts. Self (2021) describes data collection methods during the pandemic, as the best method to conduct interviews agreed by researchers has been face-to-face (Novic, 2008), and with the travel and socialisation restrictions during the pandemic Microsoft Teams and Zoom became valuable tools for data collection.

3.3.2. Microsoft Stream

Stream was used as a repository, as it is part of the Microsoft suite, therefore considered safe from a data safety and protection point of view. It was also used for its automatic transcript feature, to turn spoken content into written content, as a time and cost saving tool. The written transcriptions were then sense checked as discussed in section 3.5.4. before analysis.

3.3.3. Adobe Photoshop and Illustrator

Maps were required to analyse the usage pattern of the campus, to be used both in data collection and to produce the final output. The initial base map was drawn by hand using an iPad and iPencil over a CAD map in Adobe Photoshop for iPads. The buildings were then colour coded by their use, from teaching and learning buildings to student accommodation and non-university buildings. To create the infographic maps, Adobe

Illustrator was used, as it is a vector based graphic software. The Adobe software package was selected due to its availability and existing skillset of the researcher.

3.3.4. Nvivo

A qualitative data analysis software was used to manage the large amount of data; the interview transcripts were generally over 80,000 words. Nvivo was chosen due to its availability for Coventry University students and its ability to create links when coding was done appropriately. The software has been used to aid in qualitative research for more than 40 years and is used to allow researchers to employ mixed research methods in primarily qualitative data collection.

3.3.5. Miro

Miro was selected to be used as a collaborative space for both interviews and workshops due to the researcher's familiarity with the platform and the improved communication it provides. It is a browser-based application that allows free and paid for accounts as well as guest usage (Miro, 2022). Online whiteboards have been successfully used in research in the past (Salmons, 2015), and Miro facilitated the interview process.

A series of codes were devised around the aim of this study and the interview questions set (Figure 17). The codes aim to place the interviewee's responses in a building or a space, get an understanding of their attitude towards the building or space, interrogate their usage pattern, investigate the correlation to educational outcomes and wellbeing and link this response back into urban design implementations. The codes were used in Miro on the interview transcripts, a detailed code breakdown is available in appendix 4, figure 67.

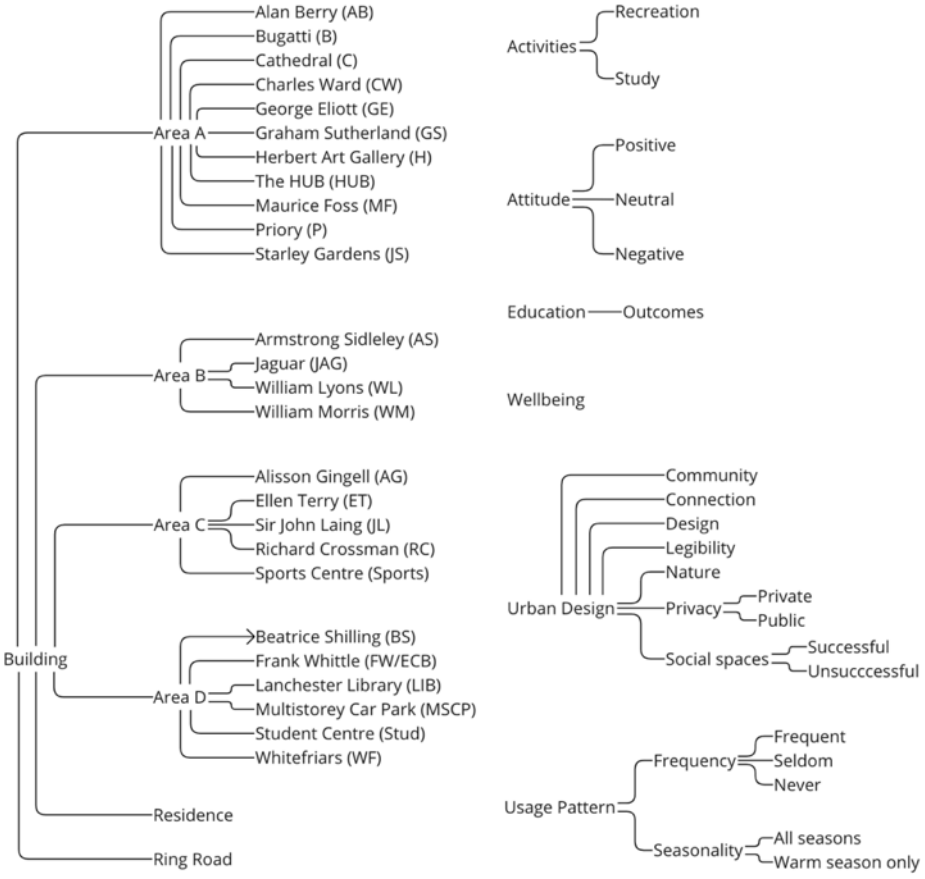


Figure 17 - Miro codes

3.3.6. Information management and coding

The product of primary data collection was a series of video interviews and whiteboards. To extract ideas and meaning from these video recordings they were uploaded to the streaming platform *Microsoft Stream* which automatically generates a written transcript. This written transcript was then checked side by side with the interviews to ensure that ideas were coherent, and no data was lost due to audio recording issues or verbal ticks. The transcripts were then formatted appropriately, and the interviewer's questions removed to ensure that all that remained were the interviewee's ideas.

This data was then brought into qualitative data management software NVivo (version 1.6.2), where each interview was classified as a case and each case was given the following attributes: Role, Gender, and Age.

3.4. Creating design criteria

The Aim of this study in chapter 1 was to create a simple scoring model for social spaces which promote wellbeing. To achieve this, existing scoring models were evaluated, and commonalities and gaps were identified. This data along with new information gathered as part of this study identified five key areas as discussed in sections 3.6.1. and 3.6.2. of focus as shown in Figure 18. To determine the scoring range for each, responses from interviews were analysed. The illustration of the design criteria was inspired by the Flourish model, using traffic light colours to represent the status of each area. It is different to Flourish as it shows all available scores even those not achieved as shown in Figure 19 (Clements-Croome, 2016).

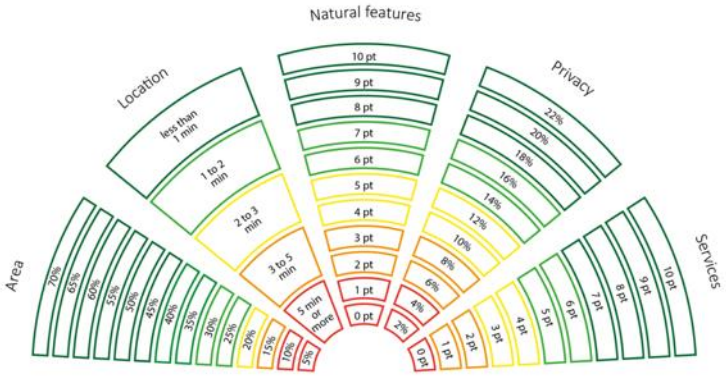


Figure 18 - Social Spaces Design criteria blank

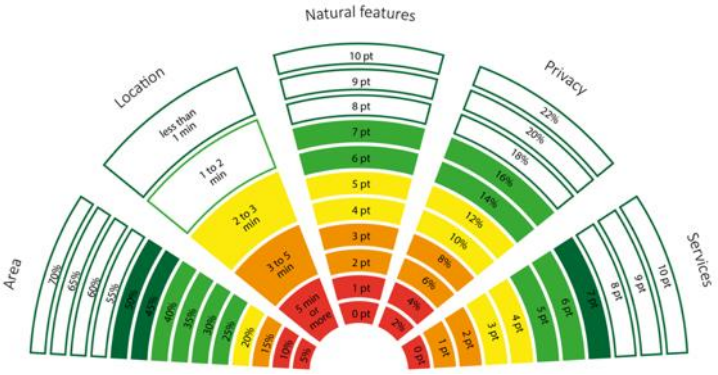


Figure 19 -Social Spaces Design criteria filled with scores

3.4.1. Social space availability and privacy

On Coventry University campus, four buildings were identified as BREEAM excellent, and results from interviews showed that three out of the four buildings scored highest with interviewees. All buildings on campus were analysed to determine how space was allocated as shown in Appendix 6 and the desirable range for social/ breakout space determined as can be seen in section 4.6. The range for privacy was determined in a similar way, by calculating the percentage of private space in the social space area.

3.4.2. Natural features, Location and Services

Another outcome of interviews was the perceived importance or value of natural features. Interviewees helped determine the type of natural features desired in social space with input from the literature, the LEED-ND and the Flourish model to determine different degrees of access to nature. LEED-ND included calculations of how far users were willing to walk to access social space as well as the types of services required in that social space.

3.4.3. Validation

By using the scoring criteria created in this study campus design should be improved, for both new projects and refurbishments. To ensure its effectiveness a questionnaire was launched among users of university spaces, testing each section and the criteria overall, the in-depth analysis can be observed in Appendix 9

Based on the results, changes were implemented to the design criteria, adding more detailed instructions, and improving formatting.

3.5. Social space scoring guidance

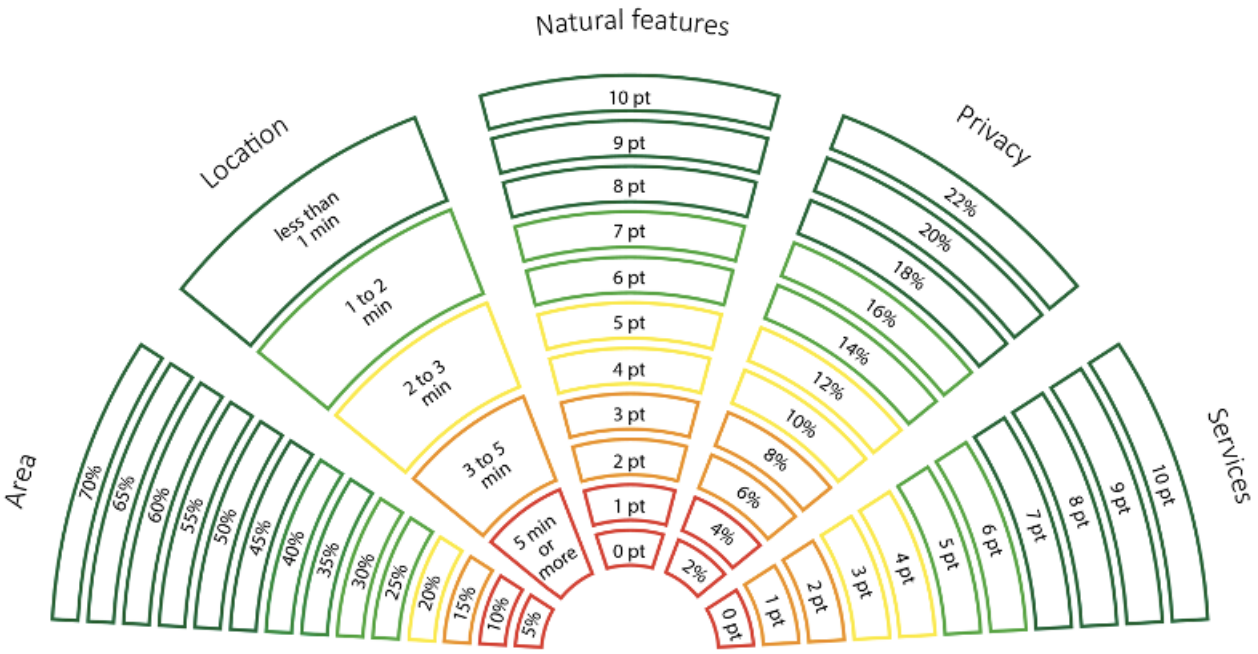
A scoring guidance document was created to apply the design criteria to projects. It was split into four pages, starting with a brief introduction and an illustration of the blank model as well as relevant references on the first page, followed by a page which examined the total social space area, its location in relation to the spaces it served and the percentage of private space within the social space. The third page scored natural features while the fourth scored services. These scores were plotted on the blank model to see an overall social space score, and the colours used provided an indication of required improvements or adjustments. The scoring guidance document was designed to be made available as a booklet or online application and with different sections for each of the five categories, and it contains relevant references, as can be observed in Figures 20 to 23

SOCIAL SPACE SCORING GUIDANCE

Social space model is based on 5 metrics: Area, Location, Natural features which includes light and fresh air, privacy of space, and the services or facilities it provides to its users.

Area and Privacy are numeric calculations, reflecting percentages of the entire useable area, Location refers to the distance walked to access the social space while Natural features and Services are point based. Upon assessment, designers may choose to implement changes to improve each score and perform a reassessment.

The footnotes shown on each question refer to relevant literature, references can be seen on the first page of the document



Footnote references

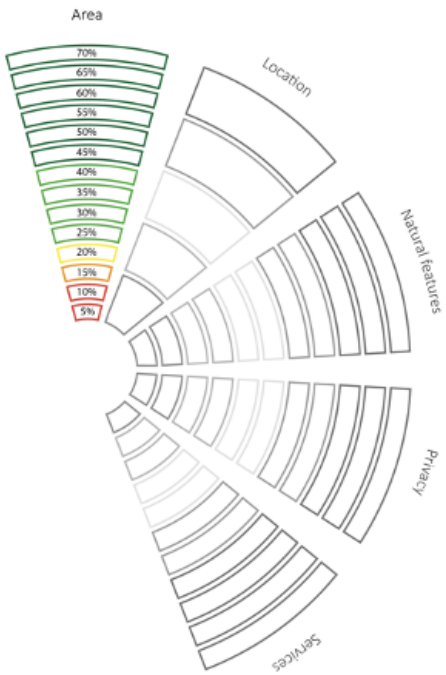
(1) Interview outcome (Manea, 2022) **(2)** People will travel to a social space if it provides food, socialisation or shopping opportunities (WorldGBC, 2015) (Gyeryn, 2000) **(3)** workspaces have become more flexible (RIBA, 2016) **(4)** being in, or seeing nature from a window has been proved to decrease stress (Frontczak et al, 2012), (WorldGBC, 2014), (WorldGBC, 2015), (Marcus and Jones, 1999), and increase productivity (Ulrich, 1984) **(5)** absence of natural light is a direct predictor of sick building syndrome (Frontczak et al, 2012), (WorldGBC, 2015), (RIBA, 2016) **(6)** absence of fresh air is a direct predictor of sick building syndrome (Frontczak et al, 2012), (WorldGBC, 2015), (RIBA, 2016) **(7)** users require agency and control over their workspace, by being able to open windows to control air quality and temperature (WorldGBC, 2014) **(8)** users are likely to spend more time in a space if they have access to safe and clean toilets (Approved Documents, 2020) **(9)** people are more likely to make healthy food choices if they are provided with basic cooking facilities at work (Zuniga-Teran et al, 2015) **(10)** people are more likely to use spaces that provide seating, formal or informal (Garcia-Moruno et al, 2010) **(11)** Creative spaces need to provide for group and individual work (O'Bryne, 2018)

Figure 20 - Social Space Scoring guidance document page 1

AREA

How much of Net internal area (NIA) can be social space? [1]

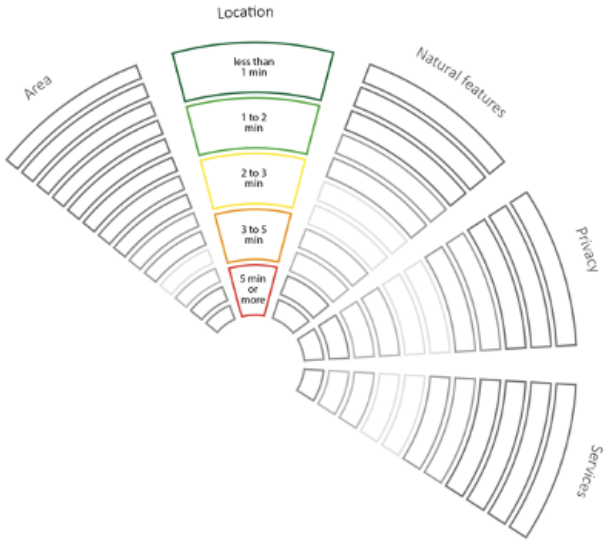
Calculate the percentage of Net internal area that can be used a social space? (quick chat, coffee with friend, telephone call)



LOCATION

How close is the social space to workspaces it services? [2]

How far in minutes do users walk to the social space



PRIVATE

How much of your social space is private? [3, 11]
(suitable for lone work, phone calls, video conferencing)

Calculate the percentage of social space area from above that is private

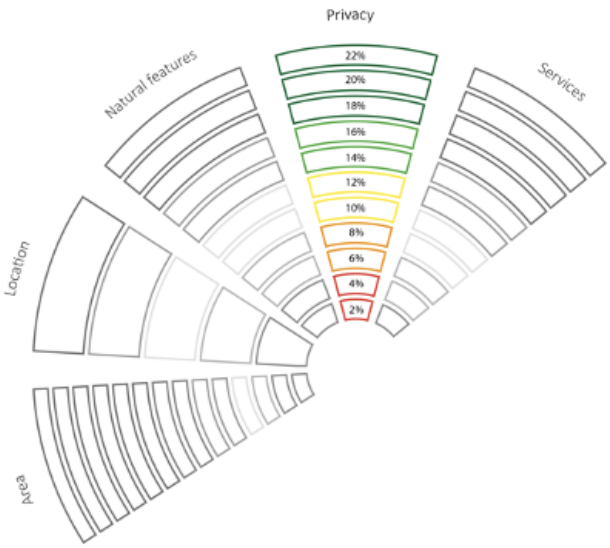


Figure 21 - Social Space scoring guidance document page 2

NATURAL FEATURES:

Choose one in each section

Does the social space have natural features? [4]

Within sight of any area	4 pt
Withing sight of 50% of area	3 pt
Within 1 min walk	2 pt
Within 2 min walk	1 pt
None	0 pt

Does the social space have natural light? [5]

Direct natural light from windows	3 pt
Direct natural light from high level windows	2 pt
Indirect natural light	1 pt
Only artificial light	0 pt

Does the social space have fresh air? [6, 7]

Fresh air directly from windows	3 pt
Fresh air directly from high level windows	2 pt
Fresh air from mechanical ventilation	1 pt
No fresh air	0 pt

Figure 22 - Social Space scoring guidance document page 3

SERVICES:

Choose one in each section

Does the social space have toilets? [8]

Within 1 min walk	2 pt
Within 2 min walk	1 pt
More than 2 min walk	0 pt

Does the social space have a café/ vending machine? [2]

Café in Social Space	3 pt
Café within 2 min walk	2 pt
Vending machine in Social Space	1 pt
No food & drink opportunity	0 pt

Does the social space have a kitchenette (hot & cold-water taps)? [2, 9]

Kitchenette in the Social Space	2 pt
Kitchenette within 2 min walk	1 pt
No kitchenette available	0 pt

Does the social space have seating? [10, 11]

Sofas and tables	3 pt
Tables and chairs	2 pt
Low wall that can be used for seating	1 pt
No seating available	0 pt

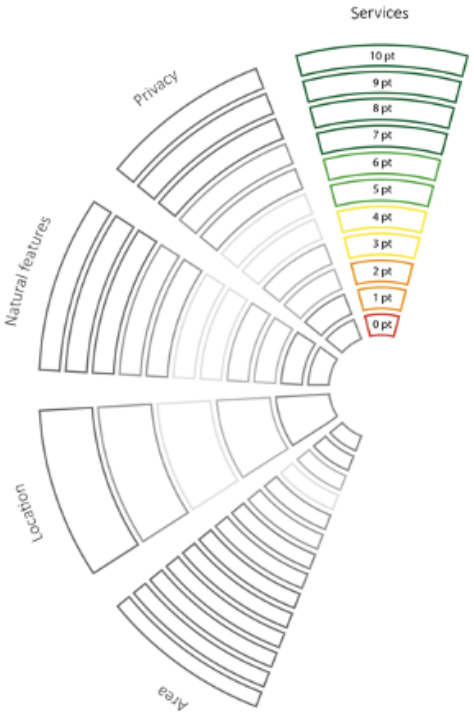


Figure 23 - - Social Space scoring guidance document page 4

3.6. Ethical considerations

The purpose of this work was to further understand the impact the spaces can have on wellbeing, focusing on a university campus. The findings of this study should be read in the wider context of design and should not be interpreted to gain student numbers or influence mental health.

Expert opinions as well as user opinions given in this study were taken from a limited sample, therefore further verification of the validity of these statements is required as described in section 6.2 “Further study”. Due to the limited number of participants, statistical analysis was not advisable in this case, and most data analysis was qualitative, a skill that improves and develops with time. The variability of outcomes from different research expertise must also be considered, which was the main reason for the direction of the outcomes of this study.

Data collected from Module Evaluation Questionnaires was centralised in the Coventry University internal systems, and relevant approvals were obtained before accessing it, as part of the overall ethics application evidenced in Appendix 12. The data was made available to university staff, requiring an appropriate secure account, and was collected anonymously at university level, as part of general quality assurance processes outside of this study. A comprehensive ethics flowchart is available in Appendix 12 Figure 91.

Throughout this chapter the methods and ideologies behind this study were discussed, defining the primary and secondary data collection methods, primary data collection being focused on online interviews, while secondary data collection involved a variety of sources, from literature to maps, to student surveys and campus typologies. The analysis of the data gathered was outlined and the main outcome of this study was detailed, including its documentation for application. The methods map in Figure 7 explains the steps taken in during the study.

4. Data analysis and findings

Chapters 2 and 3 outlined the relevant literature and research methods used during this study, in chapter 4 the results and findings of this study will be discussed. The aim of this study was to develop a scoring system for social spaces on a university campus, therefore the typology of campuses in the UK is determined, a case study campus is analysed, student opinions are examined, both from metanalysis of large-scale surveys, and interviews, and staff and expert interviews are analysed. To understand scoring systems five relevant systems are analysed for categories scored, and proportion of marks/ credits awarded, consequently gaps in existing scoring systems are determined.

4.1. Coventry University case study

Coventry University was chosen as a case study for this work, the group has multiple campuses in the UK and outside the UK, but for this study was focused on the main campus in Coventry city centre. Coventry University has expanded in recent years, as can be seen in Appendix 2, and four of the last buildings opened on campus have been awarded BREEAM (Building Research Establishment Environmental Assessment Method) Excellent accreditation. Coventry University is the third largest university in the UK by student numbers, (Statista, 2022), with students on Coventry campus being split over 4 faculties.

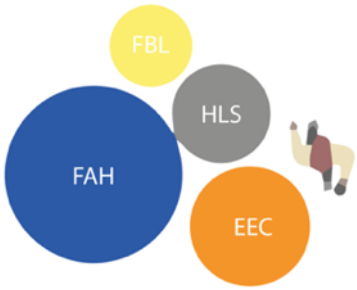


Figure 24 - Area/ student

faculty	area/ student
EEC	4.25 m^2
FAH	9.26 m^2
FBL	1.97 m^2
HLS	2.86 m^2

Table 9 - Area/student

A full analysis on the student distribution was done on Coventry campus, this is made available in Appendix 7, and it was discovered that students were given different amounts of space depending on what course/ faculty they were enrolled on, ranging from 9.26m^2 to 1.97m^2 per student as illustrated in Table 8 and Figure 23, student numbers can also be observed in Figure 24 which illustrates the number per faculty on the campus map, if they were all spread on the ground floor and were allocated the same area, therefore it demonstrates the marked difference in numbers between the four faculties, as well as the space offered on campus to each student. Coventry University allocated different buildings to different faculties rather than integrate, approach that has been taken by other universities (York, 1962).

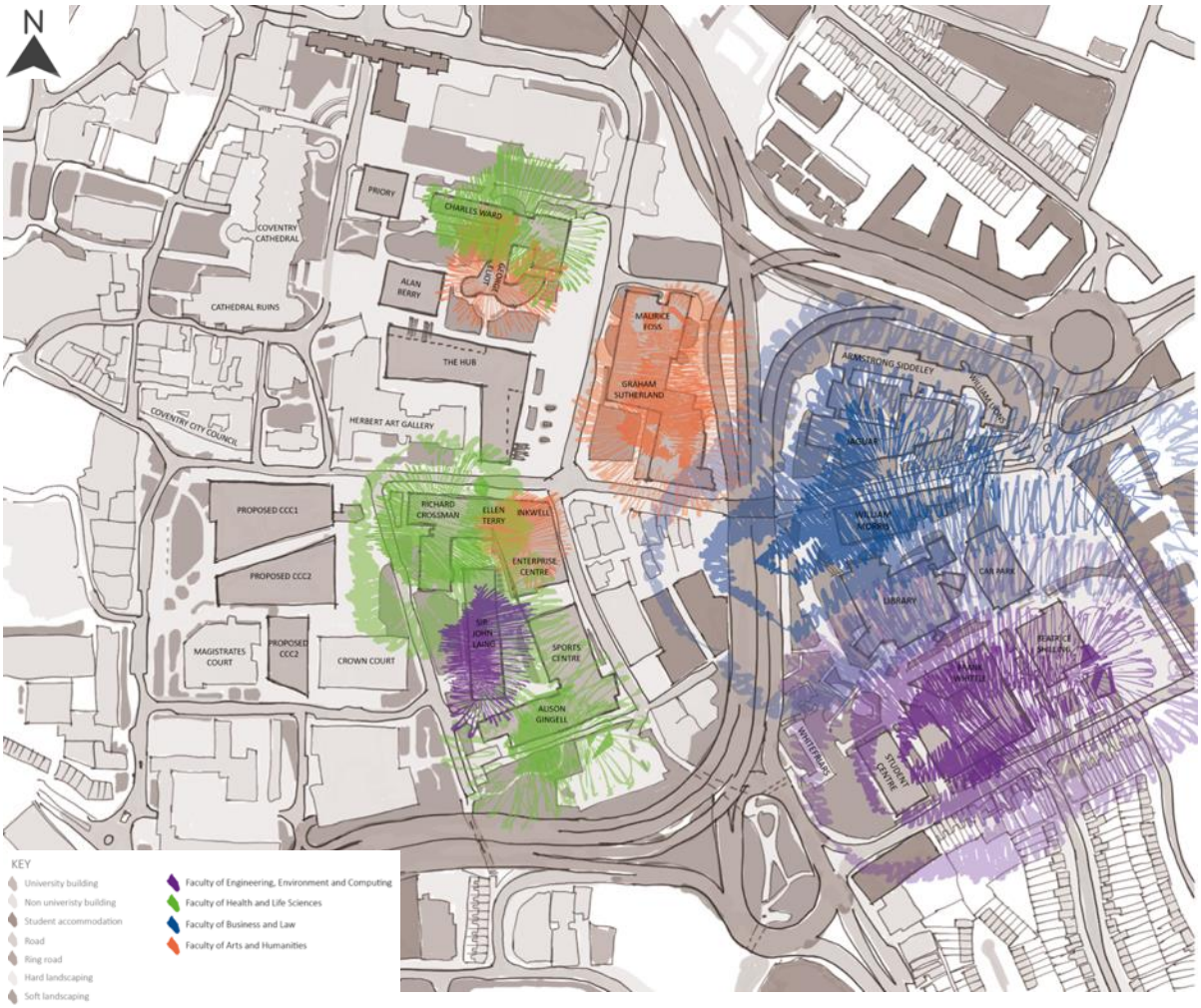


Figure 25 - Distribution of student numbers spread on campus

4.2. Student satisfaction

Student satisfaction has been previously introduced in chapter 3.3.1, where the scoring system and questions are explained. Figure 25 below shows how the overall student satisfaction (answers to Question 20 from MEQ questionnaire as shown in Figure 10, chapter 3.3.1) and the belonging to an academic community (answers to Question 17 from MEQ questionnaire as shown in Figure 10, chapter 3.3.1) evolved from 2016 to 2022 and a comparison between results for the two questions. COVID-19 lockdowns have allowed the measurement of the impact of the University campus on student satisfaction. To delve into the impact of the pandemic on the sense of community students may experience, the student's sense of community and belonging before and during the pandemic were analysed to understand if the inability to use campus spaces impacted how students felt about their academic community.

Figure 26 illustrates how the number of students who agree with the statement "I feel part of an academic community of staff and students" drops considerably when teaching and learning was done from home due to the national lockdowns. This establishes that students enjoy an increased sense of community and

belonging if they use the communal spaces on campus and experience face to face teaching in campus facilities. Table 10 also demonstrates that overall student satisfaction decreased considerably less than the sense of community, the average drop for community was 9.5 while overall student satisfaction only dropped 3 percentage points.

