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Learning space design: the presentation of a framework for the built environment discipline

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This paper reports on research undertaken to identify the specific learning space preferences of built environment students within a UK university. Through an instrumental case study design, utilizing a sequential exploratory mixed methods approach, this research explored learning space requirements for built environment students. Initial focus groups were conducted to identify elements of the learning spaces that are important in students' learning spaces, which were then used to develop questions for the survey phase of the research. From this, we proceeded to develop a framework for learning space design for built environment students. Eight important learning space factors were identified; access to space, convenient workspaces, environment, layout, sense, integrated space, aesthetics and identity. Initial findings are presented regarding differences between disciplines in their rating of elements of the learning space. A framework is presented for practitioners to use in the design process for the development of built environment disciplines learning spaces. This research adds to current understanding regarding student centered learning and workplace research, highlighting preferences for specific learning space factors. The current research is part of a bigger study but presents built environment disciplines outcomes which are applicable to a larger group.

Keywords: Learning environment, Physical space, Student centered, University buildings, Built environment

Introduction

The expenditure on the development of new and existing estates/property in the UK has seen a drastic rise over a short period of time (Ferrell, 2016). It has also been noted by researchers internationally that there is a lack of understanding about the requirements of the learning spaces for pedagogy (McNeil & Borg, 2018). It is therefore important to gain an understanding of the specific requirements of the design learning spaces, to meet the pedagogic needs of those using the space.

Within the UK in 2012, there was an increase in the University fees (Department for Business, 2010). This has had an impact on the educational landscape, along with an increased focus on student satisfaction through the National Student Survey (NSS) due to the introduction of the Teaching Excellence Framework (Higher Education Funding Council for England, 2016). Although these are UK centered metrics, this model of student experience is exportable and relevant to other countries who have similar metrics and is therefore internationally relevant. In fact, in a 2016 Horizon report (L. Johnson et al., 2016) exploring trends in Higher Education it was highlighted that a mid-term plan is to redesign learning spaces.

With a rise in property expenditure and higher expectations, there is a need to re-imagine university spaces to ensure the environment contributes to students' positive experiences and

satisfaction (Neary et al., 2009). The physical learning space has been found to influence students' satisfaction with the university (Sami & Päivi, 2015) as well as supporting teaching (Perks, Orr, & Al-Omari, 2016). Therefore, it is crucial to identify how to support students' learning experiences with the facilities that HEIs provide.

This study focused on examining the specific requirements of students from the built environment discipline and presenting a framework developed through a multiphase research project to reflect the preferences of these students. The aim was to develop a framework to inform on the design of space considering the specific requirements and preference of students from the built environment discipline. The objectives cover three main areas important in the consideration of learning spaces; design, quality, community and individual difference is preferences. This research was conducted using a sequential exploratory mixed methods design based on a case study within a UK University in the Built Environment (BE) department. The current research comprises two studies, a qualitative and quantitative phase, including:

- Focus groups, to explore students' preferences to expand on the existing literature, which tend to portray designers and universities deliberation. These findings were then used to develop the questions for the second phase,
- A survey to identify the importance of the features in the learning space.

The results identified that students from the BE discipline have specific preferences in the design of the physical learning environment, that are not only distinct from those studying other subjects but also specific to their own learning needs. A framework was then developed that presents a comparison of preferences between subjects, with a second framework outlining BE students' specific requirements. This research presents an alternative perspective on the conceptualization and development of higher education learning spaces, considering the perspective of the main users of the space, that is, the students. Practical implications and recommendations are then presented identifying the practical outcomes for practitioners to use within the design of higher education learning environments.

Literature review

Recent estimates state that we spend 90% of our times indoors (Marques, Roque Ferreira, & Pitarma, 2018), therefore, the physical space has a significant impact on humans and our experience of the world. The physical space can impact ones cognitive ability (Stone, 2001), the structure of buildings can create a restorative environment (Lindal & Hartig, 2013) or they can illicit emotional responses (Vartanian et al., 2015). The physical space can also have an impact on the teaching and learning process, such as concentration, engagement and attendance (Granito & Santana, 2016), from both student and academic perspectives. Students require spaces that facilitate their learning (Jones, Sutcliffe, Bragg, & Harris, 2016), these adaptations can increase motivation (Adedokun, Parker, Henke, & Burgess, 2017), engagement and attention (Granito & Santana, 2016). The experiences one has with the space around them is important in ensuring positive educational experiences (Temple, 2009). Therefore, the environment has an important role to play in students' learning.