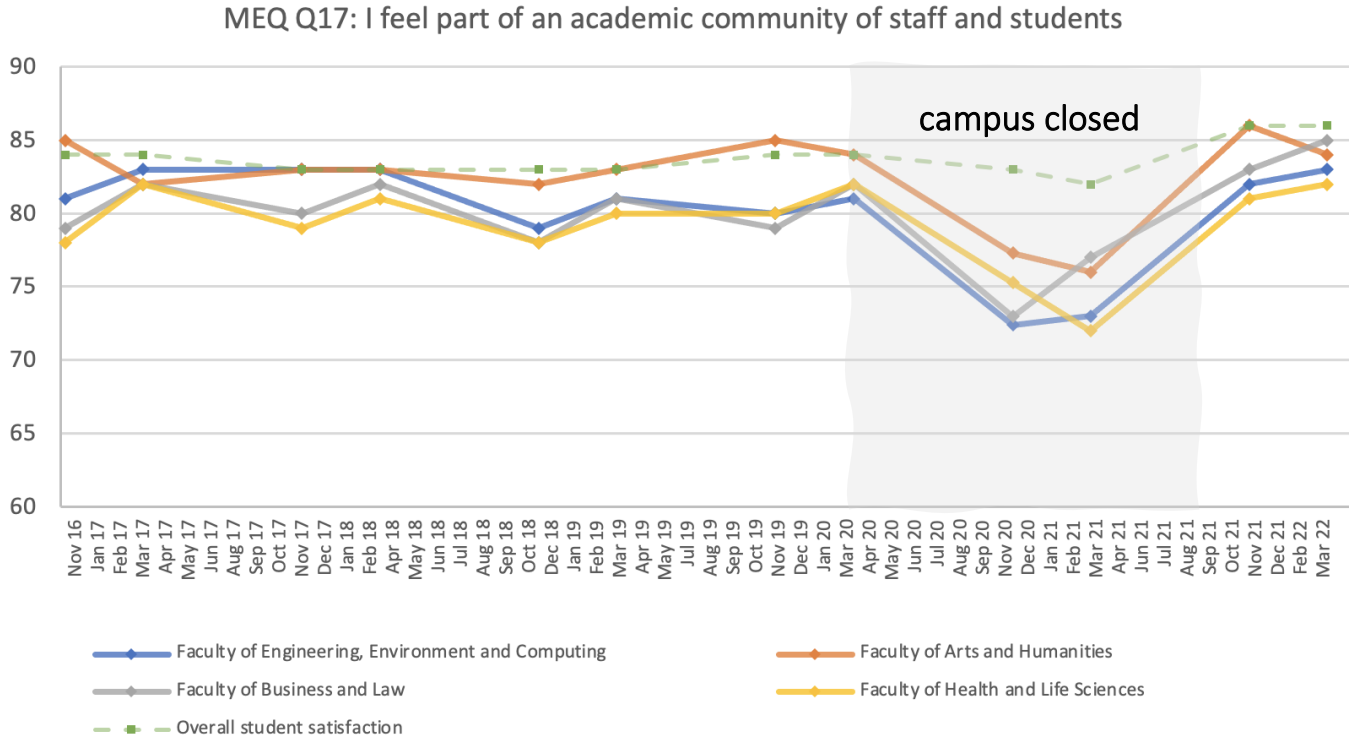


Figure 26 - Answer to Q17 from module evaluation questionnaire – Autumn and Spring terms (average Number of responses: 32778)

	Q 17 – Community				Q20 Overall Satisfaction
	EEC	FAH	FBL	HLS	
Lowest score	72	76	73	72	82
Assessment period	Nov 2020	Mar 2021	Nov 2020	Mar 2021	Mar 2021
No lockdown score	82	84	83	82	85

Table 10 - Community score calculated drop

There could be a link between the faculties and the drop in community score, the Faculty of Arts and Humanities obtained the highest score in lockdown, with the smallest drop, 8 percentage points, while the other three faculties all scored 10 points less than expected. Observing this information while considering Table 10, the considerably larger area given to FAH students, as shown in Table 8 in 4.1, may have had an impact on lessening the decrease, especially if the area is correlated to staff numbers.

While FAH had a calculated drop of 8 percentage points for community, all other faculties showed the same drop of 10 percentage points, irrespective of their starting point, which is correlated with the 3 percent drop in overall satisfaction with the modules taken. This finding does not link to area provided per student, as this ranges from 1.94 m^2 for FBL and 2.86 m^2 for HLS to 4.25 m^2 for EEC, and lastly 9.26 m^2 for FAH. The average area for all four faculties is 4.59 m^2 (higher than EEC), and when disregarding FAH as an outlier, the average

becomes 3.02 m^2, coming closer to the median of 2.86 m^2 (HLS). This supports the hypothesis that FAH provides markedly more space per student, reflecting the overall higher community scores before the lockdowns, and the smaller drop during the lockdowns.

4.3. Framework analysis

FW	Well-being	Management	Energy	Trans-port	Water	Materi-als	Waste	Land Use & Ecology	Pollution
WELL	73%	23%	19%	1%	6%	8%	0%	0%	0%
FLOURISH	54%	46%	4%	4%	0%	4%	0%	4%	4%
SPEAR	26%	16%	6%	4%	2%	2%	2%	20%	6%
LEED ND	19%	11%	14%	12%	9%	1%	1%	29%	4%
BREEAM	17%	13%	22%	8%	7%	15%	9%	10%	10%

Table 11 – Wellbeing in frameworks comparison

Table 11 displays a comparison between five chosen frameworks, based on 9 common factors, which were determined from the framework analysis. The comparison is based exclusively on points or credits given to each section, and the weight they carry in the ultimate score, some percentages adding to more than 100, as points for wellbeing were given in different categories such as energy or transport. The table is also illustrated in Figure 27.

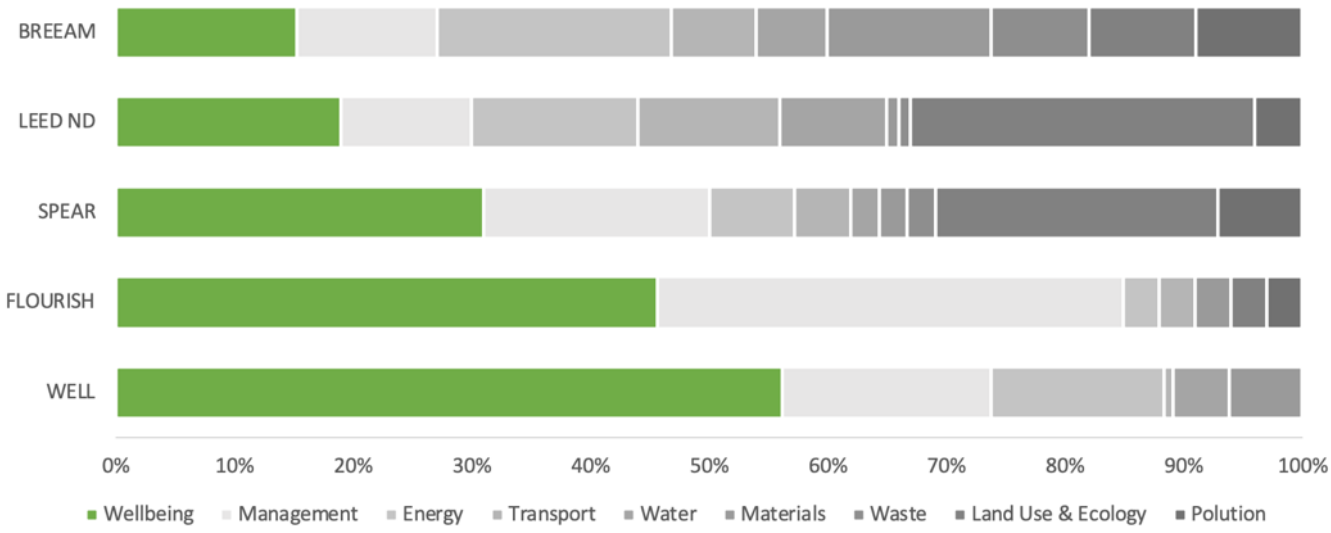


Figure 27 - Wellbeing in frameworks

It is evident that the Flourish framework is focused primarily on Wellbeing and Management, with a small percentage dedicated to sustainable land use, energy, and transport, but this is still through the wellbeing prism, as well as sustainable materials and reducing pollution, while WELL sets a strong emphasis on wellbeing and management, but gives no points to waste, land use or pollution. SPEAR gives most credits after wellbeing to Land Use and Ecology.

Lastly, in a comparison between BREEAM and LEED ND, LEED ND is only marginally more focused on wellbeing than BREEAM but gives most of its points to Land Use and Ecology, while BREEAM is evenly split across the measured categories. The two frameworks are notable as they are most used worldwide (Allplan, 2021), and BREEAM has awarded certifications for the case study discussed in section 3.3.

Table 12 demonstrates how wellbeing is scored in each framework, and shows that there is no consensus, some frameworks give points to an overall category called health and wellbeing, it can be observed that some award credits whilst others do not, also illustrated in Figure 28.

Framework	WELL	FLOURISH	SPEAR	LEED ND	BREEAM
Visual	8%	25%		1%	4%
Air	8%	7%	4%		6%
Thermal	7%	4%			3%
Acoustic	8%	4%			1%
Safety		4%			2%
Community	17%	4%	9%	8%	
Nature		4%	9%	2%	
Wellbeing/ Mind	8%	4%	4%		
Nourish	7%			1%	
Movement	9%			7%	

Table 12 - Wellbeing in frameworks

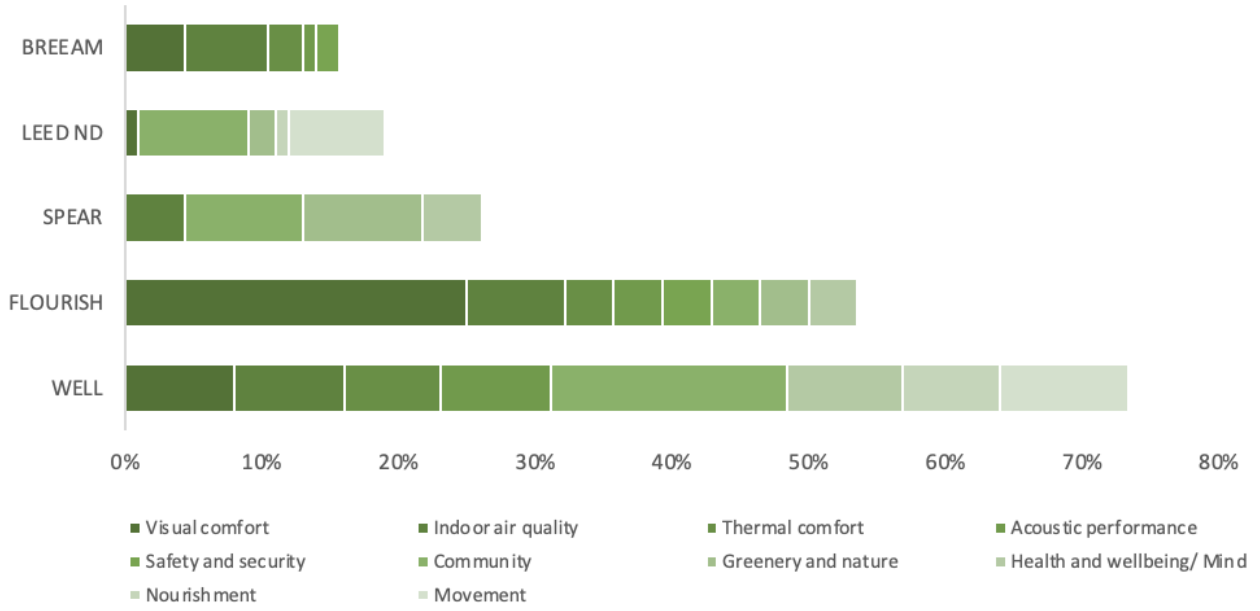


Figure 28 - Wellbeing in frameworks

From the analysis of 5 frameworks, it is evident that they all use different metrics to arrive at their scores, and the information given to users does not give any information whether the scores achieved had some, all, or no wellbeing points. Most frameworks are used by design teams to demonstrate the quality and sustainability of their proposals, other than Flourish, which is a theoretical framework, all others are used as selling points for buildings or developments, with some buildings having their certification displayed in entrance lobbies or

on their website. Therefore, by knowing that a building has been certified BREEAM Excellent or LEED-ND Gold, users have no information about wellbeing measures, although they may have wellbeing credits without being specific about it.

This demonstrates that there is a need to develop a more tailored framework that focuses on measuring design and management factors that improve wellbeing. While most of the frameworks measure wellbeing and design and management factors, these findings need to be correlated to develop a measurement system for design that can influence wellbeing, in this case, on a university campus.

4.4. Interview analysis

4.4.1. Interview Part 1 – Interviewee responses to social spaces at Coventry University

There appears to be a direct correlation between those buildings that had been built or refurbished recently and the success of their social spaces. This may be because designers became more aware of the requirements for social spaces near core teaching spaces recently, or it may be linked with the drive to achieve BREEAM ratings on university campuses such as Coventry University. The most preferred outdoor space was to the South of George Eliot building, while the least preferred was Beatrice Shilling North, both pictured in Figures 29 and 30.

Figure 30 - George Eliot south June 2022

Figure 30 - Beatrice Shilling north June 2022

When discussing the success of George Eliot south, interviewees remarked on the diversity of people, with staff, students and members of the public, availability of seating with different levels of privacy, the natural features, and visual points of interest as well as the abundance of sunny spots. Beatrice Shilling North was perceived by most interviewees as the worst outdoor space on campus and the factors discussed for this rating were the inadequate proportions, with the outdoor space being shadowed by buildings, lack of sun on seating areas and the lack of diversity of people.

When examining indoor spaces, the HUB (pictured in Figure 31) had most positive responses, interviewees stated that it provided a variety of socialising and workspaces, both students and staff expressed feelings of ownership over the spaces, while Alan Berry (pictured in Figure 32) had the most negative responses; interviewees stated that they did not have any feelings of ownership over the spaces, none of the students interviewed had used any of the spaces in the building, although it provides large scale lecturing facilities, the scale of the lecture theatre may have been an influencing factor, as some students may have never attended a large lecture, depending on the size of their course. After interviews for this study were conducted, Coventry University announced that Alan Berry was to be demolished (Coventry University, 2022).

Figure 32 - HUB ground floor June 2022

Figure 32 - Alan Berry building May 2022

In Figure 33 the interviewees' attitude to spaces can observed, using smiley faces to explain respondents' opinions of indoor and outdoor spaces, while in Table 12 the direct quotes from interviews can be observed with analysis and interpretation to the Coventry University campus context. Figure 34 uses the same map to exhibit the spatial breakdown of each building on campus, with breakout space and other space. There was a direct correlation between internal spaces with positive responses in Figure 33 such as the student HUB, Frank Whittle, Alison Gingell and the student Library and the amount and proportion of breakout space shown in Figure 34.

Figure 33 - Interviewee attitude to spaces on CU campus

Figure 34 - Indoor area analysis on campus map

Building	Space	Interview quotes	Characteristics
P	In	*Not used*	Only used for pre university courses
	N	*improved by demolishing H block*	Near accommodation, not near teaching and learning
CW	In	*Tucked away*	Teaching spaces, mid-century building with no recent updates
	N	*No pedestrian traffic –* ***1 x Dislike***	
GE	In	*Lots of space*	7 story building, teaching spaces and offices
	S	*Lively, successful space, lots of people, informal meeting place, edible garden scheme –* ***5 x Like, 7 x Strongly like***	Large outdoor space linking GE and HUB, used during freshers' week and for open days
AB	In	*Unwelcoming –* ***2 x Dislike***	administrative building, with some teaching space
	W	*diversity of people, skateboarders, nice area, children playing in fountains, public space –* ***6 x Like***	University square, looks over Cathedral and Herbert
	N	*isolated place, underused, not used, oppressive and dark, nice greenery, beautiful trees –* ***6 x Dislike, 6 x Like***	Mostly green space, mature trees, and some gravestones
C	ruins	*Beautiful view –* ***1 x Strongly like***	60's cathedral and open-air cathedral ruins
	W	*I like to sit in the outdoor space, there's wildlife and planting -* ***1 x Strongly like***	Green space, links to Coventry city centre and restaurants
HUB	In	*Nice rooftop terrace that is underused, good meeting space, I like the courtyard, meet for group work and socially –* ***1 x Dislike, 4 x Like, 7 x Strongly like***	BREEAM Excellent, student life building with multiple food and coffee outlets, collaborative and independent working space
	E	*Thoroughfare, unpleasant when hoarding was up, people don't linger here, don't like the stairs, connecting space –* ***1 x Dislike, 7 x Like***	Links GE and CW to rest of campus, some planting, and benches, can be windy
H	N	*Young people gather here, kids come and play, skateboarding –* ***4 x Like***	Steps of various heights leading to Herbert art gallery, sunny at times
	S	*Sunny, popular coffee shop, sat outdoors in January –* ***1 x Like***	Hard landscaped courtyard, links to Herbert Cafe
MF	In	*Labs are good*	Teaching spaces and laboratories, mid-century building currently undergoing refurbishment
	W	*Seems pretty, no one uses it, little oasis of trees –* ***1 x Dislike, 1 x Like***	Rectangular green space with trees, buildings 3 sides
GS	In		Teaching and learning, 7 story building, currently undergoing refurbishment
	S	*Not very successful space, never used, never go past it, disconnected to the building –* ***4 x Dislike***	Rectangular green space with mature trees, buildings 3 sides
AS	In	*Beautiful view from top floor –* ***1 x Like***	Teaching and learning building, classrooms, laboratories, and offices
	N	*Never passed through, I avoid going near the ring road, potential to change –* ***5 x Dislike***	Large green area between AS and ring road, quiet
	W	*enjoyed the wild meadow when it was there –* ***1 x Like***	Medium green area between AS and ring road, quiet
J	In	*Feels grown up, you can spend time outside the entrance, I get lost in the building, space works well, lots of meetings in that coffee shop –* ***5 x Like***	2 storey building, recently updated, teaching and learning spaces, coffee shop
	N	*Bandstand was a bad idea, least successful space –* ***5 x Dislike***	Rectangular green space with bandstand at the back of JAG, accessed from buildings or walking around them
	W	*Never used –* ***1 x Like***	Car park
	S	*Breakout space, has seating and beautiful planting, comfortable, most greenery in that area –* ***2 x Like***	Formal entrance to JAG, some planting and seating areas
WL	In	*Hugely ineffective*	Administrative building
	S	*Nothing going on, I've never been there*	Large green area between buildings and road
WM	In		5 storey building, teaching and learning, laboratories, large entrance lobby
	W	*High pedestrian flow, space invites you in, meeting space, I use the coffee van, proportions have an impact on people, needs to be human scale, no one uses the benches –* ***3 x Dislike, 4 x Like***	Busy area with people from Library, Jaguar, Frank Whittle and east Coventry. Some seating, can be windy
ET	In	*Beautiful building –* ***1 x Like***	Converted cinema from 1880s, retained original façade, large entrance lobby, teaching and learning + laboratories
	N	*Busy with people, I like the proportions –* ***1 x Like***	Large overhang from building protects from rain, students often meet outside the building
RC	In	*Nice café, thoroughfare, nice comfortable space, large social space –* ***5 x Like***	4-storey building from 70s, teaching and learning space, large entrance lobby with seating, big café with seating
	N	*Busy area, links to town, important space –* ***1 x Like***	Pavement outside building, busy during the day, little sun, students meet outside building if dry
	W	*Not used*	Green area to the side of the building, pavement busy with university traffic, bus stop, no seating
L	In	*Good meeting space, spaces you can talk –* ***1 x Dislike, 4 x Like***	5-storey building with large, enclosed atriums, computers, books, and meeting spaces. Café on the GF with seating
	W	*Good outdoor social space, best space, inclusive space, student activities, space works well, seating space, crossing paths with people you know –* ***1 Dislike, 4 x Like, 1 x Strongly like***	Large green and pavement strip with seating and planting, some mature trees, and well-maintained borders
S	G	*Unoccupied seating, improved views from cathedral to Graham Sutherland, new greenery, sunny space –* ***3 x Like, 4 x Strongly like***	Recently developed gardens, hard landscaping with limited seating. Well maintained borders. Does not link to HUB
BS	In	*Nice atrium, far away from everything, inviting building, lots of space, nice social space, I've never used it –* ***1 Dislike, 1 x Like***	BREEAM Excellent building, teaching and learning, laboratories large atrium in centre, seating, opened during the pandemic
	N	*North facing steps, space not used very well, lost opportunity for communal space, space should be bigger –* ***7 Dislike***	Steps down to BS entrance, buildings on one side and car parks two sides, can be windy, some seating, never used
	E		Car park
	S	*Strange orientation, faces the wrong way, don't know where the back is and where is the front, not well performing space, out of the way –* ***6 Dislike***	Formal entrance to BS, can be windy, overlooks car cark and high traffic road with residential buildings. Some planting
FW	In	*Like a fortress, roof terrace never used, lots of collaborative space, nice places to sit and drink, nice to go into, investment, social spaces on the GF, coffee place, real buzz –* ***1 Dislike, 4 x Like, 2 x Strongly like***	BREEAM Excellent, 7 storey building, teaching and learning + Laboratories,
	N	*Service yard, busy with people, thoroughfare, nice when it's sunny –* ***1 x Dislike, 2 x Like***	Space between FW and Lib, cycle parking, trees, and seating, both FW and Lib have inactive frontages, busy area, access to BS
	S	*Back of the building, unusable space, worst space, not inviting –* ***1 x Strongly dislike, 1 x Dislike***	Thin grassy area fenced off from narrow pavement of busy road
	W	*Vehicular access here, dead frontages –* ***1 x Dislike***	Space between FW and Student Centre, FW has inactive frontage, tall retractable bollards to allow for deliveries, Student centre entrance here, some planting and seating
	C	*Uninviting, meadow experiment means you cannot walk the grass, wasted opportunity –* ***4 x Dislike***	Paved and green space at the centre of FW, paved space is sloped with no features or seating, green space is inaccessible, all FW frontages are to this courtyard
SC	In		Administrative building with large lobby and offices, requires refurbishment
	WF	*Would not spend time here, the pond is nice, would spend a few minutes to unwind, or go out of my way to walk through here, historically important to Coventry –* ***1 x Dislike, 4 x Like, 1 x Strongly like***	Whitefriars ruins set in grassy area as well as pond with bridge, no seating available, links to underpass connecting to JL and AG
AG	In	*Use it as access, too spacious, not organic, successful space, I like to sit here with a coffee, successful in terms of social space, very successful internal space, good spot to meet people –* ***2 x Dislike, 2 x Like, 4 x Strongly like***	BREEAM Excellent, teaching, learning and labs, 5-storey building, with large atrium and glazing on the north side, seating on several levels, café and link to sports centre
	N	*I like what they've done there, service yard, proportions are wrong, popular space, I like to have meetings here, catches the sun –* ***2 x Dislike, 2 x Like***	Space between JL and AG, links to RC, some mature trees, fixed and moveable seating, some sun, no protection from weather
	S	*I use this as access, nice greenery, out of the way –* ***1 x Dislike, 1 x Like***	Cobbled path and park, old part of Coventry city wall, car park, several mature trees and limited seating
JL	In	*Nice light spaces, could be improved, rooms designed for collaboration, lacks identity, common room is well used, spaces to eat, spaces to meet –* ***3 x Like***	Teaching, learning and labs, 2-storey building with offices and classrooms, has common room at the centre of building
	W	*Should get more use, building orientation is inappropriate, nice greenery, soft approach to building, can't do much with it –* ***3 x Dislike, 3 x Like***	Large green area in front of JL with mature trees and uneven topography, chapel ruins to the south
	N	*Very urban area, gets some sun, feels private, odd shape, met students here, pleasant courtyard –* ***1 x Dislike, 3 x Like***	Space between RC and JL, hard landscaping with one tree, some sun, busy thoroughfare during the day

Table 13 - Interviewees opinions about spaces - quotes

4.4.2. Interview Part 2 – Interviewee responses to social spaces criteria

Q1. How do you think weather influences social spaces?

Seasonality and weather conditions have a great impact on the success of social spaces. Every interviewee described weather conditions as a deciding factor when choosing a space to be social. Factors that made up weather conditions were time of the year, temperature, wind conditions and precipitation. None of the respondents referred to outdoor spaces as successful work/ study spaces. Unfavourable weather conditions were also shown to shorten the acceptable distance from a study space to a social space.

> *"Weather impacts the way I use outdoor spaces unless there's a permanent cover that protects the areas or an overhang from a building or something I can sit under. I don't think many people would want to sit out in bad weather."*
>
> *Student*

Q2. What is the impact of nature on social spaces?

Most respondents (91%) would like to see more natural features in social spaces. Features mentioned were views onto nature, space to walk and interact with nature. Most agreed that these interventions did not need to be expansive, but rather smaller approaches to planting. When talking about indoor social spaces daylight and fresh air were prioritised over indoor planting.

> *"I like to (sit) down in an outdoor green space, and thinking of indoor spaces, you want to look out, and not feel like you're in a concrete jungle. We want to be reminded of what's outside, you want to see the weather and the time of day go by, making you feel more present."*
>
> *Student*
>
> *"I think [nature] has a massive impact, in the summer, the trees that provide some shading, so it's vital to get that balance right, the buildings with the vegetation and plants. I think it helps you move more and can reduce your stress, and it's just nice to be able to look at vegetation rather than staring at a concrete wall."*
>
> *Manager*

Q3. How do you see privacy in campus spaces when thinking about its users (students, staff and public)?

Most respondents (91%) would prefer to have more interaction with the public on campus but think this is not encouraged through design or management. Some agreed that although situated in a city centre, the Coventry University is not an urban campus, and others mention that they do not feel welcome in certain buildings or spaces.

> *"Yes, so I think you know there should be opportunities to make places like the University Square genuinely public"*
>
> *Manager*
>
> *"I don't think Coventry's campus is a city campus, even though it's in the city centre. I'm comparing it to other universities where I taught, I think it kind of feels a little bit more like in a closed campus than like a city campus because of the adjacency of the buildings. It's not really like the buildings are integrated into the city or into the urban fabric"*
>
> *Academic*

Q4. What is the importance of connection to facilities? How important is the link to the town centre?

All respondents agreed that the location of the campus allowed it to be more diverse by drawing from the uses and facilities in Coventry city centre, and all respondents said that they leave the campus regularly to use the city centre for shopping or meetings. Some students said that the proximity to Coventry city centre allowed them to maintain a connection to the urban environment.

> *"It is great because it just gives you connection. And it allows you to then be in the action all the time. And if you're like, oh, you know what I'm going to go, get coffee or a honeydew pear, trousers or whatever it is. You can go out at lunch and go and get them and you can go and experience town. You can shop, socialize, whatever you want"*
>
> *Student*

Q5. How do you think social spaces impact education?

Most people believed that successful social spaces would have a positive impact on educational outcomes, some students said that they did not use the social spaces available but that they believed that their outcomes would be improved if they had. Academics, managers, and experts all stated that effective social spaces were necessary for positive educational outcomes as they allowed for regular breaks while keeping students on campus, and that effective social spaces could be used for teaching as well as recreation.

> *"I do see the benefit of having that social life within the campus and being able to go to places with your housemates or your friends or whatever. I think that would help [educational outcomes]"*
>
> *Student*

Q6. How do you see the relationship between social spaces and mental wellbeing?

All respondents believed that social spaces had a significant impact on mental wellbeing, some students stated that although they did not use the social spaces provided as much as they believed others did, they thought that engaging with these spaces could improve their mental wellbeing. All academics and managers believed strongly in the benefits of successful social spaces for mental wellbeing, managers seeing this as a benefit for staff.

> *"I think there is a direct correlation [between social spaces and mental wellbeing], obviously because places where you feel you are part of the University are important. The University is a group of people. […] [and the important thing] is the coming together, people are the first in that, and [getting your people] underpins everything, so therefore get your social spaces right, you get University right and you get peoples mental health right. […] And I think in a world where people are increasingly worried and nervous about meeting other people, that means that the social spaces must feel safe, as well as being safe."*
>
> *Social spaces designer (Expert)*

Summary

QUESTIONS	RECOMMENDATIONS
Q1. How do you think weather influences social spaces?	Provision of covered seating next to buildings, introducing street furniture to small outdoor areas that are sheltered from the wind, adding natural features that provide shelter from rain and wind
Q2. What is the impact of nature on social spaces?	Outdoor social spaces should have some natural features such as planting or water features, while indoor social spaces need to prioritise direct natural light and fresh air
Q3. How do you see privacy in campus spaces when thinking about its users (students, staff and public)?	Outdoor social spaces on a university campus should have elements that encourage public engagement
Q4. What is the importance of connection to facilities? How important is the link to the town centre?	In the case of Coventry University Campus, the location allows the campus to be less diverse in terms of uses and facilities and draws from the sense of belonging to a community. In a standalone university campus diversity and community should be designed in.
Q5. How do you think social spaces impact education?	Teaching is more informal; therefore, students require space outside the classroom to interact with academics and their peers. Recreational spaces can be used as work and restorative spaces.
Q6. How do you see the relationship between social spaces and mental wellbeing?	Successful social spaces are not always large, there is a need for balance of indoor and outdoor as well as catering for individuals and large groups. They need to be in a comfortable walking distance and have a diverse set of services available to allow users to spend more time in them comfortably.

4.5. Workshop analysis

In the first part of the workshop students were asked to define what makes a social space good vs what makes a social space bad for them. The original output from the online whiteboard is shown on Figure 13 in chapter 3.3.5. and the output has been edited for analysis in tables 14 and 15 below.

What makes a social space good?	What makes a social space bad?
Experiences, Activities, Interactions, things to do	Nothing to do
Comfortable	Too much/ too little space
Presence of people	
Engaging the senses	
Iconic/noticeable	
	Bad location, Negative setting/ environment
	Dark colours

Table 14 - Social space factors

Examples of good social spaces

Diocletian palace, Split, Croatia

Neil's Yard, London, UK

Piazza Maggiore, Bologna, Italy

Typical Moroccan market

MET steps, New York, USA

Hyde Park, London, UK

Commonalities

Busy spaces, mixed use, all have seating, culturally representative, food and drink opportunities, mixture of large and small spaces

Examples of bad social spaces

Broadgate plaza, Coventry, UK

Green West of John Laing Building

Commonalities

Throughfares, spaces used to get to other places. Broadgate has elements from the good category, seating, food

Table 15 - Examples of good and bad social spaces given by workshop participants

The second part asked the students about their frequency of usage of every space on campus as shown in Figure 35 below and on the map in Figure 15 in chapter 3.3.5. The map was also redrawn for analysis in Figure 34. This information must be viewed in its context, as all students were enrolled on the same course and primarily using the Sir John Laing building, number 12 on Figure 36. Other buildings these students are expected to use are Frank Whittle, the HUB and Library and outdoor spaces Sir John Laing west, Alison Gingell north, Richard Crossman north, HUB east, George Eliot south, Frank Whittle Centre, Library north, Library west and Frank Whittle north.

Students mostly used the indoor spaces associated with their course, spaces such as the HUB and Library, or those in immediate proximity of these spaces. Outliers here are one participant using Armstrong Siddeley, Jaguar, and William Morris. Analysing responses to outdoor spaces, students used spaces on every part of the campus, depending on the amenities provided. Notably spaces not used are Starley Gardens, which due to the time of this workshop is justifiable as it was newly opened, had no amenities, or didn't lead to another more attractive space such as Maurice Foss west, Graham Sutherland south, Alison Gingell south, Jaguar north, William Lyons north. Jaguar south was expected to have a more positive response as it provided access to the building, but two students stated they have never used the space. This may be explained due to its small scale.

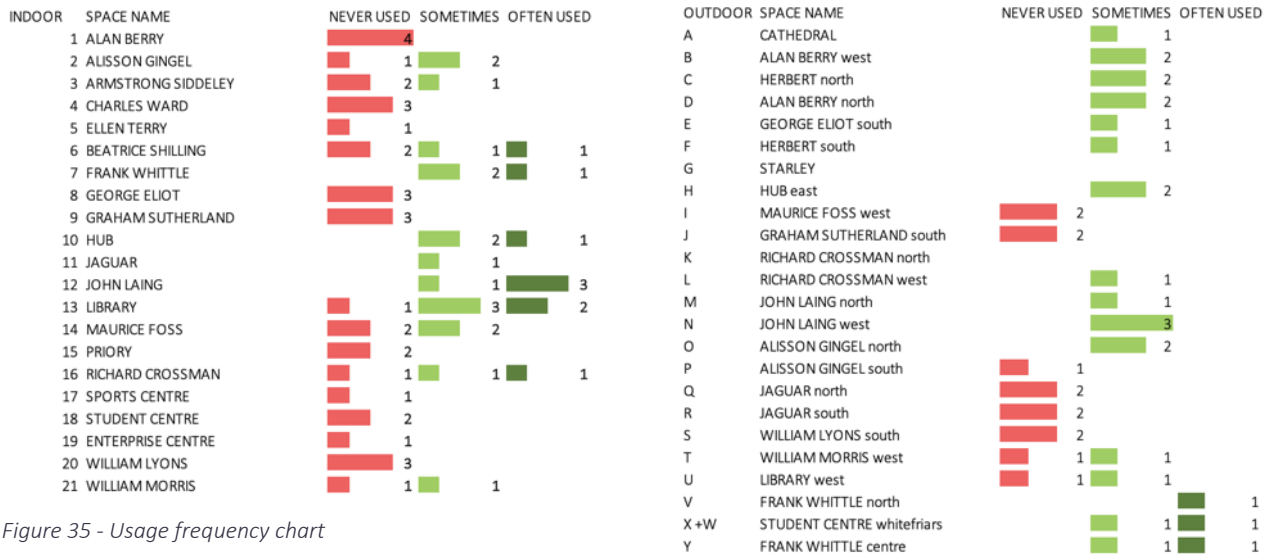


Figure 35 - Usage frequency chart

Figure 34 demonstrates this zoning, where students preferred to use spaces associated with their courses or those in immediate proximity, with the area around Sir John Laing, the HUB, the Library, Frank Whittle and Beatrice Shilling showing frequent use, while the area around Graham Sutherland, Maurice Foss, Jaguar, Armstrong Siddeley and William Lyons showing no use from this student group.

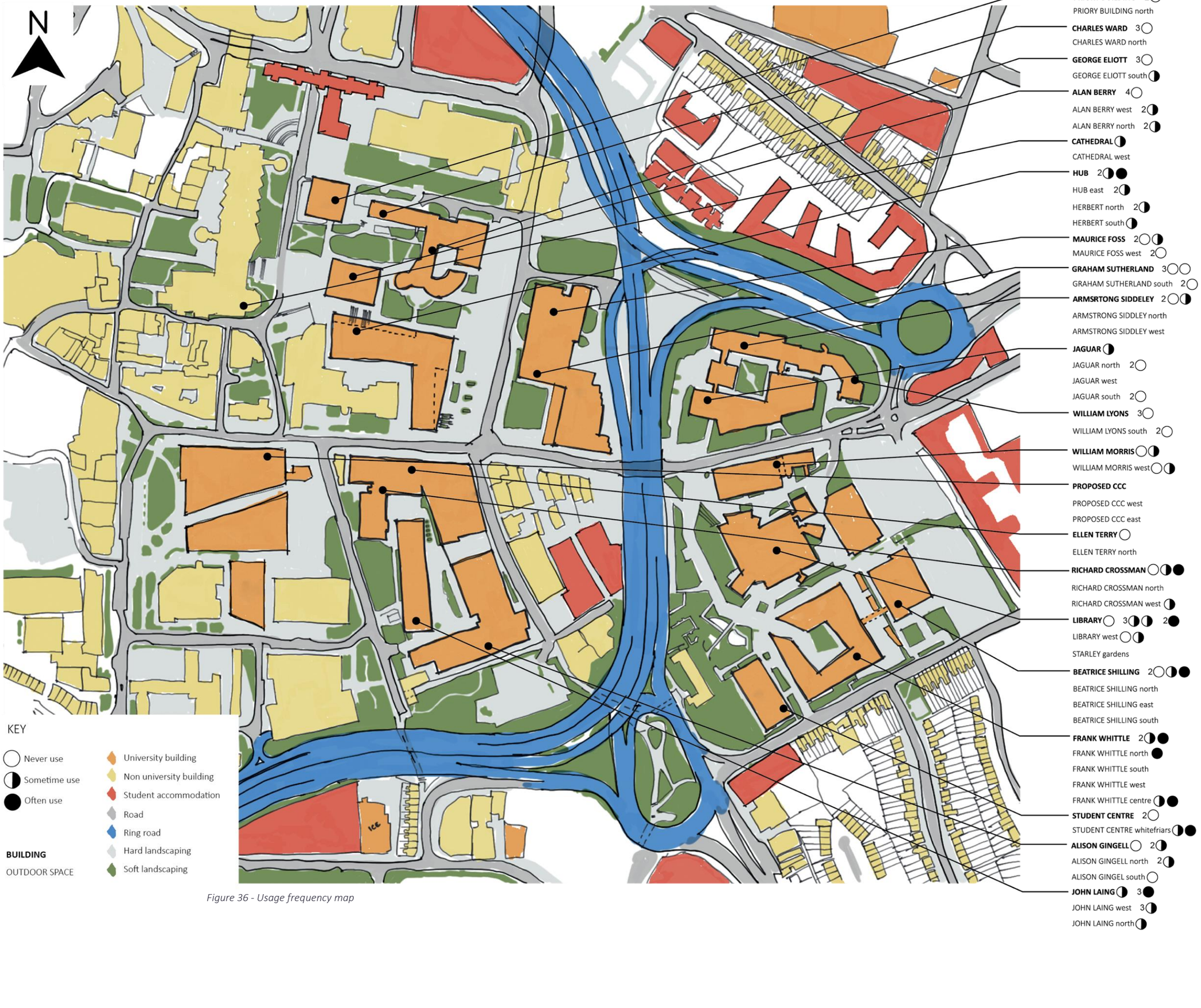


Figure 36 - Usage frequency map

The last part of the workshop discussed the overall ranking of buildings and social spaces on campus from worst to best on a 10-point scale. Figure 37 shows that students preferred outdoor spaces for example Cathedral, Alan Berry north, Whitefriars, Hub east, Sir John Laing west, Jaguar south and Herbert south, which are primarily greened spaces, with the most preferred being the Cathedral green, which is not within the campus boundary, but rather next to the Coventry Cathedral ruins. Preferred indoor spaces included HUB, Library, Alison Gingell and Frank Whittle, with the most preferred being the HUB.

Workshop participants showed a marked dislike of outdoor spaces Sir John Laing north, Sir John Laing west and Richard Crossman West as well as Alison Gingell north, which are all the outdoor spaces around the Sir John Laing building, the main teaching and learning space for this group of students. They also expressed a dislike of the spaces inside Sir John Laing Building and those inside the Jaguar building. This ranking was displayed as an output from the workshop in Figure 15 section 3.2.5. and edited for analysis in Figure 37.

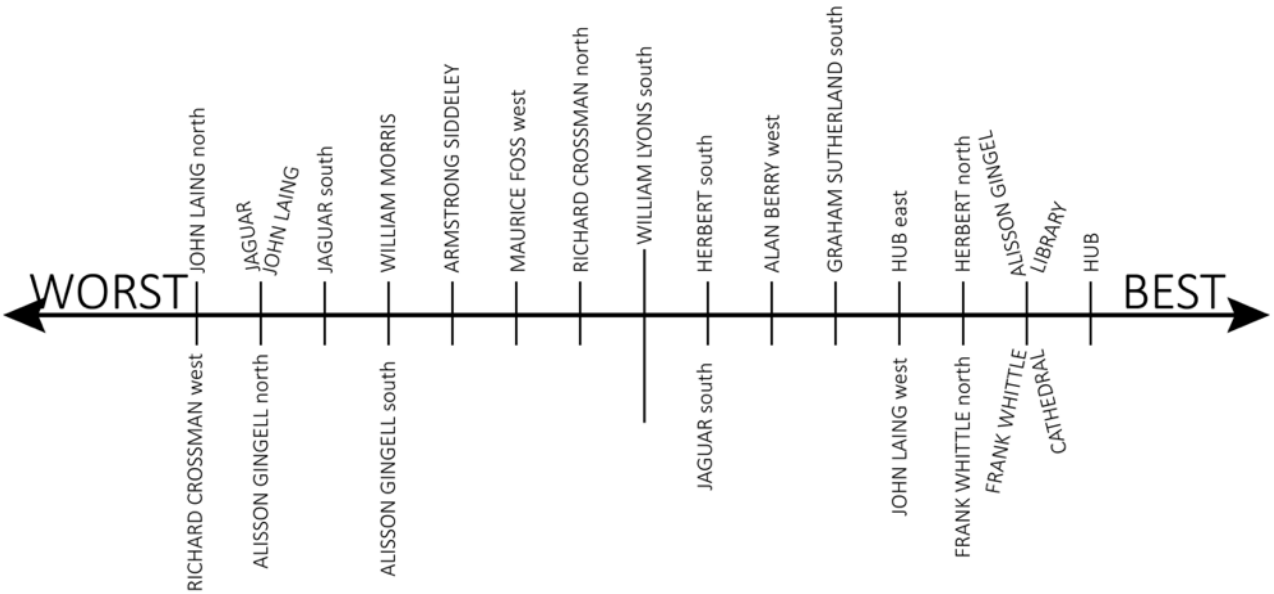


Figure 37 - Ranking of indoor and outdoor social spaces by CU students

The student space ranking was then colour coded on a red-to-green scale to represent worst-to-best and the relevant colours were added to the map in Figure 38 to determine if the preferences were correlated by location. A cluster of red and orange shades can be seen around the John Laing building, as discussed above while shades of green populate the area around the HUB and University Square as well as spaces near Frank Whittle and the Library. The relationship between Figure 38 and Figure 36 must be analysed, as the frequency of use is not directly correlated with a distinct appreciation for the space. Students frequently used spaces in and around Sir John Laing building but place them as some of the worst spaces on campus. The link between frequency and appreciation is visible for the area at the northeast of the campus, around the Jaguar building. One student scored 3/4 of the outdoor spaces around the building they most used, Sir John Laing as the worst social spaces, therefore they were most critical about the spaces they used most frequently.

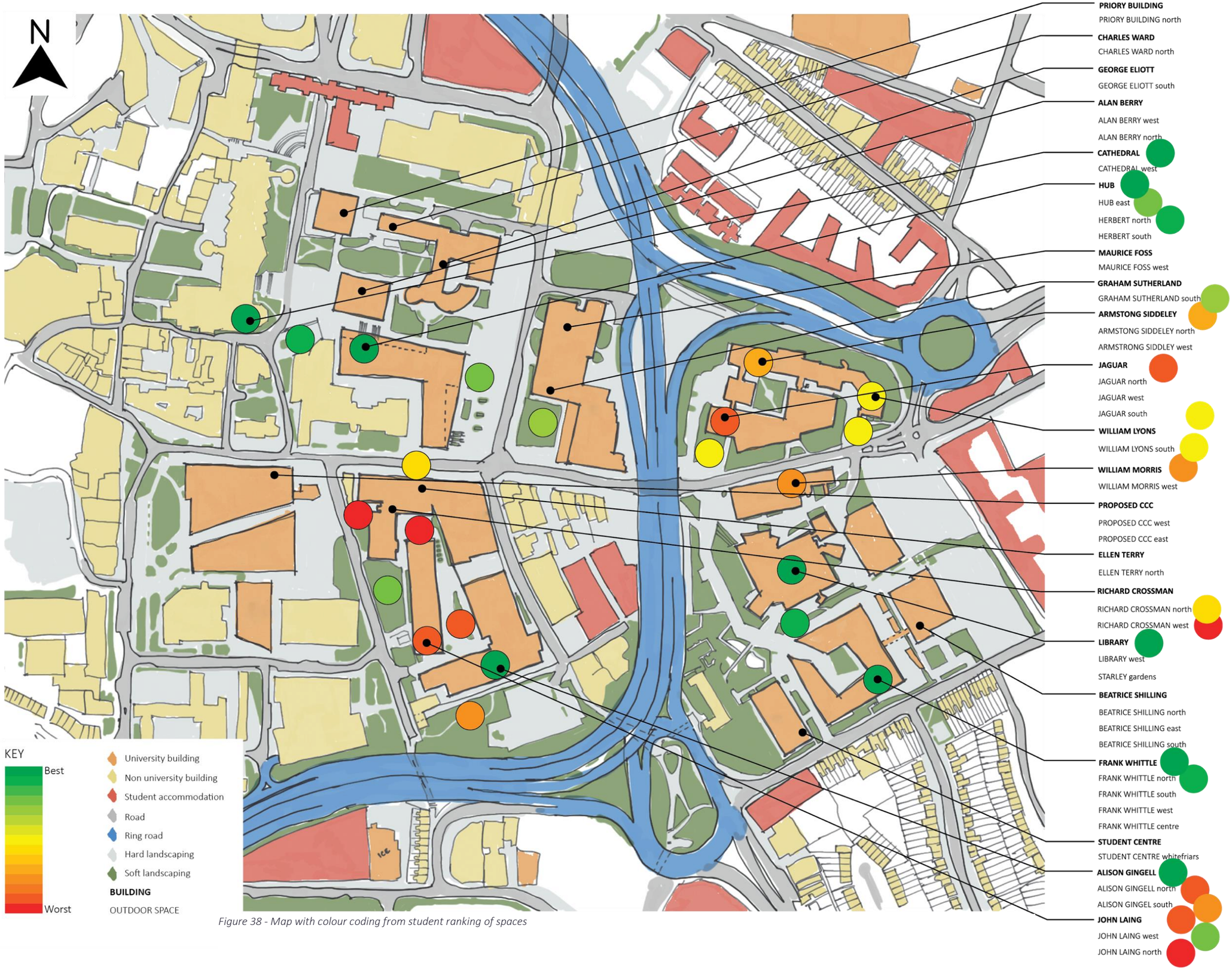


Figure 38 - Map with colour coding from student ranking of spaces

4.6. New Social Spaces design criteria for universities

The social spaces design criteria model has taken results from this study to propose a method to qualify design for social spaces on a university campus. It is mapped on a dedicated graph as shown in Figure 18 in section 3.5. The five categories are derived from knowledge obtained from both the primary data collection for this study through interviews and a workshop as shown throughout chapter 5, and the secondary data collection and analysis of existing frameworks. The categories are described in more detail on the following page and redefine the use of social spaces, their privacy levels, the availability of services, their connectivity to other teaching, learning and workspaces, and their proximity to nature and natural features.

Category 1: Area of social space

The way students learn has evolved, it is not only done in classrooms, but also collaboratively. Successful students are expected to learn on their own, discover and analyse new concepts, learning is not teacher centric. To enable this social learning, universities must supply spaces for students to meet, work, relax and collaborate. Experts and users of Coventry University spaces prefer buildings with a greater proportion of social space as evidenced in chapter 4.4.

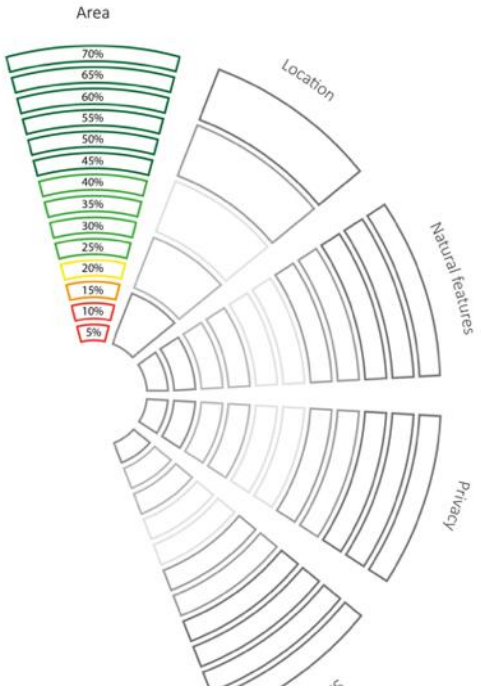


Figure 39 - Social Space category 1 - Area

The range of scores was determined from interview responses to Coventry University buildings, with Alison Gingell building having 27% of its Net area as social space, while Beatrice Shilling had 62% of its Net area as social space. Both buildings were seen to have good social spaces by interview respondents. A blank illustration of the model focusing on Area is given in Figure 39, showing that buildings with less than 10% breakout space require significant improvement, while those with less than 20% breakout space need some improvement.

Category 2: Location

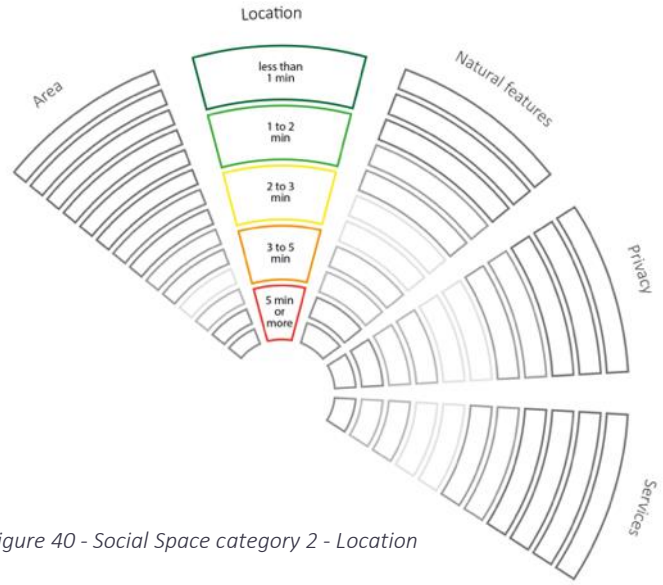


Figure 40 - Social Space category 2 - Location

Access to social spaces needs to be immediate, within a 2-to-5-minute walk of a teaching or working space, preferably having one small social space near or in each teaching building. The usage pattern of interviewees shows that their most frequently used spaces are those around their teaching or working space, within 1-to-2 minutes. If spaces are at a greater distance, users require more time between classes or meetings. WorldGBC (2015) and Gyeryn (2000) mention that people will travel to a social space if it provides food, socialisation, or shopping opportunities. Figure 40 shows appropriate distances to social spaces, recommending that buildings that are further than 5 minutes away from any social space, to develop a small space within their premises, and buildings that are further than 3 minutes away should consider developing such a space.

Category 3: Natural features

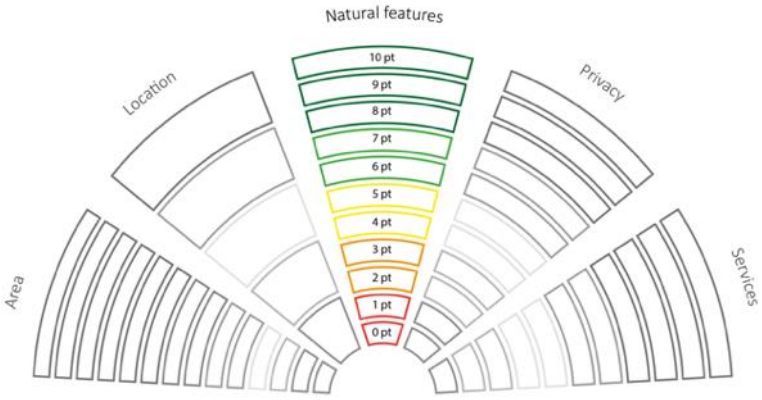


Figure 41 - Social Spaces category 3 - Natural features

Most preferred spaces on the CU campus were those with greenery or a view of greenery, interviewees showing a marked dislike of spaces with no natural light or the ability to open a window. Other studies show that being in nature or seeing nature from a window is proved to decrease stress (Frontczak et al, 2012 and WorldGBC, 2015), and increase productivity. The absence of natural light and fresh air is a direct predictor of sick building syndrome (Frontczak et al, 2012 and Architecture, 2016); users require agency and control over their workspace, by being able to open windows to control air quality and temperature (WorldGBC, 2014). Figure 41 shows that social spaces which scored less than one point in the natural features category must be redesigned or relocated to allow for natural light, ventilation and natural features to be present, while those who scored less than 5 points should consider some design changes to make the spaces more welcoming and better for their users.

Category 4: Public and Private spaces

Social spaces need to be readily available and inviting, allowing students from any area of the university to use them, and they need to have smaller more private areas, this can be done with furnishings or building form, to encourage lone working and private conversations, telephone calls or video calls. Spaces preferred on campus by interviewees were large with different working or relaxation facilities, which allow for quiet working or thinking. In previous research, RIBA (Architecture.com, 2016) discusses how work and teaching spaces must become more flexible, and O'Bryne (2018) argues that creative spaces should provide for group and individual work.

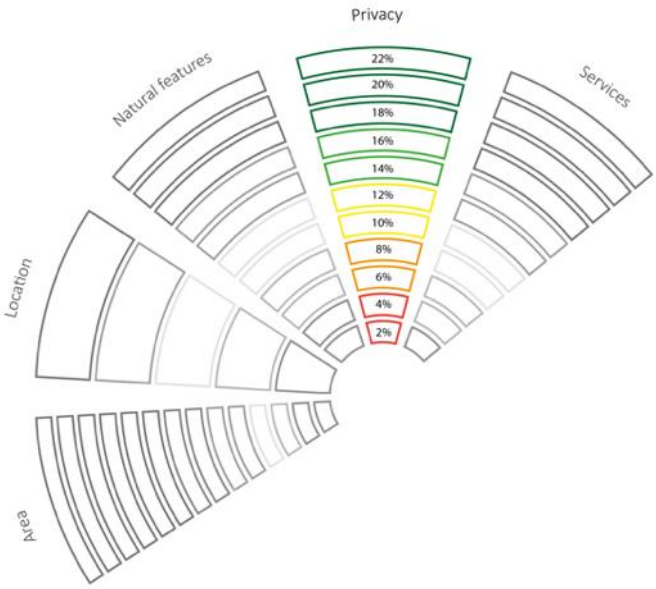


Figure 42 - Social Space category 4 - Privacy

Figure 42 maps the proportion of private space in a social space, with spaces which have less than 4% private working area requiring significant improvement, while those with less than 8% need improvement, and those with less than 12% should consider changes to increase this area. This category can be improved by updating furniture to incorporate seating with higher back and sides to reduce noise pollution and clustering this furniture in several area throughout the space.

Category 5: Services

Social spaces need to be in close vicinity to facilities, or to be included within them to enable users to spend more time. Examples of services are catering, with smaller boutique outlets preferred, self-service outlets or facilities for making hot drinks, with toilets and comfortable seating. When asked why they preferred certain spaces most interviewees spoke about the availability of the latter. Current UK regulations indicate that users are likely to spend more time in a space if they have access to safe and clean toilets (Approved Documents, 2020), and that they are more likely to make healthy food choices if they are provided with basic cooking facilities at work (Zuniga-Teran et al, 2015). In terms of provision of seating,

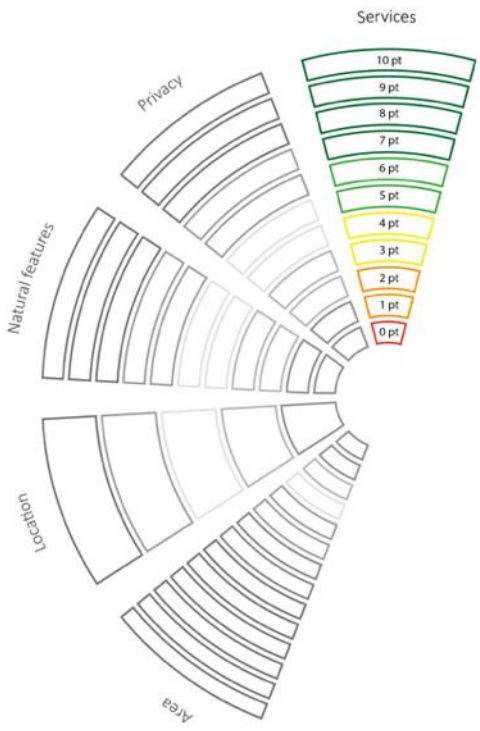


Figure 43 - Social Space category 5 - Services

whether formal or informal, people are more likely to use those spaces that provide seating, (Garcia-Moruno et al, 2010).

Figure 43 focuses on the social space design criteria illustration of credits obtained for services, showing that spaces with no points require significant improvement, those with less than three points require some improvement, and those with less than five points should be considered for improvement. To explain this further, a space would achieve five points by having toilets and a kitchenette accessible with a 2-minute walk, a vending machine and tables and chairs in its boundaries.

The design criteria was validated as explained in sectrion 3.5.3. and scored well, with most categories obtaining "Fair" to "Good" on average, the lowest scoring sections were the introductory page and overall, with Natural features and Services scoring higher, and Area/ Location/ Privacy scoring the highest. Some comments received show an overall struggle to understand the framework, which would be improved in a real-world scenario, as for the purposes of feedback each page was shown separately. Other feedback refers to the criteria being overall too complex, and this is one area which must be explored further.

Figure 44 is a visual output of these categories to be used in a designed model, employing a traffic light system to show the status of each category, with an assessment of the central social spaces inside Alison Gingell, HUB, Frank Whittle and Beatrice Shilling buildings. It is evident that in Alison Gingell more private social space is needed, as it only occupies 15% of the total social space area. This can be interpreted as the building has lots of semi-public circulation space, without much furniture to create privacy. The HUB scored well as a social space, which was expected as this is its primary function, with the only area not reaching green being location, as it serves the whole campus, and can only be used ad-hoc by those in immediate proximity.