The consideration of design and development of workplaces has begun to be re-imagined (Usher, 2018), where people are put at the center of design considerations. Understanding of learning space in higher education lags behind, especially in supporting managerial decision making and providing technical design insights for effective spaces. Although research into the design of learning environments is gaining more attention (Perks et al., 2016), little is actually understood regarding what students perceive to be a quality learning space (Riley, 2013). Much of the research into the design of space in HEIs comes from the architects, estate/property managers or teaching staff, offering suggestions on pedagogical or technical grounds with little research seeking students' opinion (Cleveland & Fisher, 2014). To meet students' needs, it is therefore important to understand students' perceptions of their physical learning spaces.

Students in higher education are seeking opportunities to learn more about a subject of interest; therefore, it is important to understand the process of acquiring knowledge. Building on Sfards' (1998) 'two metaphors for learning,' Ellis and Goodyear (2016) posit three permutations of learning that can help to understand space. 'Learning as acquisition,' denotes learning as the entity of skills and knowledge that develops over time, it is not passively evolved but actively constructed (Beichner, 2014). This metaphor sees space as affording opportunity for the acquisition of students' knowledge and skills. 'Learning as participation,' which advocates learning as becoming a part of community and the sharing of experiences. Rather than just having knowledge, it highlights knowing as something experienced. This is reflected in theories of learning, such as community of practice theory, which describe groups engaged in learning (Arthur, 2016). Consequently, space should allow for participation in a social group. Finally, 'Learning as knowledge creation,' which highlights the creation of knowledge, ideas and practices (Ellis & Goodyear, 2016) and therefore space should allow for reconfiguration to suit specific learning at that time.

Features to Consider in Learning Space Design

Currently there is a lack of consistency in the design of learning spaces; therefore, research should identify students' specific requirements from their own perspective. Spaces should encourage and develop independence, and allow for social interaction (Augustin, 2009). These factors are even more critical in HEIs, as the buildings not only have to be functional but also offer self- worth to each student (Young, Green, Roehrich-Patrick, Joseph, & Gibson, 2003). With traditional conceptions of learning taking place around the traditional lecture hall, advancements in understanding identify that learning takes place in an assortment of places the university offers (C. Johnson & Lomas, 2005). Non-classroom spaces are also important for university students (Altimare & Sheridan, 2016) as well as informal social spaces to allow for social and learning conversations (Harrop & Turpin, 2013), technology (Lomas & Oblinger, 2006), classroom layout (Smith, 2017) and virtual learning spaces (O' Shea, Stone, & Delahunty, 2015). Although research highlights the importance of the physical space in the learning experiences of students, the conversation regarding a holistic understanding of appropriate learning spaces, a student-centered perspective is still limited.

Research still fails to inform on actual design processes (Rullman & Van den Kieboom, 2012) and doesn't provide a framework under which university property developers can ascertain

students' requirements. To this end, research has suggested that an interdisciplinary approach could be taken to consider the interaction of students and their physical space and the 're-framing' of issues (Cleveland & Fisher, 2014). It has been concluded that further work should be conducted to explore the space preferences of students and additionally, whether there are specific preferences from groups of students (Beckers, van der Voordt, & Dewulf, 2016). This research aims to fil this gap in research to identify and develop a specific framework for the design of HEIs.

There is a diverse range of people who both work and learn on University sites, with the main beneficiaries being students from a range of backgrounds. Individual difference literature maintains that people vary on a range of psychological characteristics, which therefore affects behavior, attitudes and preferences (Axelsson, 2007; Sagioglou & Greitemeyer, 2016). Individual differences have also been found to influence how students learn (Harfield, Panko, Davies, & Kenley, 2007). Pawlowska, Westerman, Bergman, and Huelsman (2014) identified a difference in personality traits and classroom environment preferences, which may also affect where individuals prefer to sit of work (Ackerman, Chamorro-Premuzic, & Furnham, 2011). Moreover, research has found that there are individual differences in personality profiles between students from difference subjects (Wilson & Cotgrave, 2016), which may consequently influence their perceptions of the environment. Due to individual differences, it may be important to consider how this affects preferences of learning spaces design, to understand how to best facilitate students' learning. By understanding these specific requirements, we can ensure that the design and management of each space encourages and engages students in their learning throughout their time at university.