Frank Whittle provides more social space area than Alison Gingell but not enough is space which provides privacy, and is far away from the rest of the campus, and John Laing, whose students it serves, while Beatrice Shilling has the same challenges with location, being situated on the most Eastern point of the campus. Beatrice Shilling also scored lower than Alison Gingell on private social spaces, as it provides limited amount of workspace in a social area. It also performed well in the services category, but this is entirely dependent on Frank Whittle, to which it links to by covered bridge

By using this criteria to assess social spaces, their success can be determined, quantified and measured in order to improve provision. The criteria were developed for this study and require further improvement, but an initial validation was carried out as shown in Appendix 9, leading to some changes being implemented linked to formatting and clearer explanations for the scoring instructions, such as explaining that only one option could be selected in each section.

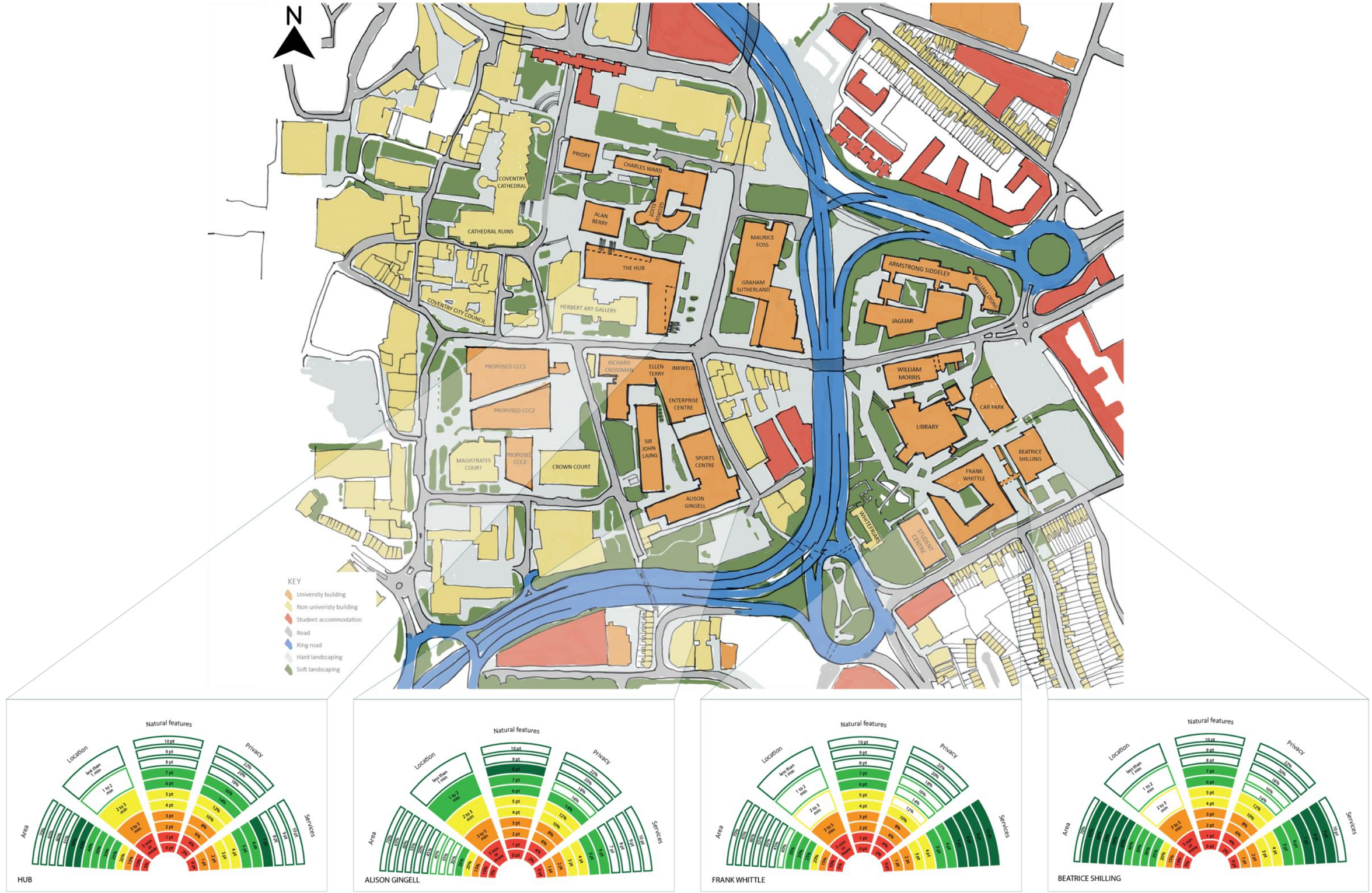


Figure 44 - Social space calculation associated with CU buildings

Throughout Chapter 4 the results of this study were demonstrated and analysed. Spaces in and around the Coventry University campus were inspected and measured to understand the link between the metrics and participant responses, a qualitative and quantitative analysis of the interviews was presented, determining not only the most and least preferred spaces on campus but also their characteristics of each space. Interviews were also analysed to determine and confirm design influencing factors from literature discussed in Chapter 2, studying the importance of natural features, weather conditions, privacy of spaces and link to the facilities outside campus. The last part of the interview analysis investigated the link between social spaces on a university campus and educational outcomes as well as their link to wellbeing. The findings of this part of the study will be further discussed in Chapter 5.

5. Discussion

Chapter 2 explored the requirements of a campus that is good for users which led to the essence of wellbeing on campus, the social space, which was then explored through primary data collection as shown in Chapter 3. The results of the data collection were then shown and analysed in Chapter 4 and five main areas of consideration were determined: the presence and proportion of social space in buildings, the availability and proportion of more private space within the public social spaces, the presence of natural features, access and distance travelled to social spaces, and facilities provided by the social spaces. The last three areas are present in some building certification systems as discussed in section 2.1, but all certification systems award different proportion of scores to the three areas.

The social spaces design criteria proposed first in Chapter 3 was created to accompany other building scoring models like BREEAM, LEED or WELL in a transparent way which shows clearly areas achieved and areas for improvement. Applying the five area design criteria when designing new buildings or refurbishing existing buildings will ensure that the heart of university buildings, social spaces, are healthy, popular with campus users and good value. This chapter will discuss the supporting theories behind social spaces on university campuses, their link to the wellbeing of users, types of spaces, the rules that underpin space, and how the COVID-19 pandemic has revealed social spaces are crucial for healthy communities.

5.1. Wellbeing factors on a university campus

Chapter 2 discussed how 79.84% of university campuses are in or around cities in the United Kingdom. This means that not only are cities highly influenced by universities, but also city universities are highly influenced by their urban context. In this respect universities can be likened to enclave states, such as Vatican City or San Marino, they have their own rules and government, but they are completely reliant on those around them.

The role of physical space in a university campus was reviewed in section 2.3, some of the spatial attributes are linked to certain places, while others can be given to any space on campus, and it has been a contentious point on discussion in the last few years, as to what constitutes a workspace. Some universities dedicate certain classrooms and offices to staff members while others allow staff to use any space available to perform work activities such as teaching, marking, administration or content creation. Therefore, it is becoming increasingly difficult to separate workspaces from social spaces and from recreational spaces. Coventry University has different approaches for different groups of staff regarding workspaces, which range from having a dedicated office for each member of staff, to having access to a large hot desking area, and the same is valid for students, some having dedicated studios with allocated storage space, while others only have access to classrooms and common spaces such as the library of the student HUB. Both staff and students interviewed refer to working in social spaces and cafes, for collaborative work such as group projects and meetings as well

as for lone work. If a university campus is a formative place, its design impacts health and it is increasingly more important to get the design right, therefore a university campus needs to be a healthy environment as it could one day influence up to half of the UK's population, by setting up working habits that can be taken into the workplace.

5.1.1. Current Frameworks overlook wellbeing

To score and differentiate urban and built environments, companies have devised frameworks, with a clear focus on low carbon methods and materials, but also scoring on wellbeing factors such as natural light, vegetation, recreational spaces, and fresh air, as shown in sections 2.1 and 4.3. A comparison of how each awards wellbeing credits in section 4.3 demonstrated that credits are not only given in different proportions but for different elements. Table 11 in chapter 4.3 presented how 4/5 frameworks gave credits to community elements, 3/5 to nature, 3/5 to wellbeing (or mind), and only 2/5 to nourishment (or healthy food provision).

WorldGBC's spatial factors were also discussed, these influence user's wellbeing linking design and productivity, many of which factors can also be seen in sustainability frameworks like the ones discussed above. It can therefore be postulated that by making buildings and spaces more environmentally friendly, the wellbeing of their users can be improved, but intentional ways to improve wellbeing through design are required, rather than as a by-product or second thought of low-carbon aspirations.

Sustainability frameworks described in section 4.3 also refer to the provision of kitchen facilities to encourage users to bring or prepare food, as opposed to purchasing fast food. (Zuniga-Teran et al, 2015). Interviewees also said that are likely to travel longer distances if the opportunity and space for food, shopping and socialisation is provided, also argued by Gyeryn (2000), and stay for longer in spaces that provide seating, formal or informal, previously discussed by Garcia-Moruno et al (2010) therefore, to design a successful social space, one must consider food and seating opportunities as well as sanitary facilities.

Primary data collection proved that indoor and outdoor spaces most preferred by respondents on the Coventry University campus were in or around buildings which had a BREEAM, all three buildings were awarded BREEAM Excellent. One notable distinction from this trend was reaction to part of one of the buildings, the semi enclosed outdoor courtyard of Frank Whittle was disliked by interviewees, therefore for each building BREEAM Excellent was achieved by obtaining credits in different categories, with some of them being wellbeing focused. Another reason these spaces were preferred may be that wellbeing requirements were added into the brief for these buildings.

It is worth exploring why the outdoor courtyard of Frank Whittle performed so poorly compared to not only its indoor spaces, but all other outdoor areas near BREEAM excellent buildings. This question was asked in interviews, and all interviewees agreed that the design and management of the building encouraged

respondents to use the space as transitional space only, there is a distinct absence of street furniture or planting, users are not encouraged to linger, and the management actively discouraged the use of the green space with physical barriers and signage to protect the grass.

Although most of the frameworks discussed have an element of assessment "in use", after the design is finished, this is aimed at facilities management rather than designers (BREEAM in use, 2022). Most architects, interior, landscape, and urban designers will make efforts to ensure that their designs are well used but have little control over how designs are used after handover. The architect of one of the BREEAM excellent buildings on the Coventry campus was interviewed for this study and they referred to social spaces as being the central focus of all design for education and universities, as the spaces "work harder" to allow students to "use their time more efficiently". They explained their vision for social spaces:

> *"As a designer you're trying to create a variety of spaces to find the one that somebody will feel safe and feel comfortable in".*
>
> *Expert interview, 2020*

5.2. The role of social space on a university campus

As education is moving away from instruction to learning, learning is moving away from the classroom and into more collaborative and informal social spaces, thus more of these social spaces are starting to develop in and around campus buildings. A HUB building was opened at Coventry University in 2011, described by its architect as the "living room for the whole university" (Coventry University, 2012). The HUB is loved by both students and staff as it provides ample amounts of social space, as shown in section 4.6. The issue arising from only having dedicated social space in one building on campus, is that socialising requires planning, rather than being ad-hoc, therefore the provision of smaller spaces throughout campus is preferable. When scored on the Social Space Design Criteria, Coventry's HUB performs well in all areas except location, as users are required to travel from all corners of the campus to use its spaces.

In section 4.4. it was demonstrated that the newest buildings on Coventry University campus have the most popular social spaces with interviewees. One of the factors is that stakeholders understand the emerging student typology as preferring to be taught rather than instructed, and who learn through collaboration and as discussed, use their time more efficiently. If students are required to collaborate, space for this activity needs to be provided, not only associated with dedicated student HUBs but also breakout space in each of the buildings, near classrooms and laboratories. The same newer buildings performed best as they have been designed with collaboration in mind. Lead designers of Frank Whittle (ECB), Arup, describe "a new approach to learning" in their design approach, and social spaces are integral to that (Arup, 2014).

The size and proportion of a social space is also important, as shown by the direct correlation between buildings with more social space and the interviewees' attitude towards them. In interviews, architects referred to human proportions, this is also backed up by previous research by Lau and Yang (2009) and Sennett and Sendra (2020), providing users with the opportunity to linger without imposing on passers-by, as happens in spaces that are irregular, giving spaces *ad hoc* functions. The morphology or further breakdown into public and private areas of these spaces has an influence on how they are used as shown section 4.4.2 and discussed in the RIBA study mentioned earlier (RIBA, 2016), demonstrating that work and study is also done outside the classroom. Learning from the COVID-19 pandemic, both staff and students mention their requirements for space to work alone or as part of a group, face to face or online. O'Bryne (2018) also refers to creative workspaces and how these need to provide for group and lone work.

5.2.1. Social aspects of wellbeing

Wellbeing on a university campus was one of the focal points of this study. All interviewees agree that social spaces and wellbeing are closely linked by increasing productivity and social connection. One of the expert interviewees focused on making users comfortable with spaces: *"In a world where people are increasingly worried about meeting other people, social spaces have to feel safe as well as be safe" (Expert interview).* Social inclusion and belonging are closely linked to wellbeing (Ronzi et al, 2018). Outdoor spaces were important for all interviewed users, and built spaces have a considerable impact on the individual wellbeing and the overall health of the community. To define design criteria for urban design, the requirements for comfort should be considered, as well as the attractiveness of a place, and nature has a large impact on this attractiveness as shown in the map in Figure 31 in section 4.4.1 and discussed by Dempsey (2009).

Maslow (1968) placed social belonging only after basic needs of safety and physiological needs and Larson (1996) investigated the World Health Organisation's areas for social wellbeing, to demonstrate its determining influence on the suitable functioning of society. The areas are social integration, social acceptance, social contribution, social actualisation, and social cohesion. Students interviewed spoke about social integration and acceptance when discussing their usage patterns and social networks at university, and of the negative impact of lockdowns on their social wellbeing. One student spoke about not belonging to their course group and referred to only using the campus for timetabled study, not using the social spaces, therefore there is a link between using social spaces and the feeling of belonging.

Satisfaction with life is a key part of wellbeing, from Myers and Diener, 1997, the achievement of wellbeing may include a good social and familial life, less hostility and aggression, and less likely to contract a disease. It has also been shown that happy respondents have a good degree of control over their own lives, at home or at work. When implementing changes to spaces, creating or refurbishing buildings and spaces, stakeholders create design briefs, but these are highly subjective, often without user consultation. Wellbeing links the person to their feelings and the world around them, their environment, therefore special care must be taken

when implementing changes to it, this must only be done after carefully investigating its status and functionality, and the social spaces design criteria can help determine key areas for improvement.

5.2.2. Social space

A social space is a communal space, where occupants from neighbouring areas can come together, socialise, and meet others. Some social spaces are privately owned, such as the Student HUB, others appear to be public but are private, such as some urban developments in large cities such as London or New York, spaces which can also be referred to as pseudo-public, and others are public. Good examples of pseudo-public spaces are the area around One City Hall in London (Figure 45) and University Square in Coventry (Figure 46), both spaces appear to be public, but are in fact privately owned and regulated. All social spaces come with rules that are either formalised or implied as mentioned by one academic interviewed for this study, they say that they tried to take part in civic action in University Square and were not able to, as the space is privately owned.

Figure 45 - One City Hall, London (Brown, 2022)

Figure 46 - University square, Coventry (Flickr, 2022)

Another academic and urban planner interviewed refers to the Coventry campus as a "closed campus", as evidenced in section 4.4.2, and the issue of open and closed cities has been discussed at length by Sennett (2018), where they propose interventions to challenges such as segregation, lack of interaction between different users and lack of experiments and complexity. The interviewee referred to other campuses they had used in large urban environments such as New York as being much more open, and they attribute the closedness of the campus to the adjacency of the buildings. If each building owned by the university comes with an implied enclosure around it, and the buildings are clustered in one area, then the entire area gains a more strongly implied enclosure, becoming a no-go zone for city residents and visitors without the need of enforcement. Therefore Sennet's (2018) strategy of boundaries and borders should be explored in this context and action should be taken to ensure the edges of the campus are not perceived as boundaries, but rather as borders; the only areas where people from different backgrounds interact, so city residents are welcome to use the open spaces on campus.

One way to ensure a variety of users in a space is to provide facilities that serve the city around the campus, such as shopping and food opportunities. One interviewed academic referred to the inflated prices for food and drink in the student areas and allowing local businesses to be represented on the university campus can ensure fairer pricing, as well as inviting city dwellers on campus, and breaking down some boundaries to ensure the campus is more open.

To design a successful social space, all user experiences must be taken into consideration, and interviewed designers discuss this at length, which means food and drink opportunities should be readily available as well as sanitary facilities. Regulations determine the requirements for sanitary facilities depending on the number of users, and through project brief designs, areas with kitchens, restaurants and cafes are incorporated into social spaces, with little guidance or restriction. Incorporating accessible food and drink provision will not only make a social space more popular but will have a positive impact on community of the space.

When discussing social spaces in the workshop all participants spoke about designed social spaces and considered green spaces on campus as social spaces. Proportional formulae provided by Lau and Yang (2009) relating the depth of a space and height of surrounding buildings which can be used to design successful green social spaces. The leap from social to green space was interesting, and from the literature, green spaces can be labelled as social spaces as they are seen as places of reflection and introspection and forming part of human identity.

Designers interviewed included incidental spaces as social spaces, but all other respondents did not, by only considering formalised spaces, for example common rooms and cafeterias, and considered all green spaces as social spaces, even though some were not designed as such. Therefore, there needs to be a clearer definition of what constitutes a social space, such as proximity to work or study spaces, a space for recreation, a space where one can linger, near food or drink and toilets, in or with a view of nature. The green space and walkway

Figure 47 - Walkway Coventry University March 2022

near the Coventry University library is such a space (Figure 47). It provides seating, it is near the library, the Frank Whittle, and William Morris buildings, and it has natural features. Most participants agreed that this was a successful space, in the right weather conditions.

5.2.3. Wellbeing in social space

Interviewees spoke about spending time outdoors to reduce their stress levels, even seeking a sheltered outdoor space during bad weather. Existing research proves that being outdoors reduces stress, even acute stress symptoms (Kondo et al, 2018) and having a balance between time spent outdoors and indoors can lead to an increased sense of wellbeing (Gascon, 2017). If having access to green space lowers stress levels, working in an environment that has a view of, or quick access to green space has been hypothesised to have similar effects (Kaplan, 2007), especially as it provides quick access to nature if one decides to take a break. Some interviewees discuss this in detail, how access to windows near their workspace improved their mood and productivity, even if they were working in a tall building.

Hartig (2004) argued how even the view of a green space improved users' emotional stress, especially if it was at a high level. It can therefore be postulated that those who work in *ad hoc* social spaces would enjoy an improved wellbeing as successful social spaces would provide natural elements or views to natural elements. There is a need to move away from acute care only, where only the symptoms of declining wellbeing are tackled but preventative measures are not taken. Western society is amid a stress epidemic (Newbegin, 2015), and although ways to prevent this are known, levels of stress in the workplace are on an upward trajectory. The focus should therefore be on user wellbeing, creating positive forming experiences, and being overall better off at the end than at the beginning.

The environment in which the activity is taking place has an impact on each of the terms in Heerwagen's (1998) productivity formula from chapter 2. A good environment, such as a successfully designed social space, can increase the user's motivation, give them more abilities to perform the task and the opportunity to do so, and all those interviewed agree that pleasant workspaces and recreation spaces have a significant impact on their productivity.

> *"COVID is a real game changer for campus design, I think now there must be less emphasis on what happens in the lecture theatre and the classroom".*
>
> *Expert interview*

Natural features were preferred by all interviewees in this study, some referring to green features while others discussed water, light and ventilation. Spending time in nature has been proven to be restorative (Frontczak et al, 2012, WorldGBC, 2014, WorldGBC, 2015, Marcus and Jones, 1999) and to have a positive impact on productivity (Miller et al, 2009), and while light and air are regulated by building regulations (Approved

Documents, 2000), as common rooms and corridors tend to be in the geometric centre of buildings, these are spaces that are less controlled, so ventilation and natural light are key when designing a social space.

5.3. Learning from a global pandemic

5.3.1. To what extent access to the campus needed for good study and retention

In Section 4.2, the responses from Module Evaluation Questionnaires 2016 to 2022 were investigated, with an average number of respondents as 33149 students as shown in figure 24 in section 4.2. It was observed that students assessed their belonging to a community as considerably diminished (8-10 percentage points) during the COVID-19 lockdowns, lifting back up when studying on campus resumed. From these results the conclusion can be drawn that students are more satisfied with their community if they are on campus as opposed to studying from home.

Coventry University has made efforts to enhance online learning, by introducing a digital platform for learning in 2020 (Coventry University, 2020), and this may have influenced overall student satisfaction, by providing access to learning resources and academics. It is notable that this drop in community was across the faculties, with Engineering, Business and Health being affected more than Arts, and as examined in 4.2, this may be due to other factors such as different staff/ student ratios in each Faculty, Arts having smaller student cohorts than others. The other result worthy of mention is the drop in overall satisfaction with course, a considerably smaller drop than that of community, of only 3 percentage points, showing all feedback scores did not reduce in the same way, further validating the analysis on community.

Students that are firmly part of a community are more likely to feel well, supported in their studies and progress through their degrees. Student retention and completion has been an issue for several years (Tinto, 2017), and it is likely to have become worse because of the COVID-19 pandemic and associated lockdowns. Management actions must be taken to ensure that more students not only make the decision to start a university course but also that they finish it and obtain a degree.

> *Although a sense of belonging may mirror students' experiences prior to entry […], it is most directly shaped by the broader campus climate and students' daily interactions with other students, academics, professional staff, and administrators, whether on-campus or on-line.*
>
> *(Tinto, 2017)*

The condensed structure of higher education courses is also notable, most undergraduate courses in the UK are 3 years, with limited time on campus, some students only having 2-3 days per week of timetabled classes. This is considerably less than courses of the same level in other European countries as well as around the

world. The reduced time diminishes the sense of belonging triggered by attending a course on campus and moves the student experience away from the campus.

5.3.2. Campus is more than a place of study or work

The information about university communities from section 4.2. demonstrates that campus spaces are much more than a place of study or work. Design trends have moved away from campus spaces solely designed for instruction, where most space was given to teaching, designers and university stakeholders alike now understand that a campus is a social space.

> *I think if you can put both public and private together into a space, that's where it really works. Go back to that, model that from our research, the idea of the flexible heart in the modular periphery. So, you've got the big thing in the centre that you're a part of, and it brings you together and you share it, but then you've all got a series of microclimates on the edge, that you want to occupy. You still feel you part of the big thing, but you can sit quietly and do some work. The very first sketch we did for Alison Gingell that space under the stairs was in it, so that was part of the vision from day one, it wasn't something that was added in later.*
>
> *Expert interview*

This is more evident when examining how much the way people work has changed. People now work remotely, with others they have never met, some companies allow workers to work from home up to 100% of the time, people work in cafes and co-working spaces. This is reflected in the way buildings have been designed/ redesigned more recently. Coventry University has modified its Library to contain less books and more space to work and collaborate. In the age of BYOD (bring your own device), there is an expectation to work from anywhere. In such a stressful environment, the space to reflect and cement knowledge is vital and must be provided for students. In addition to creating spaces that enable wellbeing, having a good university experience predicts choosing a career in the studied discipline, especially in engineering courses as discussed by Amelink (2013).

Universities should understand the changes in students' learning and allow space to learn in a supportive and safe environment, to improve student's learning, social networks, and wellbeing. Studies have shown that a campus enabling a social network is a deciding factor when applicants choose a university, as well as the university's reputation, academic environment, and course offering (Kallio 1995, Ming 2010). In addition, satisfaction with learning (IT, library, and subject specific) facilities, is used as a metric in the National Student Survey in the UK (NSS Questions, 2017) as well as the questions examined in detail in section 5.3.1 about belonging to a community, which contributes to the ranking of universities in the UK and therefore directly to the reputation of each of them.

Travel distance is another point of consideration, as users of campuses are bound by the constraints of a class timetable, therefore time must be used efficiently. All staff and students interviewed discussed their use of outdoor spaces when time allows them, some refer to going into the city centre on their lunchbreak. Although Gyeryn (2000) talks about extending travel distances to access higher quality services, this is surpassed by time restrictions, as users are less likely to walk to a social space 15 minutes away if they only have 1 hour in between classes, therefore access to a social space must be immediate.

Throughout this chapter social spaces have been discussed and analysed and it is evident that successful social spaces are the heart of a modern university campus. This study proposes a new design criteria as shown in sections 3.5, figures 19 to 21, to score social spaces at different stages of the design process, that provide spaces which enable students to study flexibly, provide all levels of privacy needed for activities from a private telephone call to a study group, which allow students to spend extended periods of time in the space by providing all the required services and facilities, are accessible from an array of more traditional teaching spaces, and provides respite by having quick access to nature or views of nature.

Outcomes of this study are that campuses are spaces for development and growth for students, and the Coventry University Campus provides some successful spaces that can be used for socialisation, recreation, and work, and all these internal spaces are part of buildings which have achieved BREEAM Excellent. This demonstrates that sustainability frameworks have a positive impact on architectural design, in conjunction with a well-developed brief, and they should be used for all educational projects. Not all sustainability frameworks measure the same aspects, therefore a unified scoring criteria for social spaces is proposed.

The Social Spaces Design Criteria provides scores for each category as mapped on a dedicated graph as shown in Figure 17 in section 3.7. The five categories are derived from knowledge obtained from both the primary data collection for this study through interviews and a workshop as shown throughout chapter 5, and the secondary data collection and analysis of existing frameworks. The categories are described in more detail in section 5.4.1. and redefine the use of social spaces, their privacy levels, the availability of services, their connectivity to other teaching, learning and workspaces, and their proximity to nature and natural features.

6. Conclusion

This study started with the ambition to extract the essence of good campus design, and social spaces were found to be key components of a healthy campus that promote student and staff wellbeing. Creating spaces that promote work and play, allow for focus and recreation, is usually the focus of most contemporary campus design, although this is left to the individual designer to realise, and often believed to only be relevant in psychology. Although frameworks have been created to measure the sustainability of a building or space, the majority provide an overall score that allows projects to score low in individual areas while still achieving a high score. This study aimed to develop a scoring model for social spaces which encourages wellbeing in an academic environment to support students, and the Social Spaces design criteria model is designed to be used in addition to the sustainability framework to ensure that key spaces in a university campus perform as well as providing for their users.

This study had four objectives: performing a systematic review of design scoring principles in relation to health and wellbeing and this was done by mapping five scoring systems to discover commonalities and gaps as shown in section 4.3; applying design principles to spaces on campus to evaluate their quality with a wellbeing focus, achieved by assessing four BREEAM Excellent buildings on campus on the new design scoring system, discussed in section 4.6; investigating the perception of Coventry campus by different user groups, focusing on the quality of space and its impact on wellbeing, reached by conducting interviews on a varied sample; and analysing the link between wellbeing and built environment at Coventry University to develop recommendations with further application, and this is a clear outcome of the interviews conducted.

The increasing number of students enrolled in higher education was discussed, and psychology theories detail the lasting impact the environment can have on people at a formative age, with practices created and reinforced by student experience. These are kept for a lifetime, and this is not only valid for subjects tested at university, but also for work life balance, physical activity levels and social skills. By intentionally designing spaces which encourage productivity on university campuses, designers can have a lasting positive impact on society.

The conversation in the interviews conducted for this study was focused on wellbeing, during a challenging time like a global pandemic and nationwide lockdown, and respondents from all categories expressed a yearning for connection and contact. City campuses should provide space for connection between academics and students but also between the city and the university entities, working together to make cities more culturally vibrant and inclusive, by introducing spaces to congregate, collaborate and coexist. The introduction of publicly available social spaces on a city university campus that are designed with wellbeing as a primary objective and social cohesion as a secondary objective would not only improve the campus environment but enhance the cities which are their home.

6.1. Recommendations

Campus design

- Academic spaces should be designed for flexible learning
- Green and natural spaces promote wellbeing and stress reduction and should be included in any development.
- Students prefer to study on campus, and they feel part of the community when they are on campus.
- Scoring frameworks provide a snapshot of the quality of the design they assess.
- Achieving a certain score in a scoring framework does not guarantee good design for wellbeing.
- Social spaces should be prioritised in building design, with at least 25% of space being allocated to social space.
- Social spaces should be near the work and study spaces they serve, within 2 minutes of any of the spaces.
- All social spaces should have natural features such as light, views of vegetation and ventilation.
- Successful social spaces will encourage people to linger, offering food and drink opportunities, comfortable and varied seating, as well as toilets nearby

Research design

- Online video calls are good methods for data collection.
- Collaborative whiteboard systems are useful for data collection.

6.2. Further study

To ensure the reliability of this model, further study is required by creating more case studies to investigate the validity of the design criteria model, and further refine it. Although reliability is elusive in the realm of qualitative inquiry, this work strives to reach it, by gathering more data from several other campuses through interviews with stakeholders and online surveys for the student population, as well as paper-based analyses of core spaces, and observation of user patterns on the case study campuses.

Other data to access and analyse is the National Student Survey (NSS) database, to investigate the effects of COVID-19 lockdowns on all participating universities in the UK on student's sense of community. When it comes to secondary research, further reading is necessary about planning ideologies as well as more research about the attitudes towards wellbeing in academia, and the consultation processes for academic projects.

This further study also comes with ethical considerations around the impact on interview and survey respondents, implications of using NSS data and questions about how the outcome of the study will be used,

as well as limitations around access to information, permissions around interviews, surveys, observation, and campus maps and building plans.

Word count 17443

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8. Appendices

Appendix 1 – Literature compilation

Ideas	Author	Year
Campus as transitional space	Yair	2008
Campus as a formative space	Yair	2008
Self-discovery	Yair	2008
Success in university assessments has long lasting effects	Yair	2008
Second chances are beneficial in education	Yair	2008
Peak experiences	Maslow	1968
Emotional short-term experiences	Maslow	1971
Long term effects of process of discovery	Maslow	1970
Peak experiences as "crystalising experiences"	Gardner	1983
Peak experiences uncover new pathways	Gardner	1983
Flourishing as desired development of a person in a nurturing environment	Croome	2000
Green spaces are spaces of reflection and introspection	Adevi and Lieberg	2012
Higher education is predictor of civic and political engagement	Ahier et al	2003
Higher education is a predictor of social participation	Ahier et al	2003
University is a place of development by design	Lau and Yang	2009
A campus is a place of congregation of likeminded people	Lefebvre	1994
A campus is a place for permanent and temporary communities	Lefebvre	1994
Universities are incubators for knowledge	Uhl	2004
Universities bring people from varied backgrounds together	Olszak	2012
Learning can also be informal peer to peer	Kuh et al	2005
Schools are designed to enhance peer to peer learning	Maclure	1984

Universities are keen on mixing courses and disciplines	University of York	1962
Proxemics can promote social interaction, with messages of support and belonging	Strange and Banning	2001
Staff and students perceive improvement in academic performance from new buildings	CABE	2005
New buildings attributed to motivation to work and collaboration between students	CABE	2005
Green spaces are used frequently, irrespective of size	Lau and Yang	2009
Proportions of green spaces are important to their success	Lau and Yang	2009
Green design is linked to health	WorldGBC	2015
Green design is linked to productivity	WorldGBC	2015
Green spaces are healing spaces	Marcus and Jones	1999
Green spaces considered a link to self and spirituality	Tuan	1976
Green spaces improve mental health outcomes	Searles	1960
Being outdoors proved to reduce acute stress	Ulrich / Kaplan and Kaplan	1987 / 1989
Good balance of time spent outdoors and indoors can lead to an increased sense of wellbeing	Christiansen and Baum	1997
Green spaces become object of attachment	Stewart et al	2004
Green spaces become the favourite/ only place for a certain activity	Lieberg / Korpela et al	1995 / 2001
Green spaces linked to MVPA and wellbeing	Ward et al	2016
Plazas attract more users than parks, significantly different for women	Soltero et al	2015
Green spaces are spaces of reflection and introspection	Adevi and Lieberg	2012
Seating in green spaces increases participation	Garcia-Moruno et al / Mumcu and Yilmaz	2010 / 2016
Important workplace factors: air quality, thermal comfort, acoustic comfort, view, control over own environment, privacy and size, cleanliness, layout, and quality of furnishings	Frontczak et al	2012
Important factors: air quality, thermal comfort, day, and night lighting, biophilia and views, noise, look and feel, active design and exercise and amenities and location	WorldGBC	2015
Light, air quality, thermal comfort and acoustics are controlled by Building regulations in the UK	Approved Documents	2020
Teachers require good lighting and good ventilation as well as spacious areas	RIBA	2016
Factors for communities: walkability, connectivity, diversity and density, good architecture, and urban design	Zuniga-Teran et al	2015

LEED ND linked to an increase in MVPA in both adults and children	Lewin/ Stevens and Brown	2012 / 2011
Factors: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, and community	Lowry	2018
A rounded approach to design is needed to link built environment and wellbeing	McGee	2016
Teachers leave workplaces because of spatial conditions	RIBA	2016
Design is linked to productivity	WorldGBC	2015
Good design leads to a good learning environment	RIBA	2016
Design is linked to educational outcomes	RIBA	2016
Design is linked to less bullying	RIBA	2016
Design for educational spaces linked to positive student behaviour	RIBA	2016
Design for educational spaces allows for successful assessment	RIBA	2016
Environment is linked to productivity	Heerwagen	1998
Creative spaces need to provide for group and individual work	O'Bryne	2018
Design of buildings portrays its meaning	Temple and Banett	2007
Linking space to social networks "sense of place"	Kuh et al	2005
The attachment to spaces helps preserve identity of culture, groups or individuals	Low and Altman	1992
Place gets its character from the occupants and turns into space	Friedmann	2007
Spaces get used even if not convenient if they have an appeal such as nature, shopping or food, and human relationships	Gieryn	2000
Space can be an actor or just backdrop	Shutz	1967

Table 16 - Literature compilation

Appendix 2 – Coventry University Campus case study

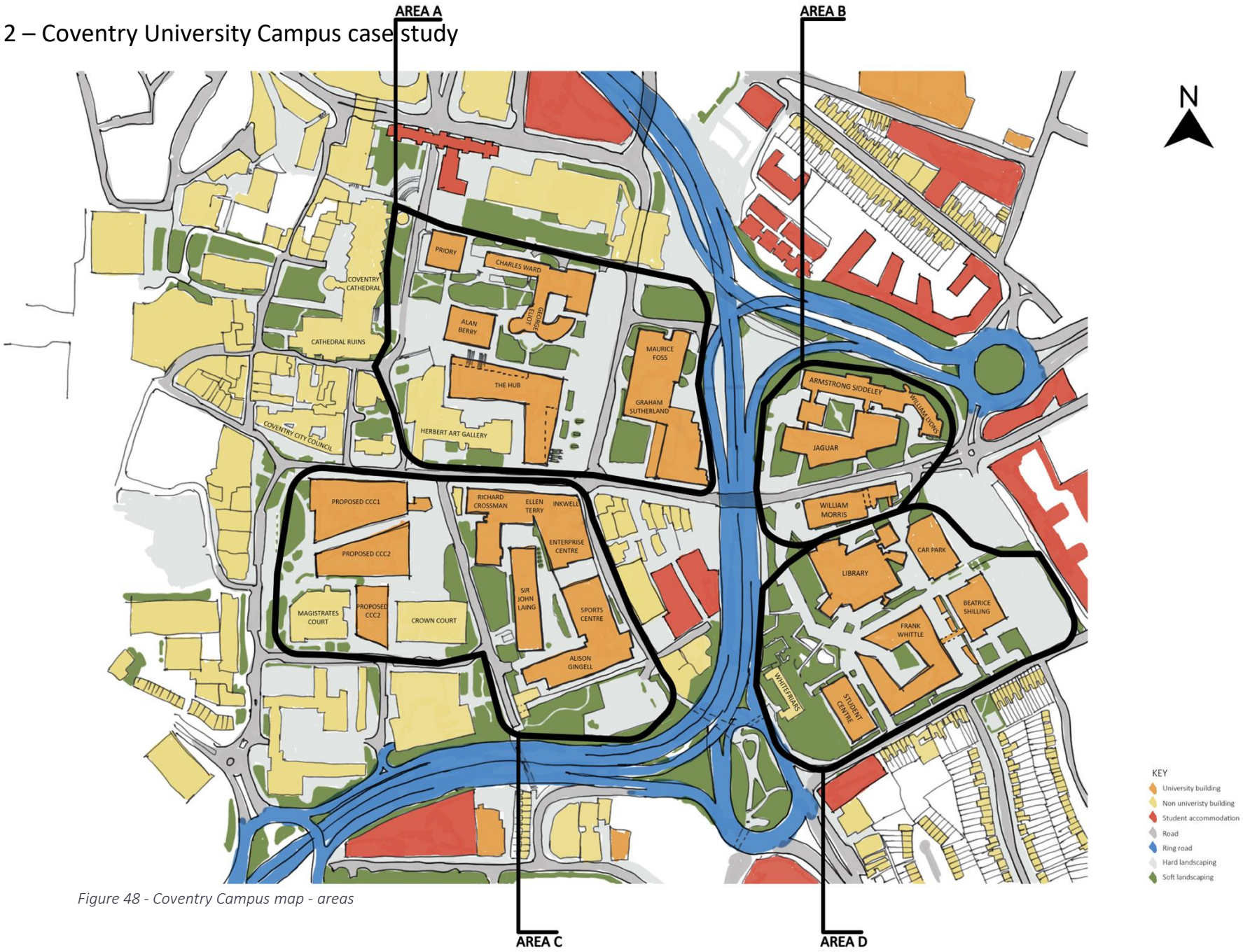


Figure 48 - Coventry Campus map - areas

To analyse the buildings and spaces in the Coventry University campus the spaces are split in 4 areas. This was initially done with the objective of determining if one area of the campus was performing better than others, but it has also proven helpful when collecting data through interviews as it provided structure. The considerations used for the split are faculty association and size. One of the areas is markedly larger than the other three due to the multi faculty spaces present. The areas are defined as follows:

Area A starts in university/ Cathedral square and ends at the ring road on a west to east axis; and starts at the Coventry City sports centre and ends in Jordan Well on a North to South axis. It contains Alan Berry (main administrative building), George Eliot (FAH), Charles Ward (FAH), the HUB, Maurice Foss (FAH) and Graham Sutherland (FAH).

Area B starts at the ring road and ends in Far Gosford Street on a West to east axis and starts at the ring road slip road and ends in the public space outside the library on a north to south axis. It contains Armstrong Siddeley and William Lyons, two buildings not used for teaching, the Jaguar building (FBL) and William Morris (FBL)

Area C is adjacent to Area A, starting with Jordan Well and ending with the Ring Road on a north to south axix, and currently starting with Much Park Street and ending with the Ring Road. Similarly, to Area B it has the ring road as a boundary on two sides. It contains Richard Crossman (HLS), Ellen Terry (FAH), the Enterprise Centre, the Sports Centre, Sir John Laing (EEC) and Alisson Gingell (HLS) as well as the Coventry Crown court, Severn Trent offices, two small scale listed buildings and a series of bars and pubs

Area D is south of Area B, starting with the ring road and ending with river Sherbourne on a west to east axis, and starting with the library and ending with Gulson road on a North to South axis. It contains the Lanchester Library, the staff and student car parks, the Whitefriars Abbey cloisters, the Student Centre, Frank Whittle/ ECB building (EEC) and Beatrice Shilling (EEC). The topography of Area D is notable, the site being considerably lower on the East than West

The following section covers the development timeline of the Coventry University campus from 2009 projected to 2024. Overall, the campus has expanded in size both for indoor and outdoor spaces.

Coventry campus map 2009

This is the oldest plan available from Coventry University Estates

A- Frank Whittle building is present on site

B- The student Club building is present on site

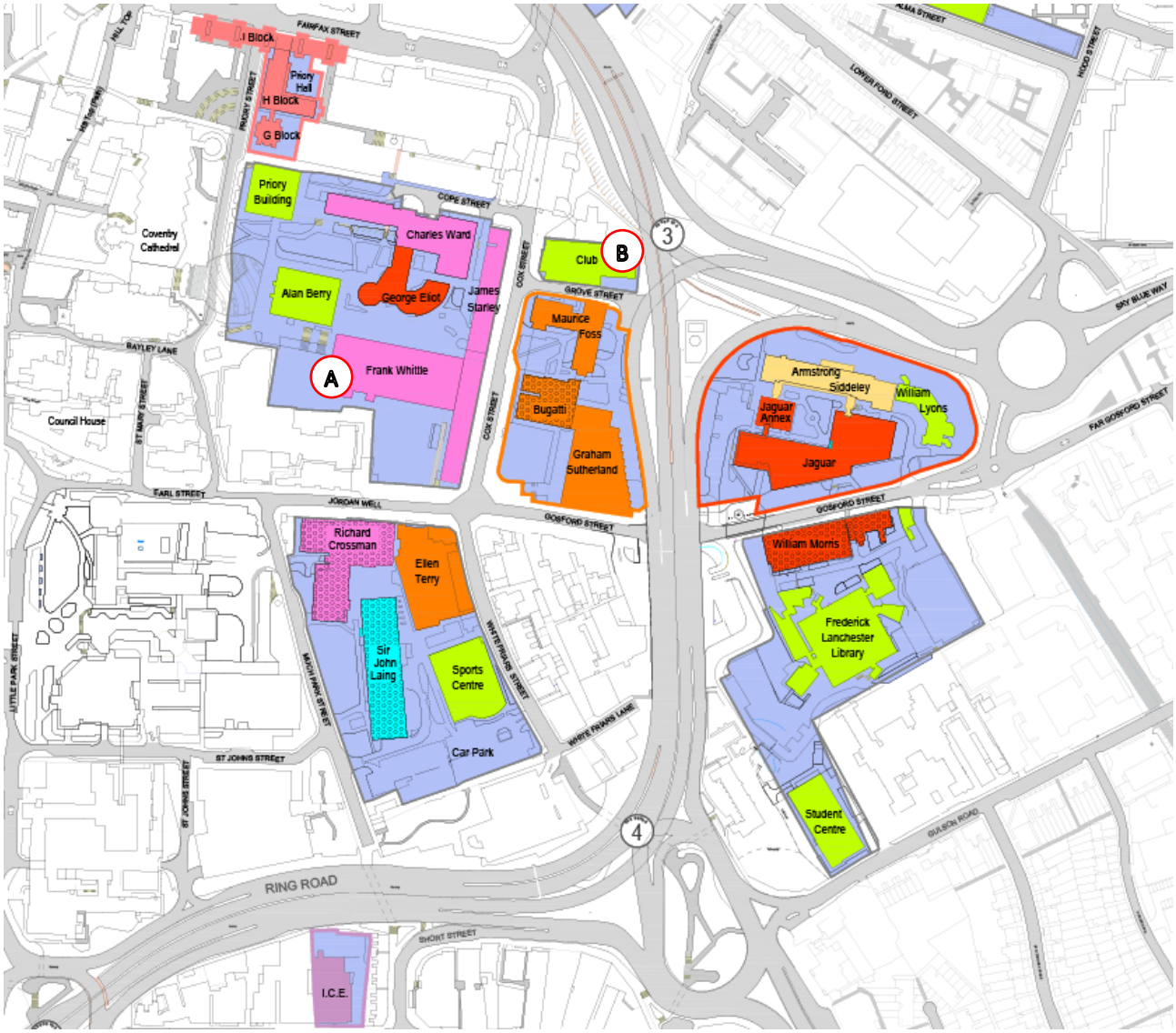


Figure 50 - Campus map 2009

Coventry Campus map 2014

Some changes have been implemented, the HUB building opened in place of Frank Whittle (A) in 2011, ECB opened in 2012 (C), a staff multistorey car park was opened (D), and the Club (B) was demolished. The campus boundary extended to include a student car park (E), and a smaller car park (F)

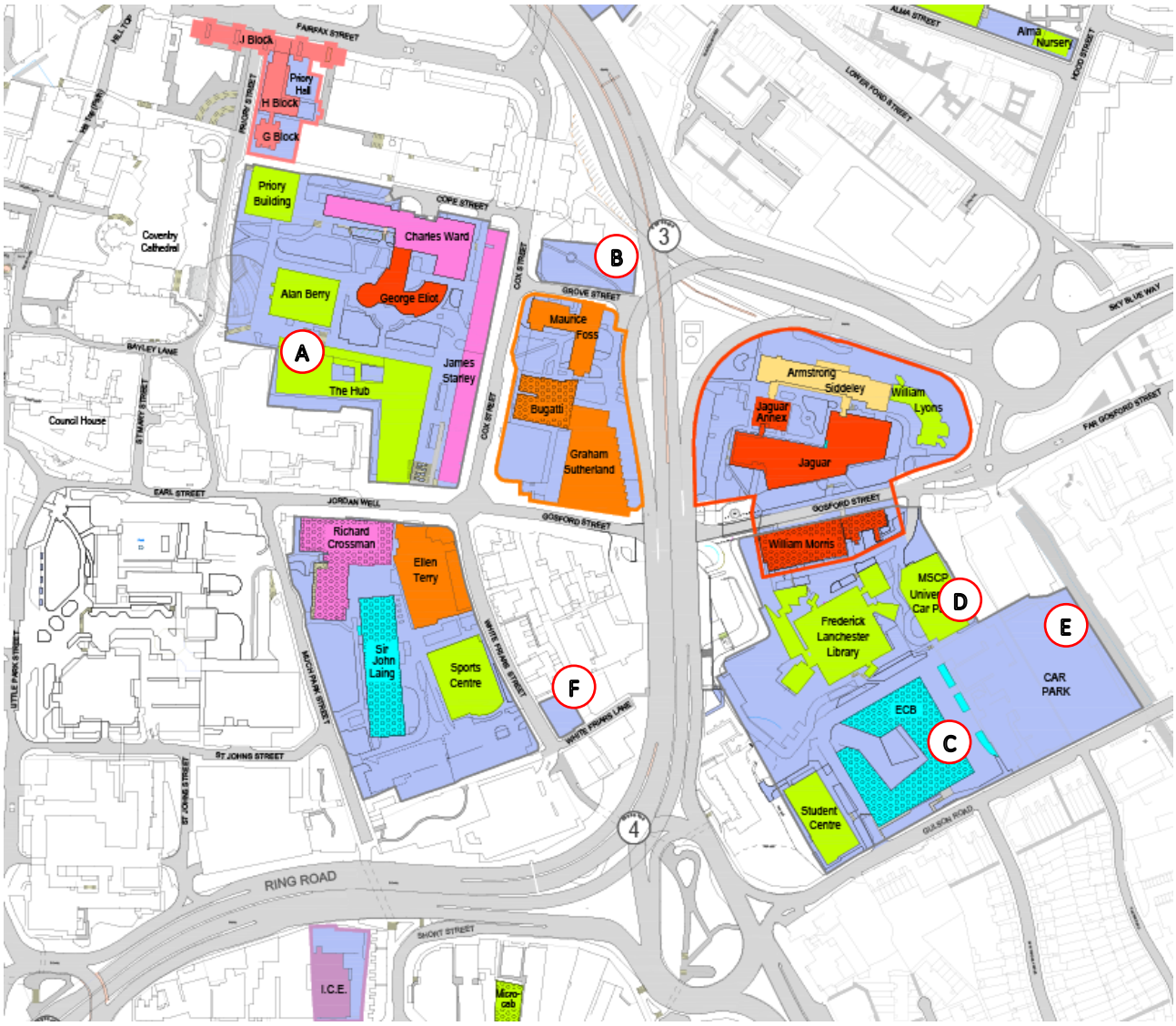


Figure 51 - Campus map 2014

Campus map 2020

This is the most up to date map from Coventry University Estates, it shows the demolition of James Starley Building and the creation of Starley gardens (A), the developments to Graham Sutherland and Maurice Foss as well as the demolition of the Bugatti building (B), the construction of Alison Gingell (E) and Beatrice Shilling (D), the acquisition and partial demolition of the civic centre site (F), and the demolition of G block as part of Priory Hall (H)

Figure 52 - Campus map 2020

Coventry campus map 2024

This map shows the desired development for 2024, notably the demolition on Alan Berry building and development of the Peace Garden (A), completion of the Graham Sutherland, Maurice Foss, and Bugatti building (B), the demolition of the William Lyons building (C), plans for Civic centre buildings (D) and the diagnostics centre (E). In January 2023 (A) and (B) were near completion.