Context of Built Environment Students

Built environment students study a range of subject from construction to real estate management. Students who enter into built environment education have clear goals, with the expectation that they will, after graduating seek graduate level positions within their chosen fields (Cross, 2016). Therefore students are far more aware of the investment they make, wanting to insure this is done in the correct institution (Ramsden, 2008). Although this literature predates the rise in fees within the UK, this research is paramount as students are now expecting more from the fees they pay. Built environment students are different from those from other academic disciplines with personal and professional development highly important (Lamond, Proverbs, & Wood, 2013). With a highly industry focused teaching structure targeting specific skills, students will require to leave university with the required tools to start their professional roles (Cross, 2016). Additionally BE students have been found to have a specific learning style (Harfield et al., 2007; Tucker, 2007), concluding that to support this learning style, classrooms would have to support this. The learning environment has also been found to be highly important in BE students' satisfaction in university (Poon, 2017). This research has identified that there is a need to consider the learning space when attending to students' satisfaction in HEIs. Therefore, this research specifically examines the requirements of students from the built environment to outline and identify how space can be designed and developed with their individual preferences in mind.

Research Methodology

The aim of this research was to develop a framework for the design of HEIs considering students' specific requirements from a BE student's perspective. The case study approach is appropriate when the examination of industries that are complex organizations and businesses (Proverbs, 2008), such as HEIs which have a diversity of institutions and internally have a diversity of student profiles. A case study is research that involves one or more 'cases' within a setting (Creswell, 2013). Although there is opportunity to conduct either single or multiple cases, Yin (2014) identifies that a single, 'instrumental' case can be used as a 'typical' case. This therefore allows generalizations to be drawn about a concept (Creswell, 2013). This single case study research was based on a representative case study of a University in the North West of England, UK, which is representative of HEIs with a similar make up, multi campus, based in an urban setting. The buildings that BE students occupy are part of a city campus, with the main building being develop in the 1960's. At the time of the research, there was limited internal refurbishment with one main social area in the immediate vicinity and some external refurbishment recently undertaken. BE students have lessons in a variety of spaces across this part of the campus. The BE school explored within this case study consists of the courses; real estate management, construction management, quantity surveying, building surveying, facilities management architectural technology, architectural engineering and building services engineering. The total student population across the undergraduate and postgraduate programme portfolio is circa 1000.

A mixed methodology design was adopted which allowed the collection of both qualitative and quantitative data (Morse, 2010). This allowed for the measurement and factorization of features but also the exploration of students' perceptions and preferences of the physical space. The studies in this research were conducted with a sample of students at an undergraduate level to identify their specific preferences in the design of their learning spaces.

Phase 1

The first phase of the research involved qualitative focus groups, aimed to explore students' experiences and perceptions of the learning space to explore students' requirements. This phase was used to inform the development of a questionnaire to identify specific factors of the learning environment that students identify as important. As identified through the literature review there is little understanding regarding students' specific requirements of their learning space, therefore the focus groups sought to understand student's preferences as opposed to interpretations of their preferences through outside bodies. Questions were asked in the focus group around the learning space, community and quality, with photo vignettes (Ray & Smith, 2012) used to support and focus the discussion on the physical learning space. It was important that the focus groups included a diverse range of students but were also balanced of heterogeneous and homogenous groups (Finch & Lewis, 2003); therefore, students from different levels of study were sampled. Two focus groups were conducted with students from the built environment, one consisted of two participants (18 minutes), with the second focus group consisting ten participants (56 minutes). It was aimed that the focus groups should contain 6-8 participants (Bryman, 2016); however, this was not achieved with one group having just two participants. Although, when it came to the analysis this was rich in data from the discussion, therefore, still provided a valuable

insight into BE students' thoughts. Additionally, the focus group data was used to develop the questions for the questionnaire and not used as the sole data point. The focus groups consisted of students from a range of disciplines within the BE, including building surveying, real estate management, and quantity surveying undergraduate degree programmes. The focus groups were conducted using the process of scene setting and ground rules, introductions, opening topic (using vignettes to provide context), discussions and end of discussion proposed by Finch and Lewis (2003). Questions such as, 'what elements of the physical learning environment are important to you?' were used to explore students' perceptions and preferences of their physical learning environments. This data was analysed by using thematic analysis (Braun & Clarke, 2006) to identify key themes and sub-themes that students identified as salient in their physical learning environments. This approach was used as it is a flexible approach that allows for the identification of patterns in responses in the data.