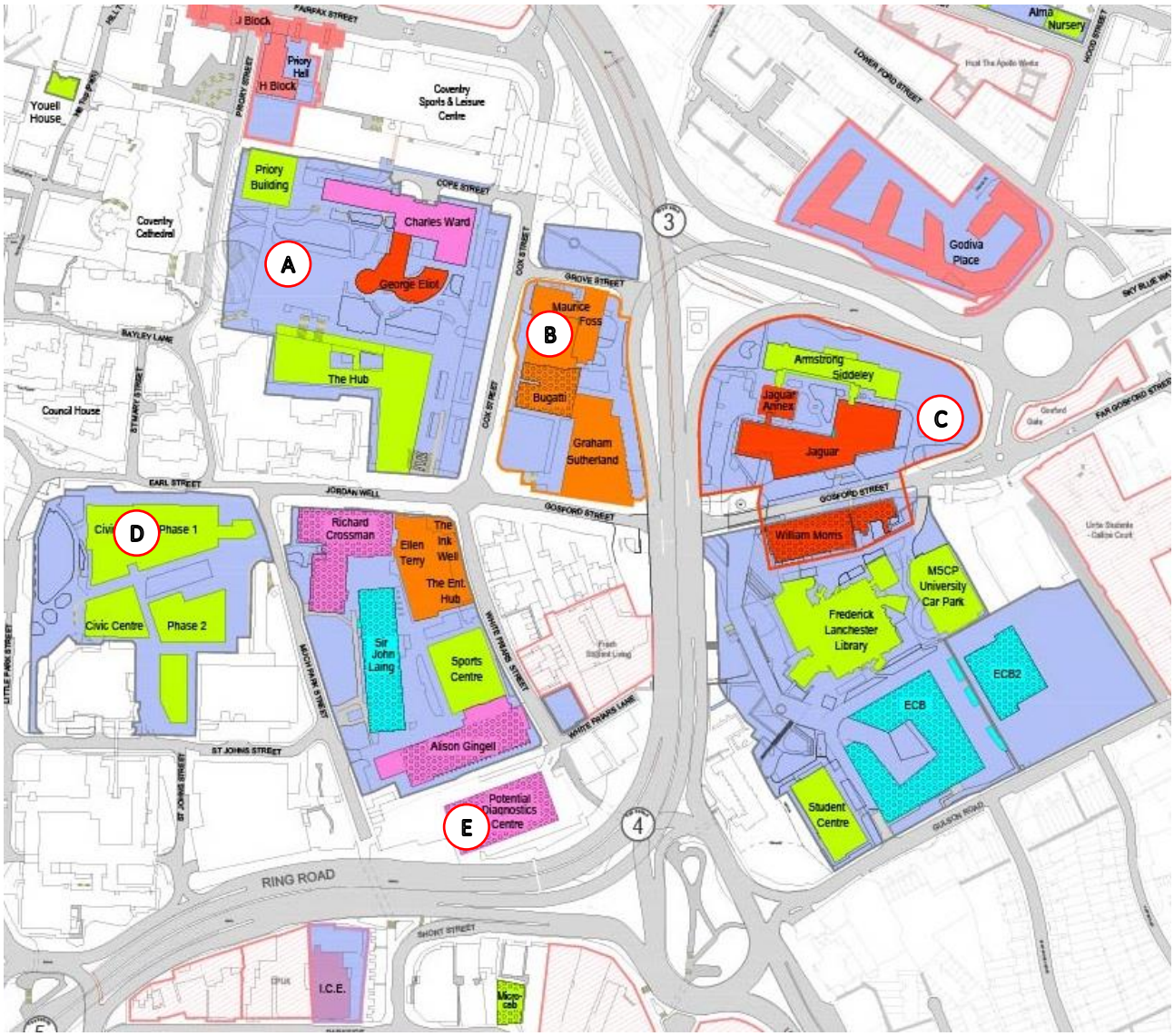


Figure 53 - Campus map 2024

Appendix 3 – Interview results

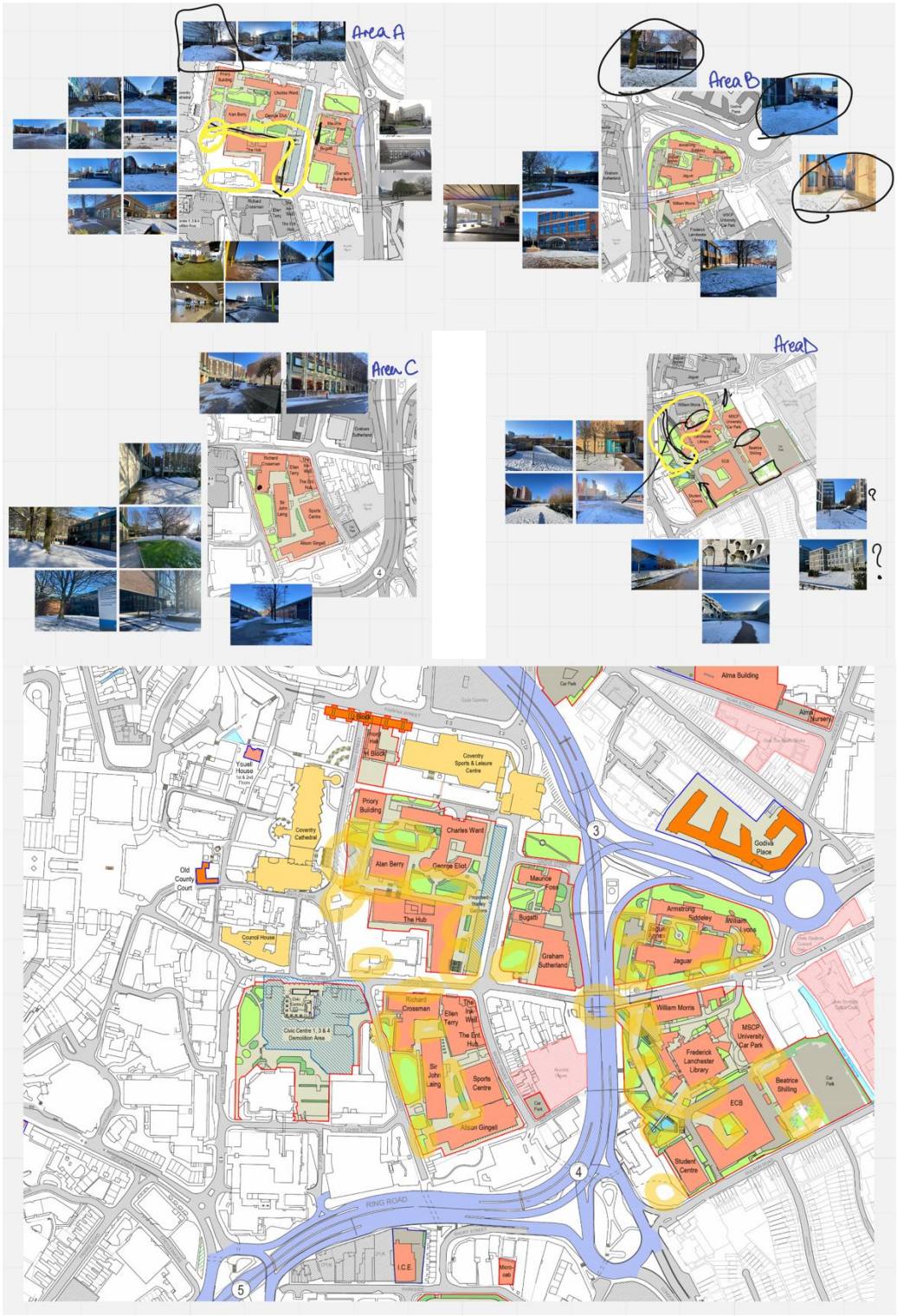


Figure 54 - Participant 01 interview maps

Figure 55 - Participant 02 interview maps

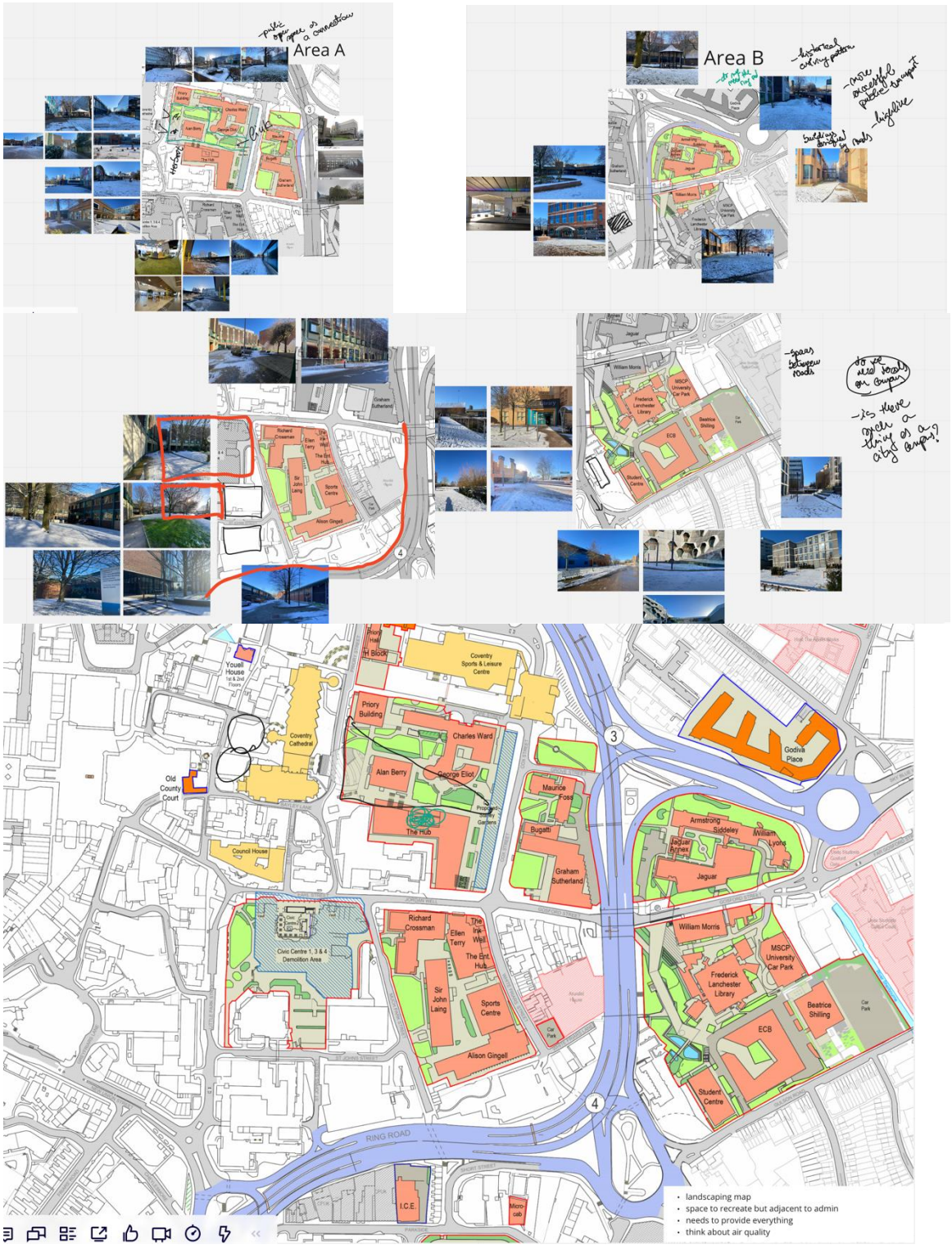


Figure 56 - Participant 03 interview maps

Figure 57 - Participant 04 interview maps

Figure 58 - Participant 05 interview maps

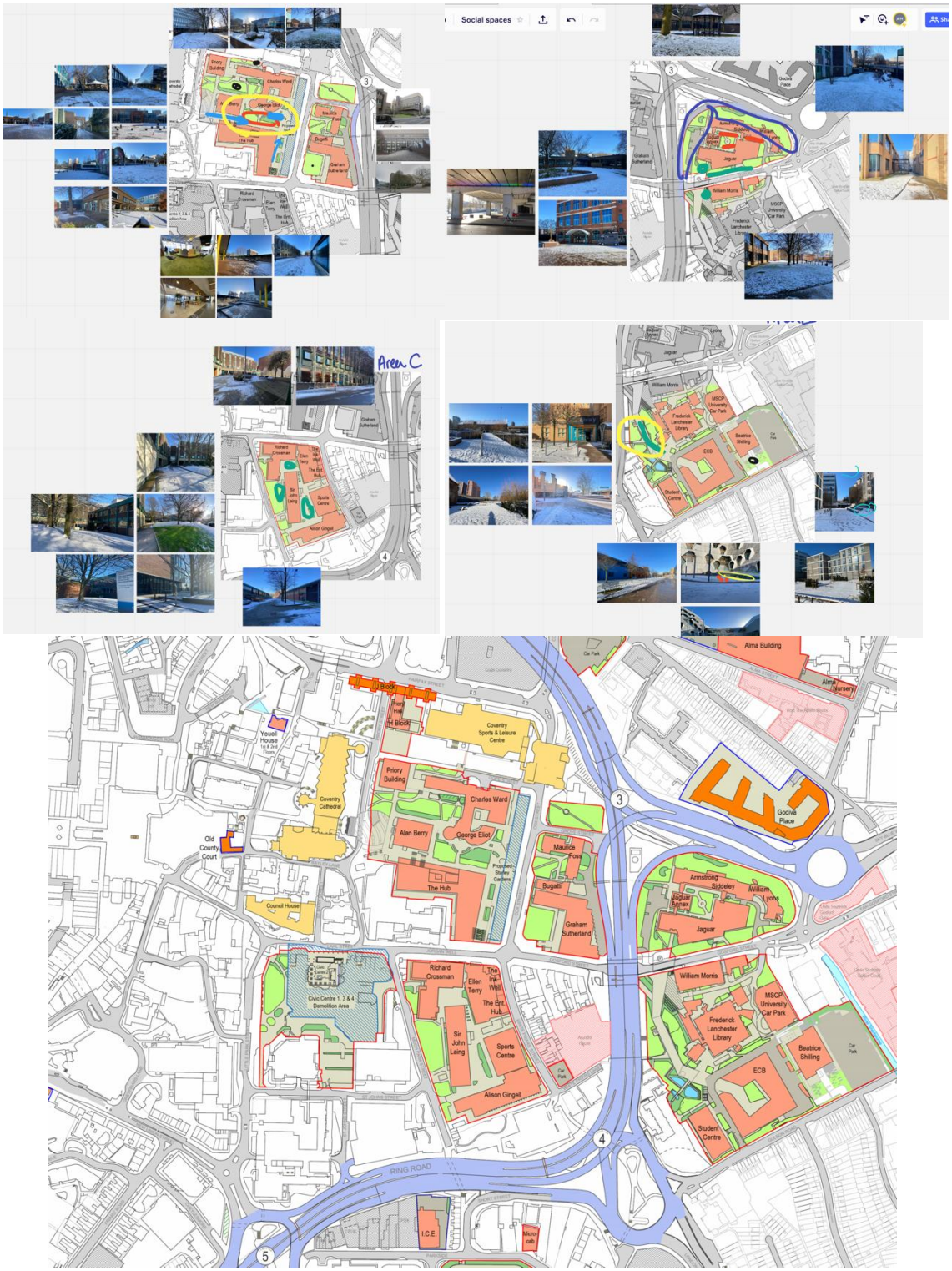


Figure 59 - Participant 06 interview maps

Figure 60 - Participant 07 interview maps

Figure 61 - Participant 08 interview maps

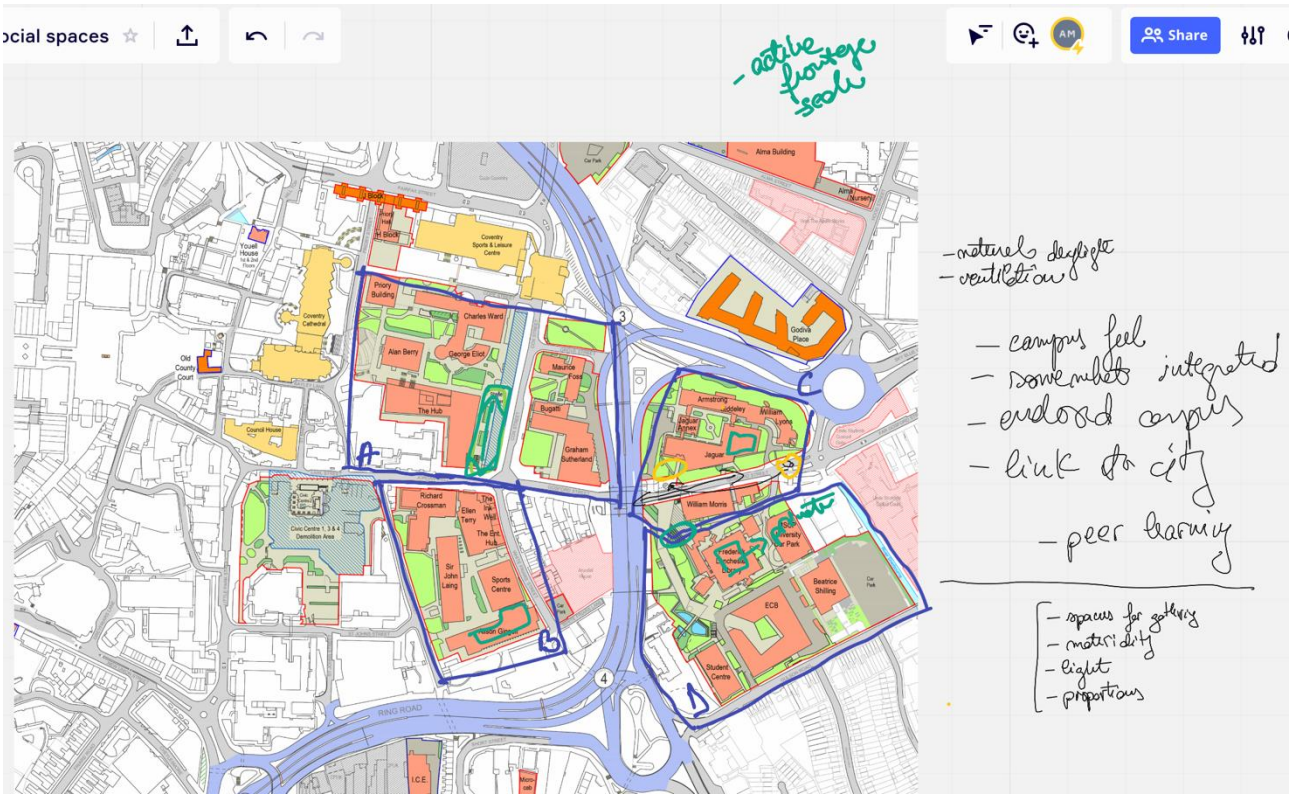


Figure 62 - Participant 09 interview map

good
- easy to find (described)
- footfall
- feel nice
- looked after

(+)
- multi use
- Pandemics
- access to wifi
- seating (table/desk) power

weather
- definite impact

nature
helps less sterile

privacy
residents not welcome
stick with your own

location
handy to have
don't go into town
some students stay
prices on campus are higher

education
reflective spaces
collaborative spaces
group work

wellbeing
important for wellbeing

perfect

nature
- connection to
- inside
- daylight
- wifi power
- seating
- privacy
- water/vending machine

Figure 63 - Participant 10 interview map

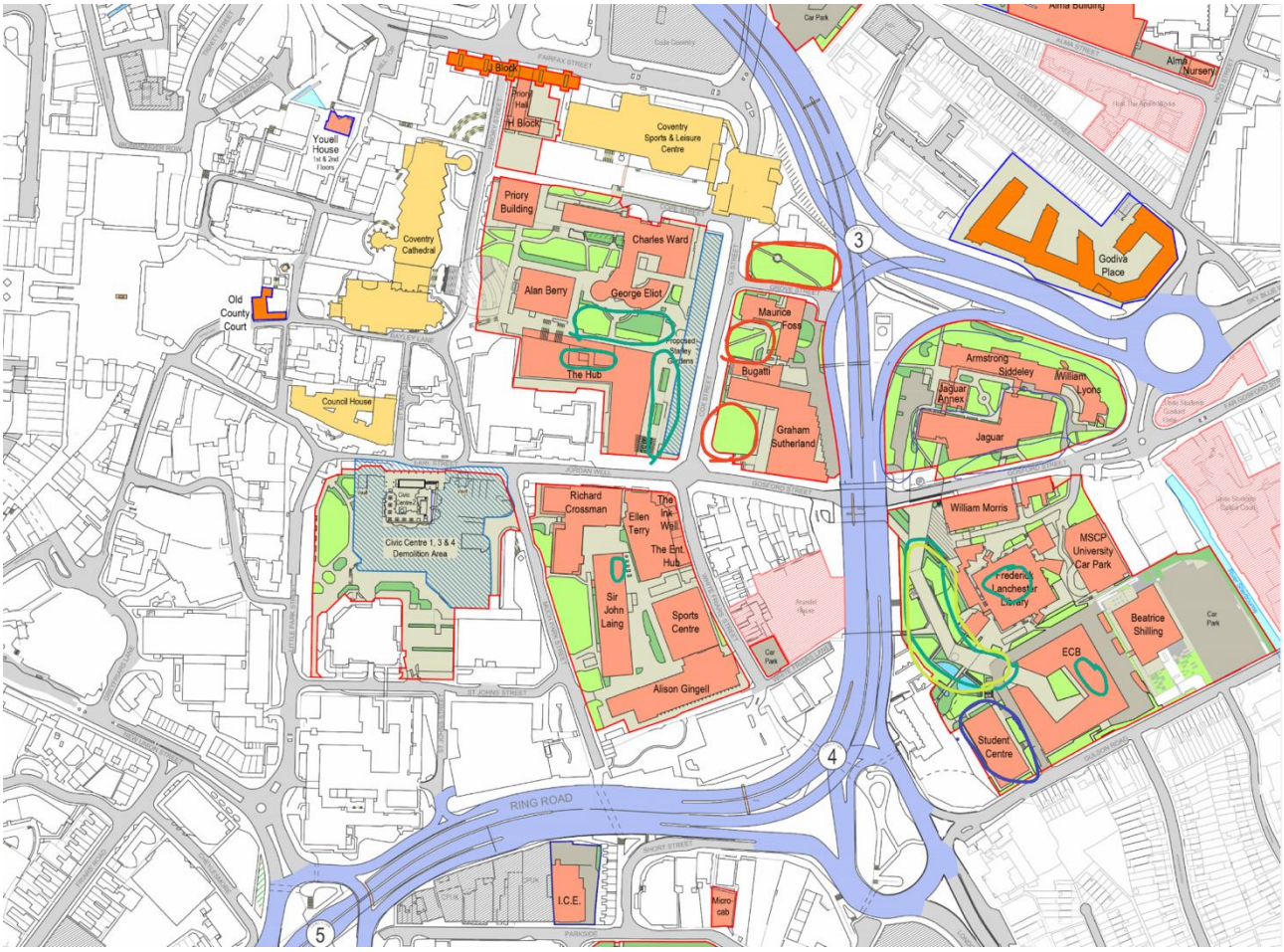


Figure 64 - Participant 11 interview map

Figure 65 - Participant 12 interview map

Figure 66 - Participant 13 interview map

Appendix 4 – Nvivo data analysis

Figure 68 - Word cloud generated from interview transcripts

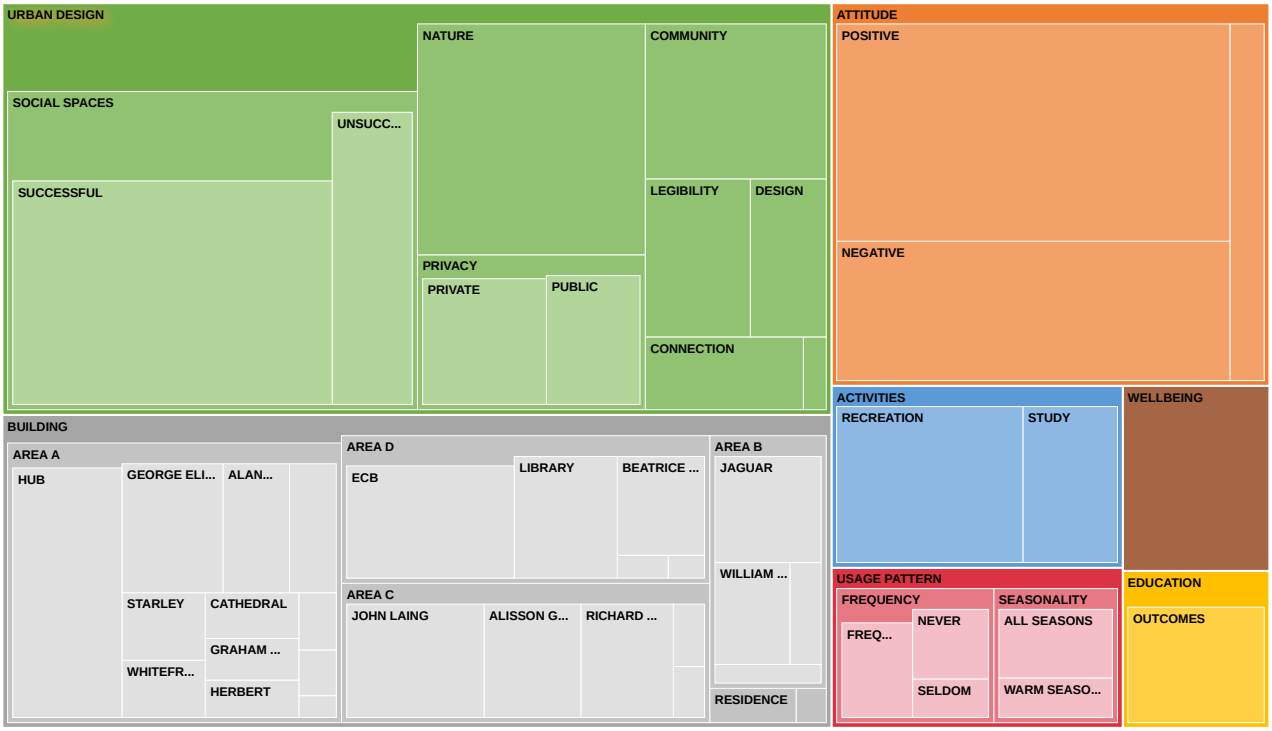


Figure 67 - Coding proportions

Figure 69 - Design word tree with context from interview transcripts

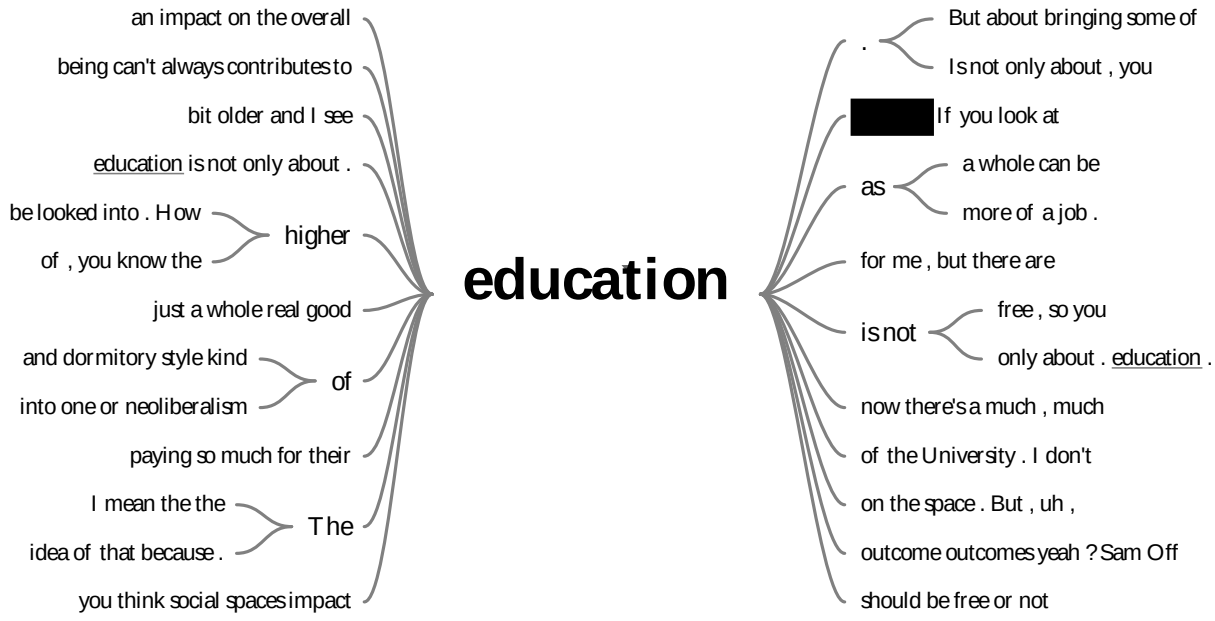


Figure 70 - Education word tree from interview transcripts

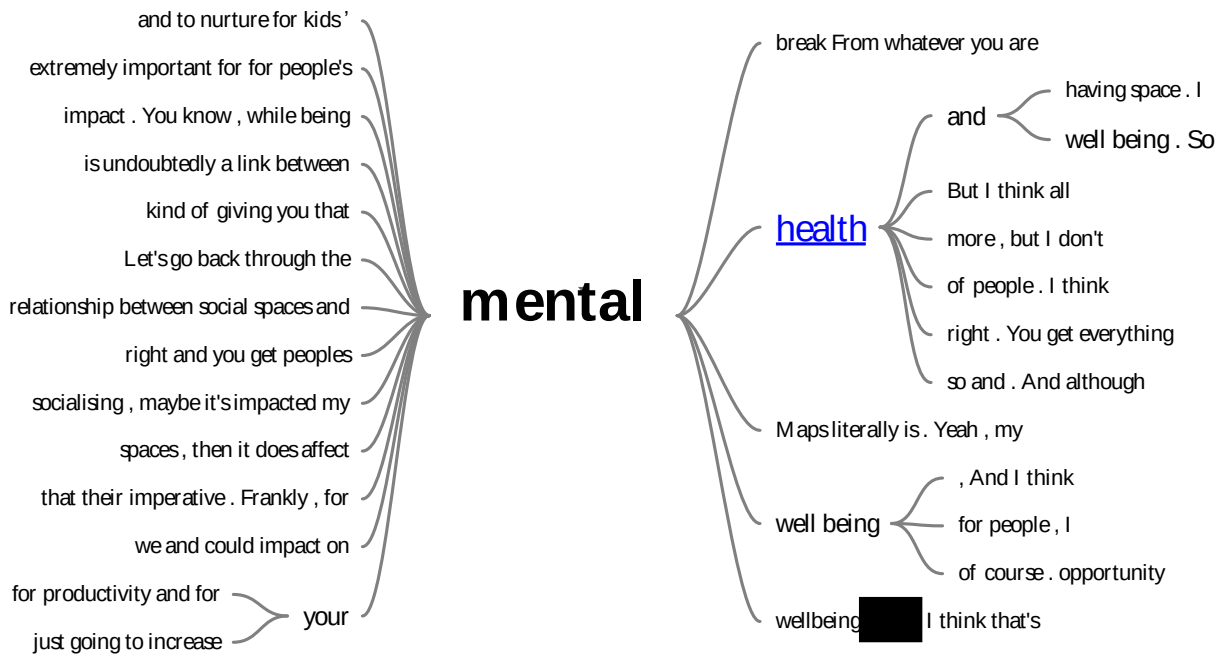


Figure 71 - Mental world tree from interview transcripts

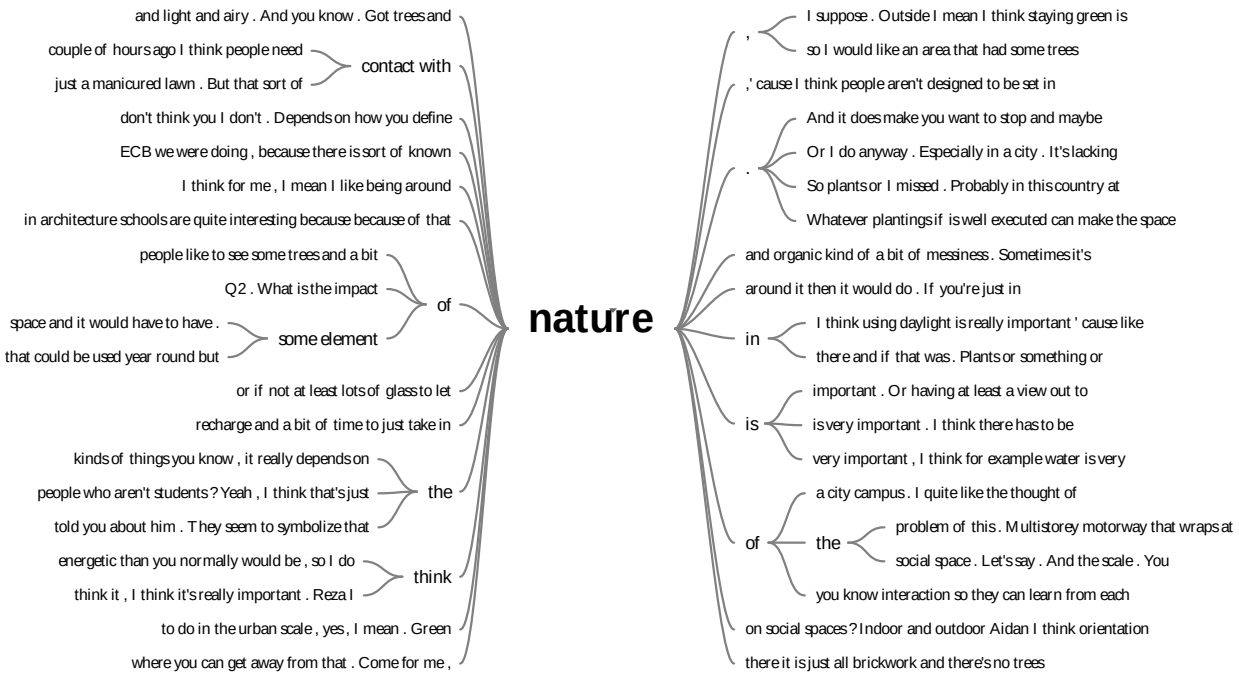


Figure 72 - Nature word tree from interview transcripts

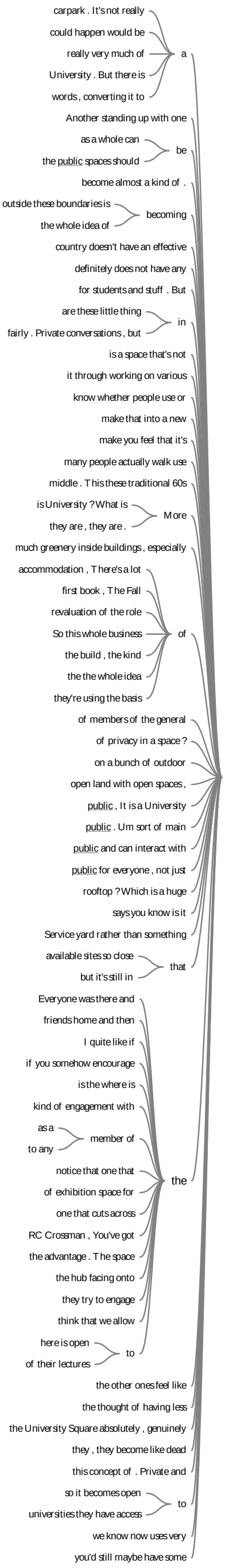


Figure 74 - Public word tree from interview transcripts

Figure 73 - Social word tree from interview transcripts

Figure 75 - Social space word tree from interview transcripts

	AREA A	AB	BUG	C	CW	GE	GS	H	HUB	MF	P	SG	AREA B	AS	JAG	WL	WM	AREA C	AG	ET	JL	RC	SPORTS	AREA D	BS	FW	LIB	MSCP	SC	WF	RES	RR
ACTIVITIES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RECREATION	22	2	0	1	0	5	0	2	17	0	0	3	1	0	1	0	0	6	4	0	3	0	0	7	1	4	1	0	0	1	1	0
STUDY	4	0	0	0	0	0	0	0	4	0	0	0	1	0	1	0	0	5	2	0	4	1	0	5	1	1	3	0	0	0	0	0
ATTITUDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEGATIVE	21	7	1	0	7	6	2	0	3	1	1	1	10	3	5	2	1	15	6	0	10	6	1	21	8	13	2	0	0	2	0	2
NEUTRAL	4	2	0	0	2	1	0	1	0	1	0	0	2	0	2	0	0	4	1	0	3	2	0	4	1	0	1	0	0	0	1	0
POSITIVE	44	1	2	6	1	13	1	2	32	3	1	4	15	2	9	0	6	20	8	1	11	8	0	29	3	10	11	0	0	8	2	2
BUILDING	124	20	4	10	14	30	9	8	63	5	2	13	52	8	28	5	19	69	28	4	40	27	5	106	22	48	32	2	3	11	6	2
EDUCATIONAL OUTCOMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
URBAN DESIGN	56	16	2	5	6	13	6	5	24	4	1	5	17	5	8	0	6	31	10	1	23	8	3	33	9	17	8	0	1	3	3	0
COMMUNITY	6	3	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3	3	0	1	0	0	1	0	0	1	0	0	0	0	0
CONNECTION	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
DESIGN	3	1	1	0	0	0	0	1	1	1	0	0	3	2	0	0	1	4	3	0	2	2	1	4	1	4	0	0	0	0	0	0
DIVERSITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEGIBILITY	10	2	0	3	1	1	3	0	7	0	0	0	5	1	2	0	2	4	1	0	3	3	0	2	0	2	0	0	0	0	0	0
NATURE	23	9	2	2	4	7	1	1	6	4	1	2	7	3	4	0	1	12	2	0	11	2	2	12	0	7	2	0	1	3	0	0
PRIVACY	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PRIVATE	5	1	0	0	0	2	0	0	3	0	0	0	1	1	0	0	0	5	1	0	4	1	0	9	2	4	2	1	0	1	1	0
PUBLIC	3	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
SOCIAL SPACES	9	2	1	1	1	2	1	2	6	1	0	2	1	0	1	0	0	4	0	0	4	1	0	4	0	2	1	0	0	0	2	0
SUCCESSFUL	39	3	0	3	1	13	0	4	30	0	1	2	9	0	5	0	4	23	11	2	8	11	0	25	1	11	15	0	0	2	0	0
UNSUCCESSFUL	12	3	0	0	4	2	1	0	4	1	0	5	7	2	2	2	4	6	4	2	4	3	0	14	4	10	1	0	0	0	0	0
USAGE PATTERN	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0
FREQUENCY	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0
FREQUENT	6	0	0	1	0	2	0	0	4	0	0	1	6	0	3	0	4	3	1	0	2	0	0	8	1	6	4	1	1	0	0	0
NEVER	4	1	1	0	1	1	0	0	0	1	0	0	5	2	2	2	1	1	0	0	0	1	0	6	3	1	1	0	2	0	2	0
SELDOM	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	4	2	0	1	0	0	1	0	0
SEASONALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALL SEASONS	8	0	0	0	0	0	0	2	6	0	0	0	0	0	0	0	0	1	1	0	1	0	0	2	0	0	2	0	0	0	0	0
WARM SEASON ONLY	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3	0	1	0	0	0	2	0	0
WELLBEING	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0

Table 17 - Code tabulation with spaces (interview transcript outcome)

	RECREATION	STUDY	BUILDING	EDUCATIONAL OUTCOMES	COMMUNITY	CONNECTION	DESIGN	DIVERSITY	LEGIBILITY	NATURE	PRIVATE	PUBLIC	SOCIAL SPACES	SUCCESSFUL	UNSUCCESSFUL	WELLBEING
ATTITUDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEGATIVE	4	0	69	2	22	6	12	0	8	9	9	4	9	1	13	2
NEUTRAL	0	1	14	1	3	1	1	0	0	7	0	0	8	1	0	0
POSITIVE	21	17	100	6	11	10	8	3	13	40	10	14	12	48	3	8
PRIVACY	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0
PRIVATE	4	3	19	0	2	0	1	0	2	8	39	3	2	4	1	0
PUBLIC	3	2	5	0	5	0	2	0	2	1	3	30	1	7	1	0
FREQUENT	3	3	20	0	0	0	0	0	1	2	2	0	3	3	0	0
NEVER	0	0	15	0	0	0	0	0	0	2	0	0	0	0	1	0
SELDOM	0	0	6	0	1	0	0	0	0	2	0	0	0	2	2	0
SEASONALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALL SEASONS	1	3	9	0	0	0	0	0	1	2	0	0	4	2	0	0
WARM SEASON ONLY	1	0	6	0	0	0	0	0	0	0	1	1	5	3	1	0

Table 18 - Code tabulation with characteristics (interview transcript outcome)

	STUDENT	ACADEMIC	EXPERT	MANAGER
WELLBEING	0	0	1	6
EDUCATIONAL OUTCOMES	0	0	5	0
COMMUNITY	2	1	3	5
CONNECTION	0	0	3	0
DESIGN	0	6	6	8
DIVERSITY	0	0	0	0
LEGIBILITY	3	3	9	9
SUCCESSFUL SOCIAL SPACE	13	23	25	22
ALL SEASONS	3	1	5	6
WARM SEASON ONLY	4	1	1	1
STUDY	0	0	2	0
RECREATION	0	3	2	0
NATURE	8	9	5	12
STUDY	0	3	0	0
RECREATION	0	1	0	1
PRIVATE	2	6	0	6
PUBLIC	5	6	0	4
STUDY	0	0	0	0
RECREATION	2	1	0	1
CONNECTION	4	7	4	4
DIVERSITY	0	0	1	0
LEGIBILITY	3	0	0	0
STUDY	0	3	1	0
RECREATION	1	1	0	1
EDUCATIONAL OUTCOMES	5	13	4	8
STUDY	0	1	0	0
RECREATION	0	4	0	4
WELLBEING	10	10	5	8
RECREATION	11	29	6	18
STUDY	7	10	7	8
OUTCOMES	6	14	9	9
COMMUNITY	4	20	10	20
CONNECTION	5	7	7	4
DESIGN	1	9	6	8
DIVERSITY	0	3	1	0
LEGIBILITY	8	5	9	11
NATURE	24	25	17	38
PRIVATE	4	16	3	16
PUBLIC	6	13	3	8
SUCCESSFUL	25	55	38	37
WELLBEING	13	11	7	19

Table 19 - Codes cross-tabulation with interview respondent type

Appendix 5 – Workshop results

Figure 76 - Space characteristics workshop outcome

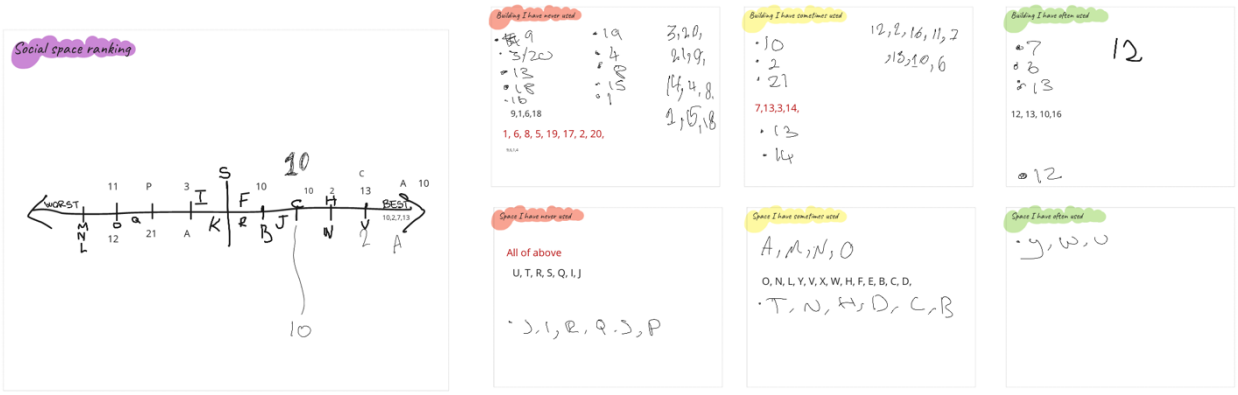


Figure 77 - Space ranking workshop outcome

Figure 78 - Workshop maps

Appendix 6 – Coventry University space calculations

BUILDING	AREA	Total NIA m^2	Total Breakout space m^2	Total Non-breakout space m^2	Breakout space%	Non-Breakout space %
CHARLES WARD	A	3973	626	3347	16%	84%
GEORGE ELIOT	A	4389	1133	3256	26%	74%
GRAHAM SUTHERLAND	A	7984	1090	6893	14%	86%
HUB	A	8369	4228	4141	51%	49%
MAURICE FOSS	A	3508	612	2896	17%	83%
ARMSTRONG SIDDELEY	B	5016	1160	3856	23%	77%
JAGUAR	B	4318	1358	2960	31%	69%
WILLIAM MORRIS	B	6913	1999	4914	29%	71%
ELLEN TERRY	C	6719	1323	5396	20%	80%
JOHN LAING	C	2940	459	2481	16%	84%
RICHARD CROSSMAN	C	7841	1908	5933	24%	76%
ALISON GINGELL	C	9219	2523	6696	27%	73%
SPORTS CENTRE	C	2592	161	2431	6%	94%
BEATRICE SHILLING	D	2894	1784	1111	62%	38%
LIBRARY	D	8285	5978	2307	72%	28%
FRANK WHITTLE	D	13512	4568	8944	34%	66%
STUDENT CENTRE	D	2185	507	1677	23%	77%

Table 20 - Spatial distribution at Coventry University

AREA	NIA m^2	Breakout space m^2	Non- breakout space m^2	%
A	28223	7689	20534	27%
B	16247	4517	11730	28%
C	29311	6374	22937	22%
D	26876	12837	14039	48%

Table 21 - Spatial distribution at Coventry University by Area

A series of maps were created to show the distribution of space on the Coventry University campus, Figure 79 demonstrates the proportion of social/ breakout space in each building compared with all other space such as teaching, offices, vertical access and facilities.

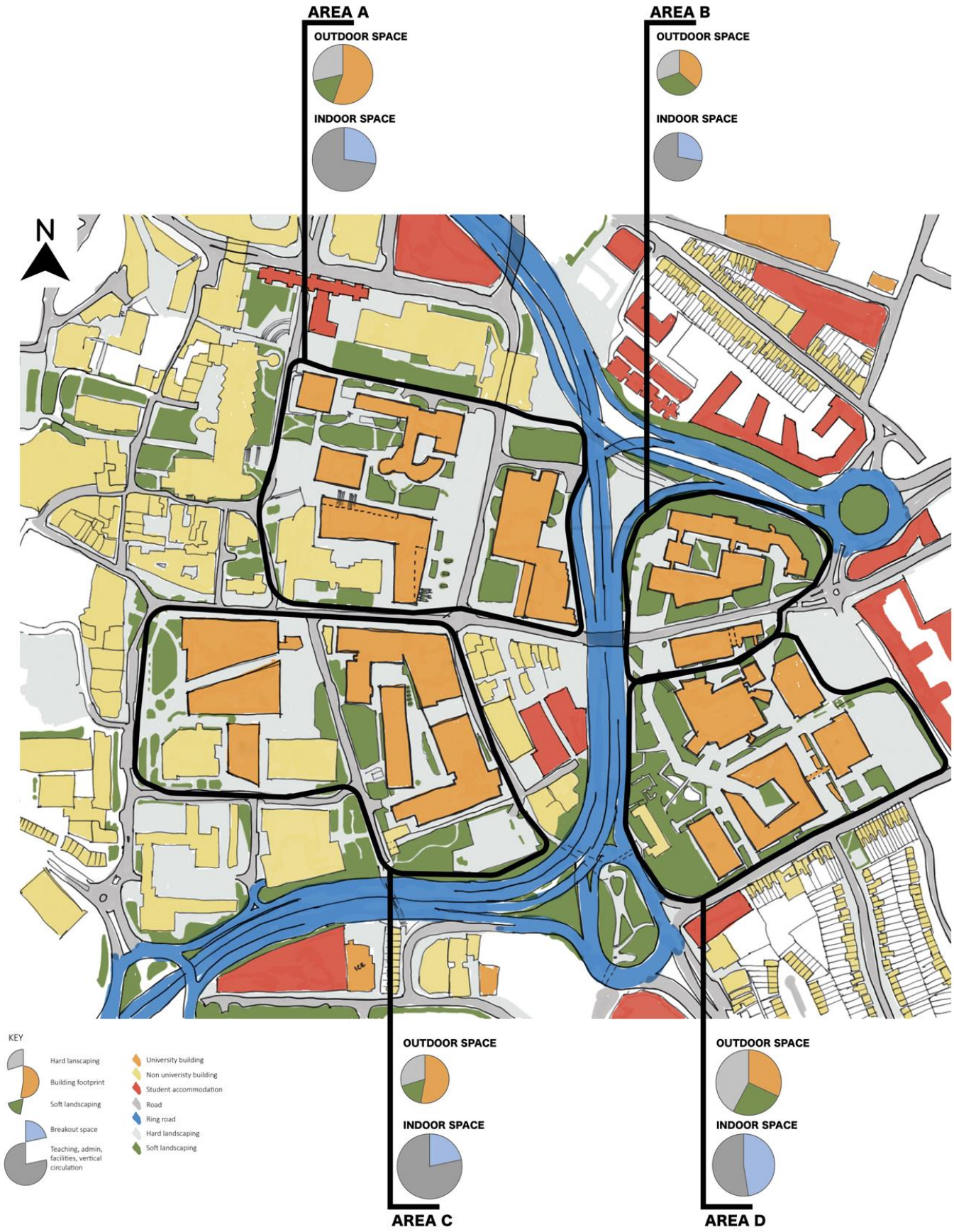


Figure 79 - Indoor and outdoor spatial distribution by area

Appendix 7 - Campus users and their distribution

The distribution of buildings across the campus was discussed and how these are split across the faculties. Space on campus is not utilised in the same way by each faculty. We are trying to determine the population on campus using data from the 2019/2020 academic year, and how these students are split across the campus. From the numbers below we can see that EEC, HLS and FBL have similar student numbers, while FAH is considerably lower making up 15% of the entire student population.

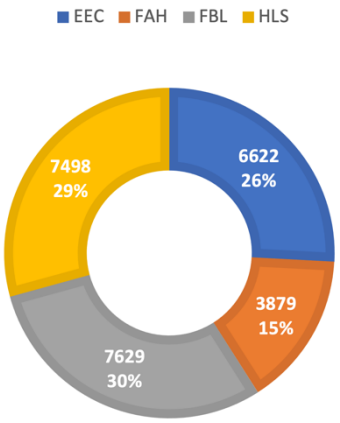


Figure 80 - Student population distribution

Table 22 - Student population distribution

Faculty	Student population (2019/2020)	Buildings	Area
EEC	6622	Frank Whittle (ECB), Beatrice Shilling, Sir John Laing	C, D
FAH	3879	Charles Ward, George Eliot, Graham Sutherland, Maurice Foss, Ellen Terry	A, C
FBL	7629	William Morris, Jaguar	B
HLS	7498	Richard Crossman, Alisson Gingell	C

Figure 70 also shows a disproportionate number of students/ area when it comes to teaching spaces, which can be understood, seeing that only Arts and Humanities teaches in Area A, and the student numbers in Arts and Humanities is lower than other faculties. This

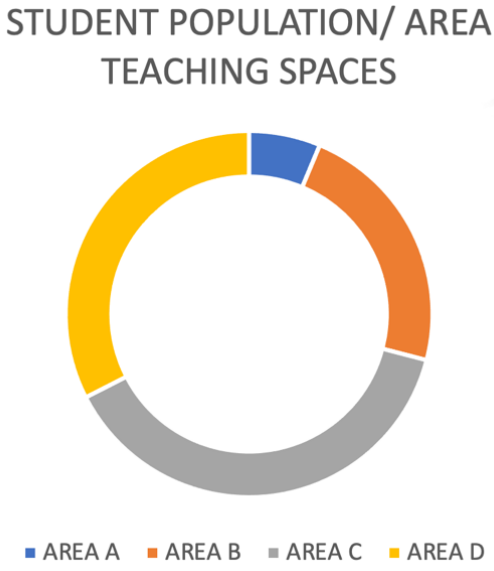


Figure 81-Student Population distribution/ Area

figure does not show a lack of students in Area A, as this area contains the student HUB, therefore attracting staff and students from all faculties.

Figure 71 shows the student distribution across the areas. It is notable that only area C has a mixture of students.

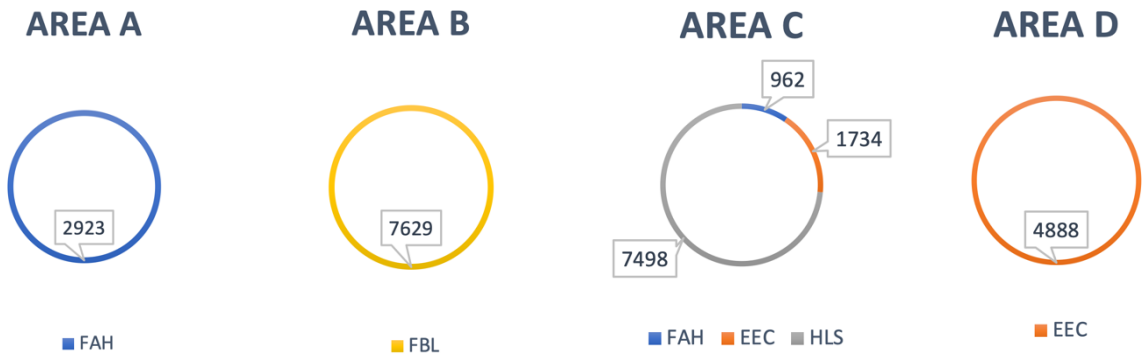


Figure 82-Student population in each area

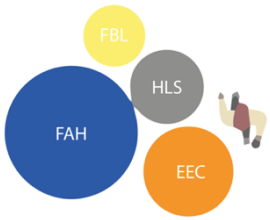


Figure 84 - Area/ student

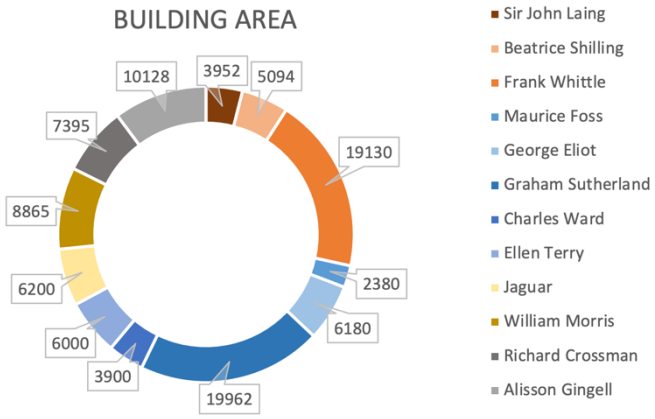


Figure 83 - Area/ Building & Faculty

Figure 72 shows the spatial distribution of each faculty. It is notable that Faculty of Arts and Humanities has the most space out of all four faculties, but the smallest number of students

Table 23 shows that different faculties have different accommodations for their students. At Coventry University, you have more space available to you if you are an Arts and Humanities student than any other students on campus, at the opposite to students in the Faculty of Business and Law. This is easily justifiable by each course requirements for space as some only require classroom space and others need laboratories and space to create. Figure 18 illustrates how much space students are given in each faculty in relation to the average human.

faculty	space per student m^2
EEC	4.25
FAH	9.26
FBL	1.97
HLS	2.86

Table 23 - Area/student

When analysing the spread of available space across campus buildings, it is evident that not only some students are afforded more space than others but also the range of proportions of spatial typology is wide. If we calculate the area of breakout space, defined here as space that can be accessed by staff and students outside

of timetabled sessions, that is not administrative or sanitary or other facilities, in relation to all useable area as can be observed in Table 20 in Appendix 5 and illustrated in Figure 74

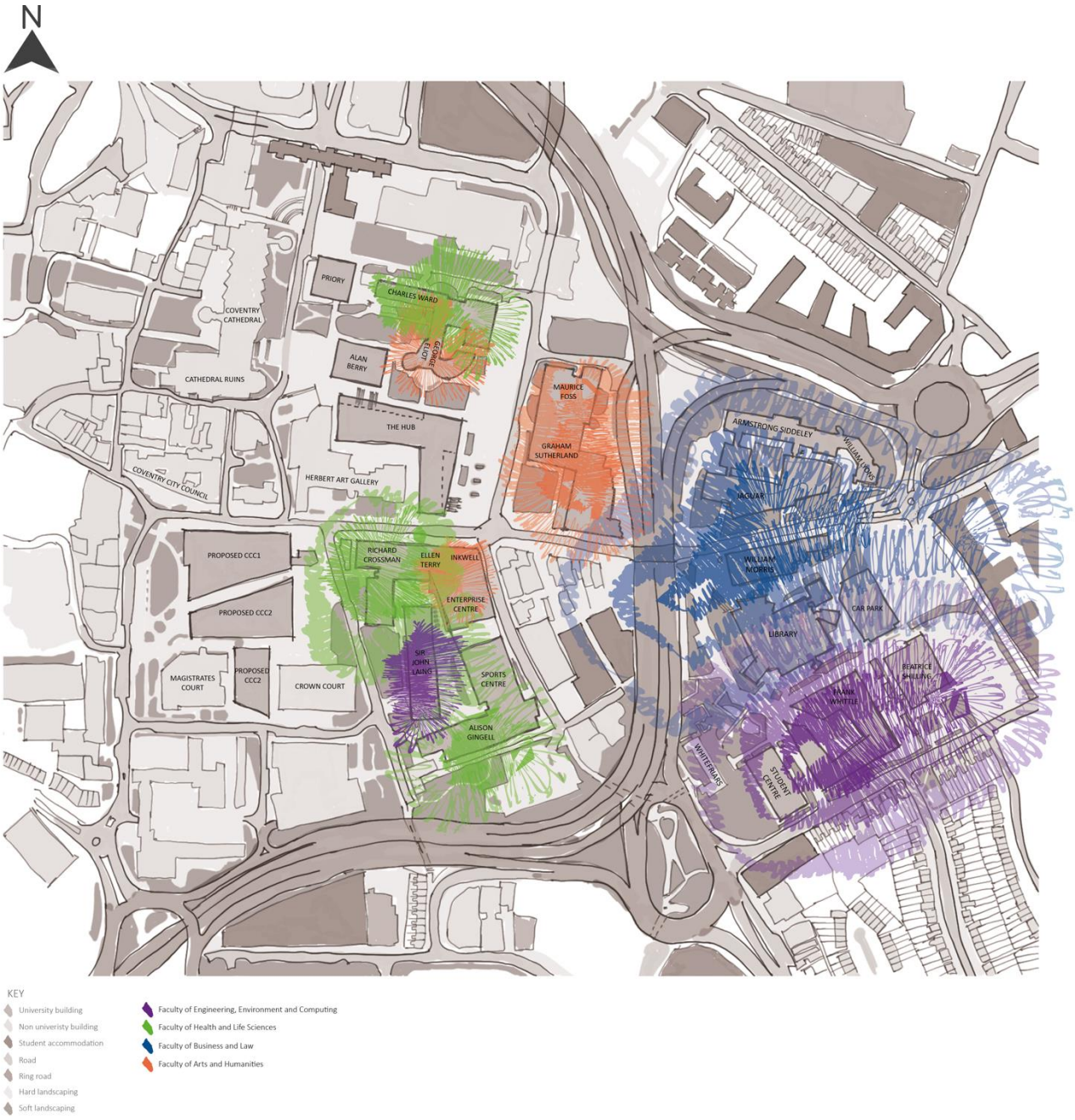
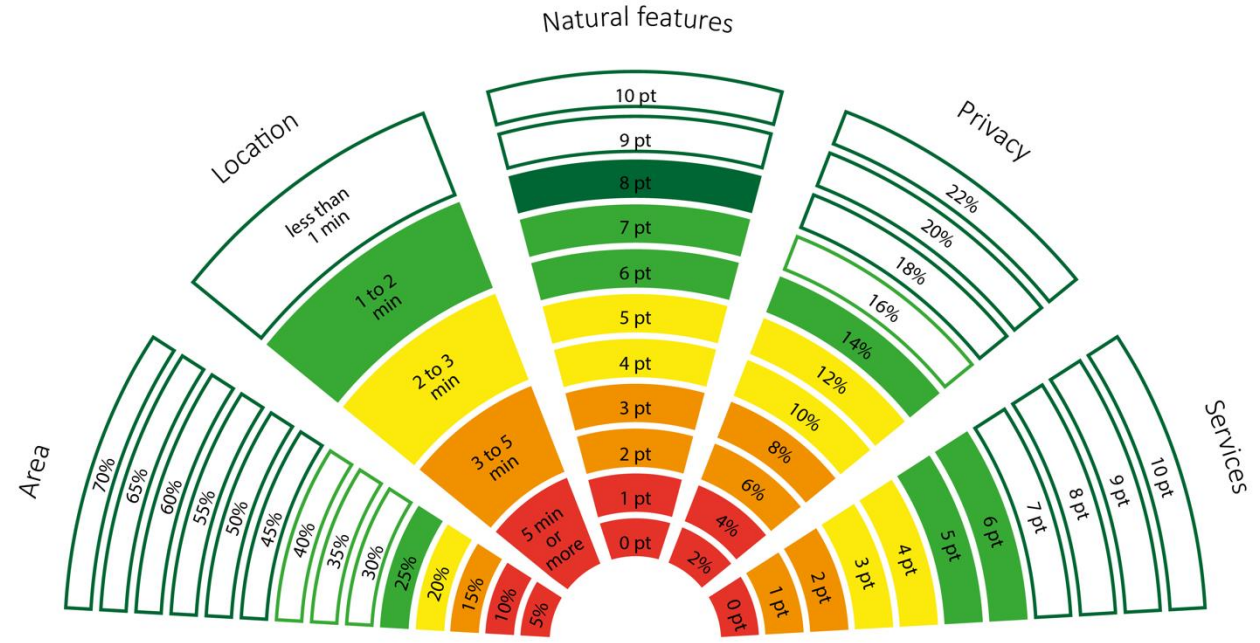
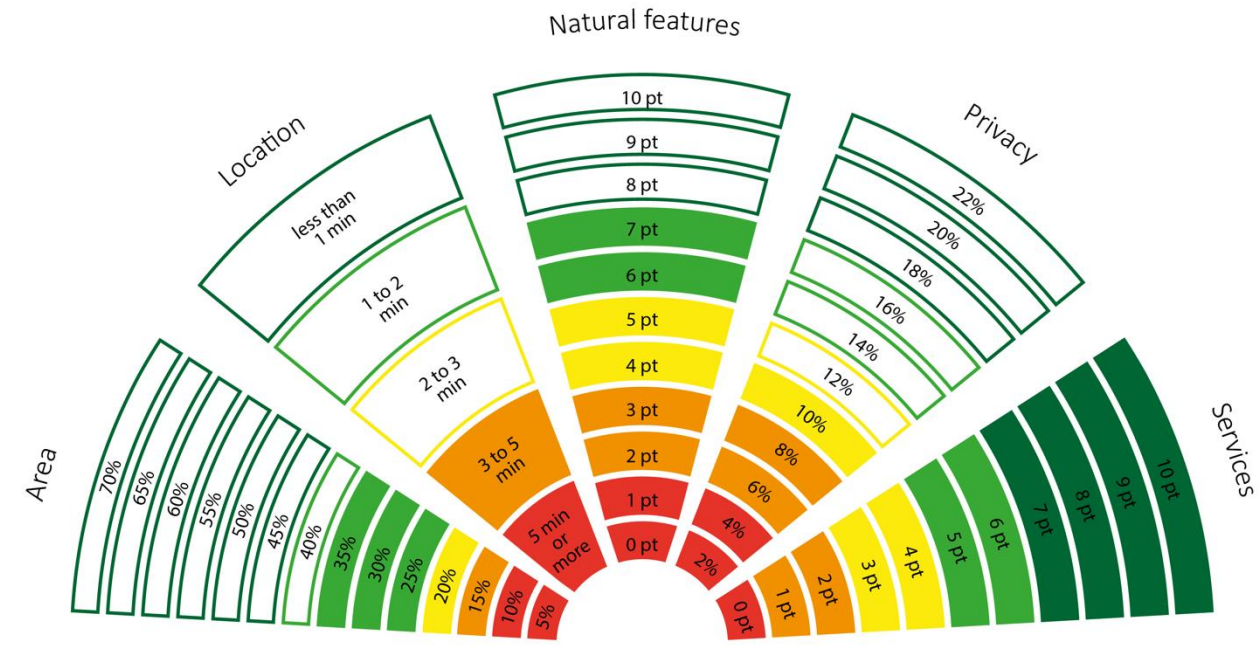