Phase 2

The findings from the focus groups and previous literature were synthesized into a questionnaire to identify the important factors in the design of learning space for students including, most importantly, the identification of the relationship between the subject choice and their preferences from the physical learning space. The questionnaire was constructed in two sections, one with questions covering quality of the physical space and the other asking questions related to features that develop sense of community. The questionnaire used a 5 Point Likert scale (Easterby-Smith, Thorpe, & Jackson, 2012) for students to rate features as 'unimportant' to 'very important.' The section of quality was developed around three features of the environment modified from the design quality indicator (Gann, Salter, & Whyte, 2003), build, functionality and the environment. The community section has features such as 'group workspaces', 'students union' and 'social spaces.' These findings were then analyzed together to identify features that students perceive as most important in their learning spaces. This research was part of a larger research project on learning spaces, with 221 completed questionnaires collected from students across the university, from four different subject areas; however, this research will present the findings from BE students. 79 Built Environment students completed the questionnaire, with 75% male and 25% female participating, An initial framework was then developed through an integration processes. Data analysis was conducted using SPSS. Factor analysis was conducted, which is a data reduction technique (Field, 2013) to reduce the number of observed items into correlated factors. This was done to identify key feature of the learning space.

Findings

Phase 1- Focus Group Analysis

Thematic analysis of the focus groups identified features of the learning spaces that are important for students generally. The research identified that student considered the features 'operations', 'design,' 'facilities,' 'rooms', 'environment' and 'cosmetics' important in their perceptions of a quality learning space. The features identified as being important to students for the concept of community were 'environment,' 'identify with space,' 'layout,' 'sense of belonging,' 'ability to socialize' and 'workspaces'. This discussion was used to inform the development of the

subsequent survey. Analysis was then undertaken to identify the specific requirements of students of the BE to develop the discipline specific framework.

Phase 2- Questionnaire Analysis

To begin, analysis of descriptive analysis was conducted to identify BE students' ratings of the features of the learning space. This demonstrated that BE students appeared to rate features associated with access to the appropriate equipment and working areas as important. For example, resources and technology and the workings of the building such as, cleanliness and comfort were more important. The least important features were around view, finish of design and aesthetics.

Figure 1 Built environment student preferences

Factor Analysis

The aim of this research was to develop a framework of the design of learning space that supports students' learning experiences by understanding the influences of satisfaction on their perceptions of the environment, specifically for students studying within BE. To identify what factors are important in the design from a student's perspective it was first important to reduce the items into factors to support with the identification of design process. This analysis was conducted on the entire student set. Later analysis was then conducted using the factors outlined below to identify BE students' specific preferences.

Exploratory factor analysis was conducted (Field, 2013). The data met the criteria for the adequacy of the sampling for the analysis KMO=.89, and Bartletts Test of sphericity $p<0.001$ (Field, 2013). After a review of the scree plot and examination of the eigenvalues (Henson & Roberts, 2006), it was decided that 8 factors should be obtained. Combined these components explained 46.1% of the variance.

Table 1 displays the components found through a factor analysis conducted to examine features of the learning space. Eight components were found that were distinct from each other. The components were named using the theory identified in the previous phases of research within this project and knowledge of the current literature.

Table 1 Factor analysis of learning space features

The components found were: 'integrated spaces,' 'layout,' 'aesthetics,' 'convenient workspaces,' 'access to resources,' 'identity,' 'sense' and environment'. These components identify the features that students require to enhance their satisfaction of the learning space and their learning experiences within that space. Kruskal-Wallis analysis was also conducted to identify if there were differences between subject cohorts and factors of the learning space. Differences in ratings were found for 'aesthetics' ($\chi^2(3)11.50$, $P<0.05$), 'facilities' ($\chi^2(3)8.20$, $P<0.05$), 'sense' ($\chi^2(3)9.17$, $P<0.05$) and 'environment' ($\chi^2(3)10.42$, $P<0.05$).