Figure 85 - Student numbers on campus

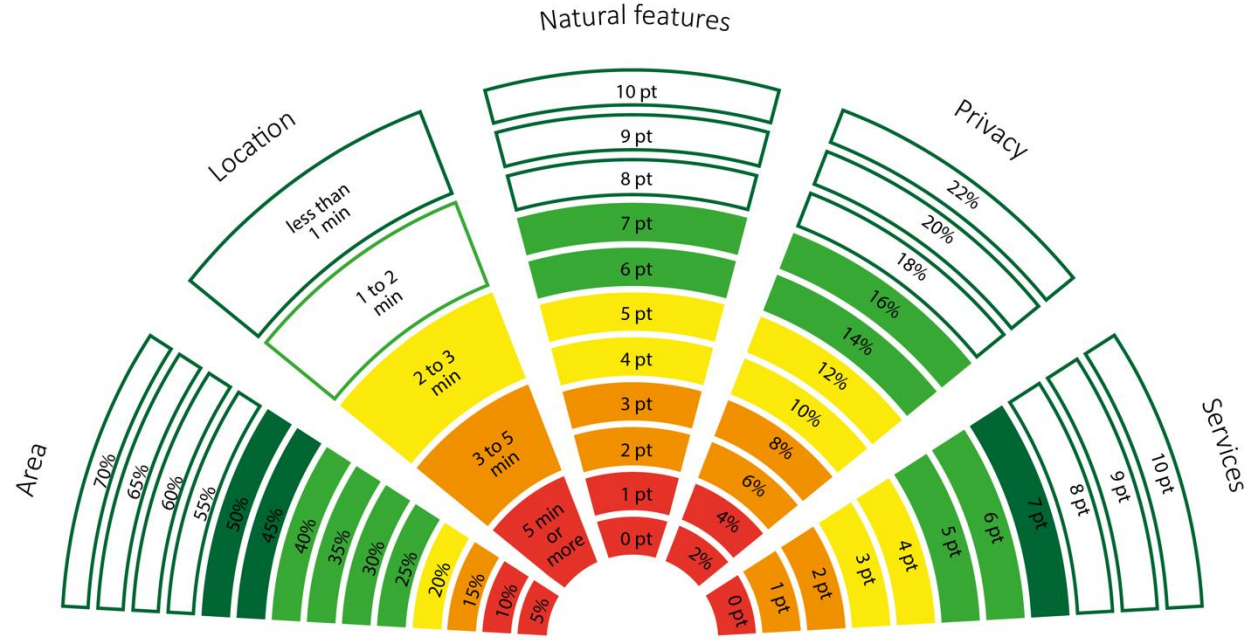
Appendix 8 – Social spaces design criteria applied on Coventry University buildings



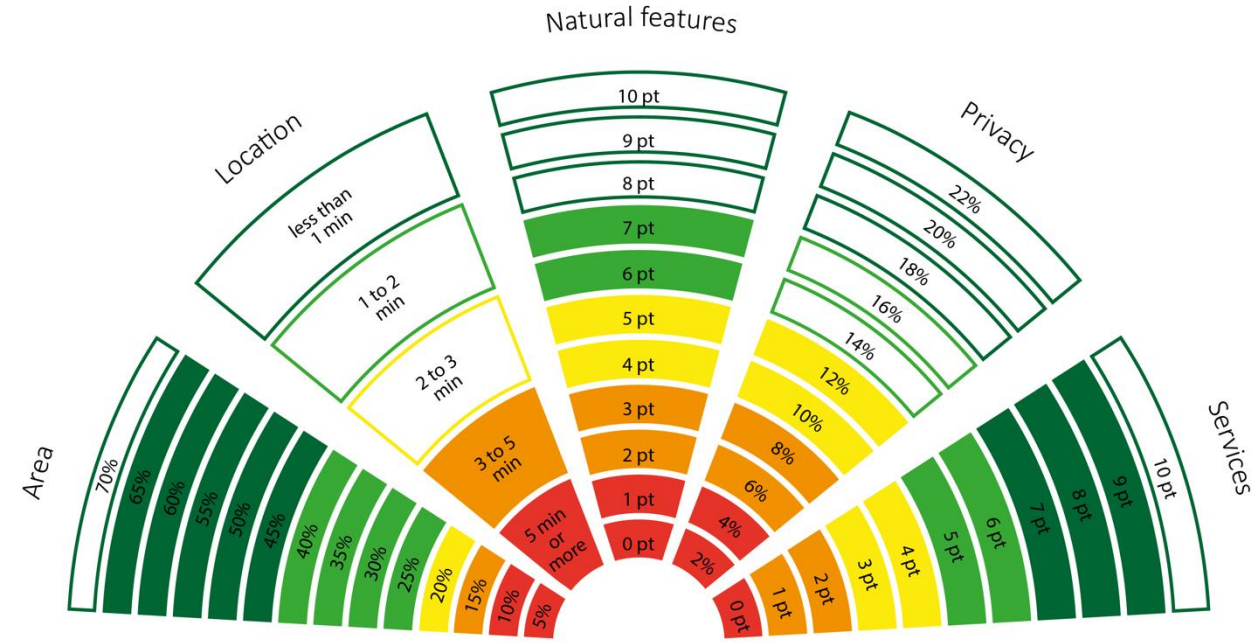
AG



FW


Natural features
10 pt
9 pt
8 pt
7 pt
6 pt
5 pt
4 pt
3 pt
2 pt
1 pt
0 pt
Location
less than 1 min
1 to 2 min
2 to 3 min
3 to 5 min
5 min or more
Privacy
22%
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0 pt
1 pt
2 pt
3 pt
4 pt
5 pt
6 pt
7 pt
8 pt
9 pt
10 pt
Services
Area
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%

HUB


Natural features
10 pt
9 pt
8 pt
7 pt
6 pt
5 pt
4 pt
3 pt
2 pt
1 pt
0 pt
Location
less than 1 min
1 to 2 min
2 to 3 min
3 to 5 min
5 min or more
Privacy
22%
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0 pt
1 pt
2 pt
3 pt
4 pt
5 pt
6 pt
7 pt
8 pt
9 pt
10 pt
Services
Area
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%

BS

Appendix 9 – Social spaces design criteria validation and analysis

participant number	p1	p2	p3	p4	p5	p6	p7	p8	p9	average
Introductory page	Fair/ 2	Fair/ 2	Good/ 3	Poor/ 1	Fair/ 2	Excellent /4	Good/ 3	Excellent /4	Good/ 3	Fair- Good/ 2.7
AREA/ LOCATION/ PRIVACY	Fair/ 2	Good/ 3	Good/ 3	Good/ 3	Poor/ 1	Excellent /4	Excellent	Excellent /4	Good/ 3	Good/ 3.0
NATURAL FEATURES	Fair/ 2	Excellent /4	Good/ 3	Poor/ 1	Poor/ 1	Excellent /4	Good/ 3	Excellent /4	Good/ 3	Fair-Good/ 2.8
SERVICES	Fair/ 2	Good/ 3	Good/ 3	Fair/ 2	Poor/ 1	Excellent /4	Good/ 3	Excellent /4	Good/ 3	Fair-Good/ 2.8
Overall	Fair/ 2	Good/ 3	Good/ 3	Poor/ 1	Poor/ 1	Excellent /4	Good/ 3	Excellent /4	Good/ 3	Fair-Good/ 2.7

Table 24 - Scoring model validation

Page	Improvement suggested	Participant
Introductory page	Use bullet points (and perhaps examples of what is a good / bad score)	P4
	When mentioning 5 criteria-list them initially then describe them	P5
AREA/ LOCATION/ PRIVACY	Define what a 'prospective user' is.	P2
	it's a bit complicated to understand	P3
	Not sure where the footnotes refer to	P4
NATURAL FEATURES	The list of features goes from 'good' to 'bad'. You could say that it is 'leading' the witness and that a reviewer might be more objective if they read the list from 0 to 4. Also, it is not clear why some features have 4 categories and others have 5.	P4
	reduce the complexity	P5
SERVICES	explain you can only pick one answer from each category.	P2
	2 mins is a long walk once inside a building... probably from the entrance of ECB to the 4th floor.	P3
	reduce the complexity	P5
Overall	Just a couple of notes to define users and how to answer the points-based questions. Maybe provide examples of how a space would be scored.	P2

Table 25 - Scoring model improvement suggestions

The scoring model requires further improvement and testing, as well as using different testing methods to ascertain the best method to employ. Overall, on first dissemination the model was well received, all the categories achieved better than average scores.

One of the testers required to "reduce the complexity", and they mentioned this on two separate occasions, therefore investigation is required on different ways to deploy this testing to ensure that it is easy to understand. Another tester disagreed with the use of Likert scale phraseology in the dissemination of this model such as "Poor" or "Good", as leading, and this is another factor which needs to be carefully considered in future research.

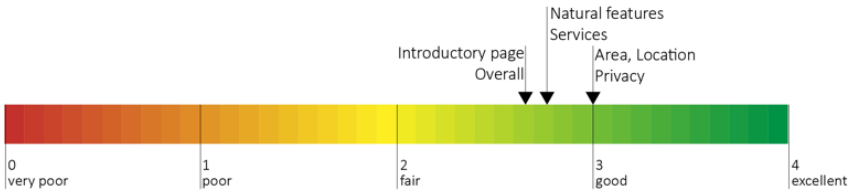


Figure 86 - Overall attitude towards scoring model

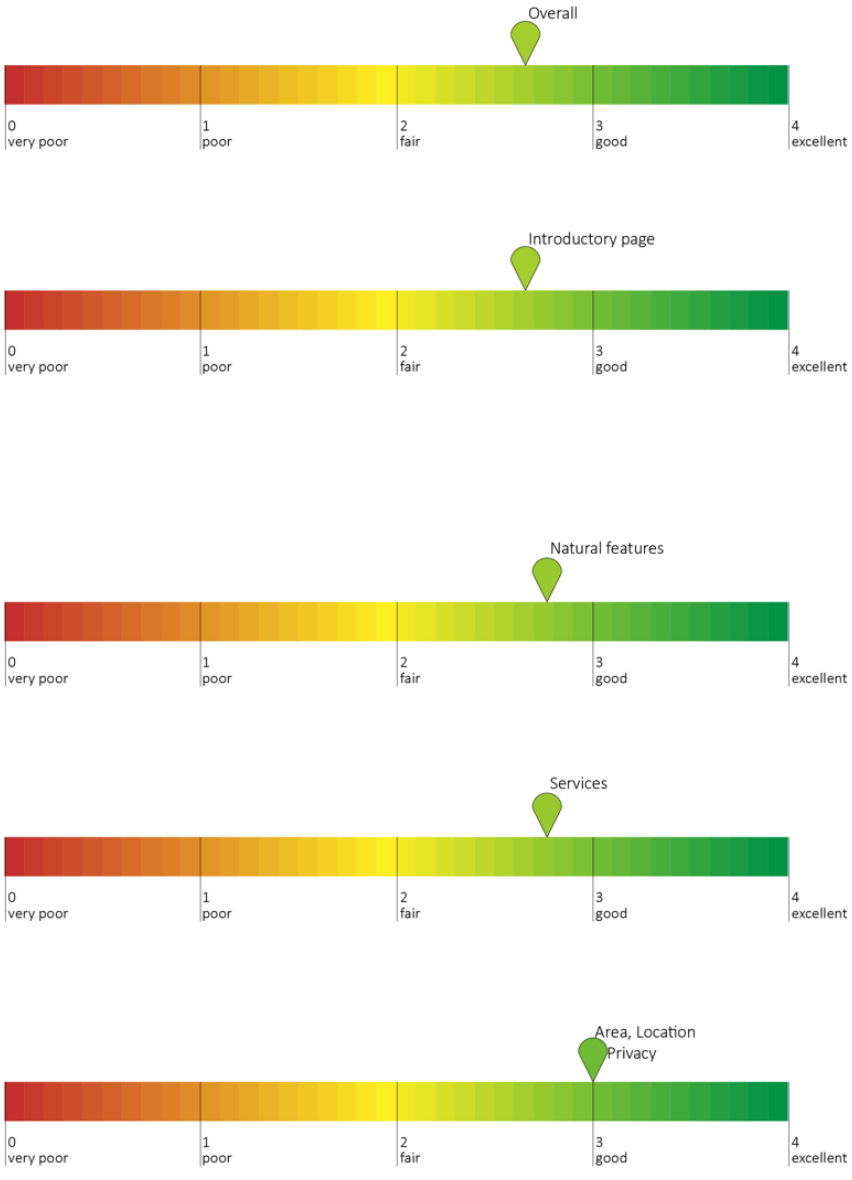


Figure 87 - Itemised attitude towards scoring model

Appendix 10 – Framework analysis on campus

The main awarding body for building performance and sustainability in the UK is BRE who assess and award BREEAM certificates. On the Coventry University Coventry campus all three of the newest teaching and learning buildings as well as the student HUB have been awarded **BREEAM Excellent** certificates, this being an integral part of the brief when designing the buildings. The four buildings are **Frank Whittle**, **Beatrice Shilling**, **Alison Gingell** and **the** (student) **HUB**.

Frank Whittle building (previously known as Engineering and Computing building) is a split over seven levels, five of which are teaching and learning, and two are reserved as staff workspaces. Throughout the student levels is informal student workspace, with computers, soft and hard furnishings, that can be used for individual and group work. The building has unusual cladding which is designed to minimise solar gain while maintaining good levels of natural light (which is supplemented by artificial light) and is ventilated naturally. Students and staff are encouraged to use the spaces socially by being provided with a cafe. The Frank Whittle Building is also linked via bridge to the Beatrice Shilling building (Opened 2012)

> *"A new approach to learning" – Arup*

> *"The design for the building has been hugely successful. Students use the building's open and collaborative spaces both socially and academically, working together as groups or as individuals" – Gerry Ackerman, Coventry University Estates Director*

Beatrice Shilling Building (previously known as Engineering and Computing building 2) is the newest educational building on campus, being opened at the beginning of 2020. It features ample working space around a naturally lit atrium (which is supplemented by artificial light), computer space as well as individual and group workspace and a visual link to the outside though large, glazed panels. The Beatrice Shilling Building is linked with the Frank whittle building via bridge. (Opened 2020)

Alison Gingell building (previously known as Science and Health Building) is another building on Coventry University Coventry Campus with a BREEAM Excellent Certificate. It features a large four storey atrium with a cafe, natural light, and ample space for individual and group working space around classrooms and laboratories. As it was designed to mimic a hospital, it has wide corridors and doors as well as lifts. The Alison Gingell building had also been incorporated into the landscape with large, glazed curtain walls that link the building visually to the other buildings on the site and with the outdoors. (Opened 2019)

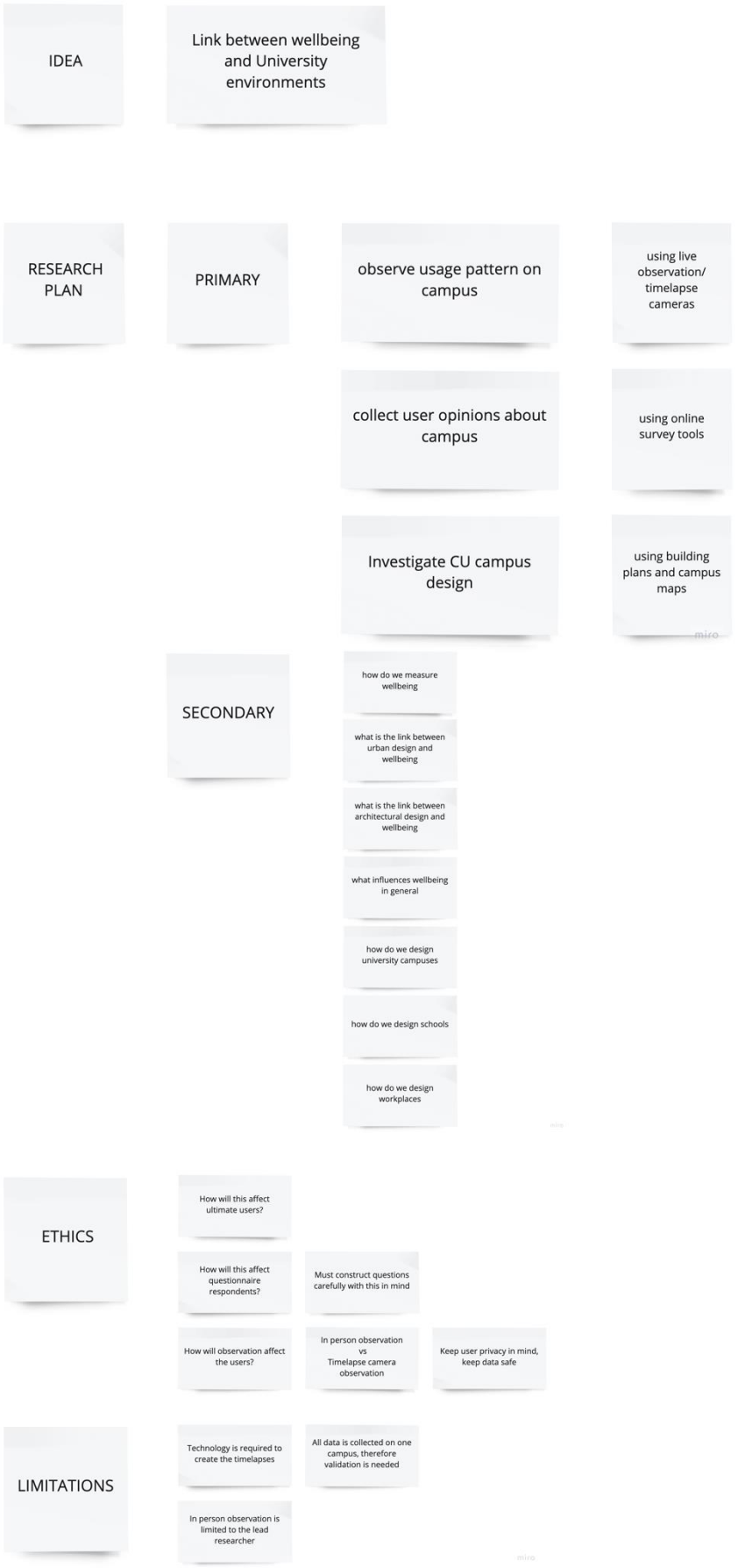
The (Student) **HUB** was designed to provide all the facilities needed for student life, it features open space with individual and group working spaces, clearly defined using colour, especially signalling yellow, as well as a supermarket, a restaurant and a cafeteria, the student's union, health and wellbeing services, employability services, spiritual and religious spaces and a large venue space which can be used as a cinema or nightclub. The building provides these services in a space that is largely naturally lit and ventilated, with good visual links to the outdoors onto nature or key views in Coventry. (Opened 2011)

The four buildings mentioned have all been awarded BREEAM Excellent and are preferred by those surveyed through interviews and workshop. The potential impact of the BREEAM award on the user perception has been discussed in more detail in the discussion chapter

Appendix 11 – Process map

INITIAL - Jan 20

A full process map document can be accessed here



first 6 months - Jul 20

IDEA

Measuring design implementations that affect wellbeing

RESEARCH PLAN

PRIMARY

collect user opinions about campus

using interviews

Questions for interview and workshop focus on social spaces

13 participants interviewed

Audio content analysed

overall themes

% of students prefer x space

scale of spaces

1 workshop organised and run

graphical content analysed

Investigate CU campus design

using building plans and campus maps

Investigate design scoring frameworks

BREEAM, LEED, SPeAR, WELL and Flourish

How do frameworks overlap

SECONDARY

how do we measure wellbeing

how to create questions to measure user experiences

what is the link between urban design and wellbeing

what is the link between architectural design and wellbeing

what influences wellbeing in general

how do we design university campuses

how do we design schools

how do we design workplaces

learning is done informally

BUS methodology

recreation spaces are required to achieve productivity

WELL and LEED-ND refer to food options, walkability, natural features and measures to increase MVPA

Campuses are designed to encourage intersection of courses and areas

new buildings have a considerable impact on educational outcomes

being in nature reduces stress symptoms

Social spaces are required for both staff and students to increase sense of wellbeing and productivity/ educational outcomes

Campuses are designed to encourage intersection of courses and areas

Schools are designed for incidental play

poor design impacts on pupil and teacher productivity

clean air, agency over own space, moderate level of noise, and light are important for productivity

Spaces which allow staff to take breaks are required, a kitchen is advantageous to encourage healthy food choices

ETHICS

How will this affect ultimate users?

How will this affect interview respondents?

Must construct questions carefully with this in mind

LIMITATIONS

All data is collected from a limited sample of respondents

All data is collected on one campus, therefore validation is needed

COVID 19 lockdowns have stopped students and staff from using the campus

first 12 months - Jan 21

IDEA

Are social spaces key to a successful university campus?

RESEARCH PLAN

PRIMARY

collect user opinions about campus

using interviews

13 participants interviewed about CU campus and social spaces

Audio and graphical content analysed

1 workshop about CU campus and social spaces

graphical content analysed

DESIGN FACTORS/ CRITERIA

scale of spaces

no of respondents prefer this space

usage frequency

reasons: size, light, greenery, ventilation, space to work (privacy), space to chat (privacy), availability of food, availability of drink, relaxed atmosphere, vibrant atmosphere

Seasonality of spaces

What is needed for a successful campus. Are city campuses better?

Nature

Impact of social spaces on educational outcomes

Ownership over space. Belonging

Link between social spaces and mental wellbeing

key points: outdoor spaces must work in all seasons, access to nature, successful spaces create ownership and belonging, link to a town or city centre, social spaces impact educational and social outcomes, social spaces impact mental wellbeing

Investigate CU campus design

using building plans and campus maps

Calculating area of space/ student

Investigate design scoring frameworks

BREEAM, LEED, SPeAR, WELL and Flourish

How do frameworks overlap?

What is missing?

Investigate the impact of COVID-19 lockdowns on students

Using student satisfaction data

Comparing lockdown years with non lockdown years

Students feel a decreased sense of community belonging during COVID-19 lockdowns

University campuses encourage the forming of connection and relationships

SECONDARY

how do we measure wellbeing

learning is done informally

BUS methodology

what is the link between urban design and wellbeing

recreation spaces are required to achieve productivity

new buildings have a considerable impact on educational outcomes

what is the link between architectural design and wellbeing

WELL and LEED-ND refer to food options, walkability, natural features and measures to increase MVPA

Campuses are designed to encourage intersection of courses and areas

what influences wellbeing in general

being in nature reduces stress symptoms

Social spaces are required for both staff and students to increase sense of wellbeing and productivity/ educational outcomes

how to create questions to measure user experiences

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GREEN DESIGN

PSYCHOLOGICAL FACTORS

Shown in more detail on the next page

ETHICS

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How will this affect interview respondents?

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GREEN DESIGN

- Seating in green spaces increases participation (Garcia-Moruno et al / Mumcu and Yilmaz, 2010 / 2016)
- Proportions of green spaces are important to their success (Lau and Yang, 2009)
- Green design is linked to health (WorldGBC, 2015)
- Green design is linked to productivity (WorldGBC, 2015)
- Good balance of time spent outdoors and indoors can lead to an increased sense of wellbeing (Christiansen and Baum, 1997)
- Green spaces improve mental health outcomes (Searles, 1960)
- Being outdoors proved to reduce acute stress (Ulrich / Kaplan and Kaplan, 1987 / 1989)
- Spaces get used even if not convenient if they have an appeal such as nature, shopping or food, and human relationships (Gieryn, 2000)
- Green spaces linked to MVPA and wellbeing (Ward et al, 2016)
- Green spaces are spaces of reflection and introspection (Adevi and Lieberg, 2012)
- Green spaces are used frequently, irrespective of size (Lau and Yang, 2009)
- Plazas attract more users than parks, significantly different for women (Soltero et al, 2015)
- Green spaces become the favourite/ only place for a certain activity (Lieberg / Korpela et al, 1995 / 2001)
- Green spaces are healing spaces (Marcus and Jones, 1999)
- Green spaces considered a link to self and spirituality (Tuan, 1976)

PSYCHOLOGICAL FACTORS

- Self-discovery (Yair, 2008)
- Campus as a formative space (Yair, 2008)
- Second chances are beneficial in education (Yair, 2008)
- The attachment to spaces helps preserve identity of culture, groups or individuals (Low and Altman, 1992)
- Campus as transitional space (Yair, 2008)
- Peak experiences (Maslow, 1968)
- Space can be an actor or just backdrop (Shutz, 1967)
- Flourishing as desired development of a person in a nurturing environment (Croome, 2000)
- Emotional short-term experiences (Maslow, 1971)
- Place gets its character from the occupants and turns into space (Friedmann, 2007)
- Success in university assessments has long lasting effects (Yair, 2008)
- Peak experiences uncover new pathways (Gardner, 1983)
- Peak experiences as "crystalising experiences" (Gardner, 1983)
- Long term effects of process of discovery (Maslow, 1970)
- Green spaces become object of attachment (Stewart et al, 2004)

UNIVERSITY/ TEACHING SPACE

- Staff and students perceive improvement in academic performance from new buildings (CABE, 2005)
- Higher education is predictor of civic and political engagement (Ahier et al, 2003)
- Higher education is a predictor of social participation (Ahier et al, 2003)
- A campus is a place of congregation of likeminded people (Lefebvre, 1994)
- A campus is a place for permanent and temporary communities (Lefebvre, 1994)
- Universities are incubators for knowledge (Uhl, 2004)
- University is a place of development by design (Lau and Yang, 2009)
- Universities bring people from varied backgrounds together (Olszak, 2012)
- Linking space to social networks "sense of place" (Kuh et al, 2005)
- Good design leads to a good learning environment (RIBA, 2016)
- Learning can also be informal peer to peer (Kuh et al, 2005)
- Schools are designed to enhance peer to peer learning (Maclure, 1984)
- Proxemics can promote social interaction, with messages of support and belonging (Strange and Banning, 2001)
- Universities are keen on mixing courses and disciplines (University of York, 1962)

DESIGN FACTORS/ CRITERIA

- Important workplace factors: air quality, thermal comfort, acoustic comfort, view, control over own environment, privacy and size, cleanliness, layout, and quality of furnishings (Frontczak et al, 2012)
- Factors: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, and community (Lowry, 2018)
- Light, air quality, thermal comfort and acoustics are controlled by Building regulations in the UK (Approved Documents, 2020)
- LEED ND linked to an increase in MVPA in both adults and children (Lewin/ Stevens and Brown, 2012 / 2011)
- Creative spaces need to provide for group and individual work (O'Bryne, 2018)
- Factors for communities: walkability, connectivity, diversity and density, good architecture, and urban design (Zuniga-Teran et al, 2015)
- Important factors: air quality, thermal comfort, day, and night lighting, biophilia and views, noise, look and feel, active design and exercise and amenities and location (WorldGBC, 2015)
- Teachers require good lighting and good ventilation as well as spacious areas (RIBA, 2016)
- A rounded approach to design is needed to link built environment and wellbeing (McGee, 2016)
- Design of buildings portrays its meaning (Temple and Banett, 2007)
- New buildings attributed to motivation to work and collaboration between students (CABE, 2005)
- Environment is linked to productivity (Heerwagen, 1998)
- Design for educational spaces linked to positive student behaviour (RIBA, 2016)
- Design is linked to educational outcomes (RIBA, 2016)
- Teachers leave workplaces because of spatial conditions (RIBA, 2016)
- Design for educational spaces allows for successful assessment (RIBA, 2016)
- Design is linked to less bullying (RIBA, 2016)
- Design is linked to productivity (WorldGBC, 2015)

first 24 months - Jul 22

IDEA

How to design social spaces for a University Campus

RESEARCH PLAN

PRIMARY

collect user opinions about campus

using interviews

13 participants interviewed about CU campus and social spaces

Audio and graphical content analysed

1 workshop about CU campus and social spaces

graphical content analysed

DESIGN FACTORS/ CRITERIA

scale of spaces

no of respondents prefer this space

usage frequency

reasons: size, light, greenery, ventilation, space to work (privacy), space to chat (privacy), availability of food, availability of drink, relaxed atmosphere, vibrant atmosphere

Seasonality of spaces

What is needed for a successful campus. Are city campuses better?

Nature

Impact of social spaces on educational outcomes

Ownership over space. Belonging

Link between social spaces and mental wellbeing

key points: outdoor spaces must work in all seasons, access to nature, successful spaces create ownership and belonging, link to a town or city centre, social spaces impact educational and social outcomes, social spaces impact mental wellbeing

Correlate participant responses + campus analysis

social space area

facilities

natural elements

privacy of social space

proximity to relevant spaces

Investigate CU campus design

using building plans and campus maps

Calculating area of spaces' student

Calculating area of social space in each building/ outdoor area

Investigate design scoring frameworks

BREEAM, LEED, SPeAR, WELL and Flourish

How do frameworks overlap?

What is missing?

Wellbeing measures are measured in different ways for each framework

There is need for an additional measuring tool to be used in conjunction with the frameworks

Investigate the impact of COVID-19 lockdowns on students

Using student satisfaction data

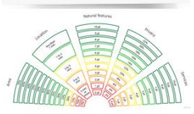
Comparing lockdown years with non lockdown years

Students feel a decreased sense of community belonging during COVID-19 lockdowns

University campuses encourage the forming of connection and relationships

Campuses need to design spaces that encourage connection and relationships in a safe environment

Social spaces design criteria measures indoor spaces pre and post construction to understand how to used design to improve them, to impact on user's experience and wellbeing.



SECONDARY

how do we measure wellbeing

learning is done informally

BUS methodology

what is the link between urban design and wellbeing

recreation spaces are required to achieve productivity

new buildings have a considerable impact on educational outcomes

what is the link between architectural design and wellbeing

WELL and LEED-ND refer to food options, walkability, natural features and measures to increase MVPA

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what influences wellbeing in general

being in nature reduces stress symptoms

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further study - next 3 years