Framework Development

Framework for Students Studying Built Environment Subjects

The research was then developed into a subject specific framework for students of the BE. This framework was developed through the evaluation of the mean scores and focus group discussion to identify and explore students most important requirements and the rationale behind these preferences. This model represents four phases for the design considerations of students within the built environment (see Figure 2):

- Phase 1, features that have been found to be consistent between subjects studied,
- Phase 2, features that are still highly important to students and have similarities with each other but do change according to the subject and would need to be considered for each different school,
- Phase 3, this is where most of the differences are seen in preferences; therefore, this phase should be focused upon to ensure the space meets the student specific requirements,
- Phase 4, noteworthy to consider; however, least important features for BE students.

Figure 2 - Built Environment design framework

Phase 1

Access to Resources

Technology is important for students in general, but BE students noted; *"access to technology just because when we do our group work… and you need to research on the internet so that is important too."* Technology for students to be able to communicate with each other is important. This may be due to the lesson format that students have, working in groups; therefore, considering the pedagogic requirements is important in the design considerations. Additionally, with the integration of Building Information Modelling (BIM) (Zhao, McCoy, Bulbul, Fiori, & Nikkhoo, 2015) and Virtual Reality (Glick, Porter, & Smith, 2012; Irizarry, Gheisari, Zolfagharian, & Meadati, 2013) in to the profession, access to technology is important to consider. Even with long standing technology, students note that it is important that this is freely available, *"with our work we use a lot of CAD [computer aided design] software."* This is especially important for BE students, noting they would like more integrated into their teaching (Harfield et al., 2007), with the integration of learning technologies found to increase student motivation (Vassigh et al., 2018). Therefore, considering accessibility of these resources is crucial to the space for BE students.

Convenient Workspaces

Having convenient workspaces is also highly important, one student noted, *"I think there should be some areas where you can go if you want be on your own and do your work"*. Although this is relevant for all students, it is important to note that it is still integral to the suitable design of the

learning spaces. Workspaces that allow accessible, private or quiet spaces allow students to pick up their work after lectures and continue. By keeping students on site to study, they are more likely to continue with their work rather than getting distracted by everything else they have to do, as they have been found to face numerous academic – life balancing issues (Sunidijo & Kamardeen, 2018). To support this it was suggested that we should incorporate *"space [where there is]… sofas and a table in the middle and there [are] just computers you could just go to."* These spaces can therefore, be flexible enabling students to carry out a range of tasks on campus, alone or with others.

Phase 2

Environment

Factors such as lighting and temperature control were rated as important. This factor is important for the comfort of the space, "*the temperature can become an issue*", noting, *"it's not comfortable it's either too hot or too cold".* The lighting and brightness of the environment is also paramount to the experience of comfort in the environment. Although this may be a specific issue related to the case, the need considering environmental comfort is supported by empirical research in many situations (Bluyssen, Aries, & van Dommelen, 2011; Haverinen-Shaughnessy, Shaughnessy, Cole, Toyinbo, & Moschandreas, 2015; Hwang, Lin, & Kuo, 2006). Hoque and Weil (2016) found through a series of building comfort experiments that those who experience thermal discomfort performed worse academically. Additionally, experimental research also found that the combined effects of light sound and temperature impacts students mood and learning capabilities (Marchand, Nardi, Reynolds, & Pamoukov, 2014). Consequently, the environmental comfort within learning spaces appears to be an important factor to consider.

Layout

The layout of the learning space should be considered, ensuring spaces are open and spacious, should also be easily accessible and easy to way find, supported by clear signage. Positively, for this case space were considered good because *"it's quite open it's got quite open spaces."* However, spaces were not looked favorably upon if they are *"compact, small spaces, narrow spaces".* Although it is noted that spaces 'tucked' away can be useful, *"I think for a quality space you have got to have both open areas and closed areas".* Wayfinding and signage is particularly important to consider for BE students. Similarly, seating arrangements (Douglas & Gifford, 2001) and classrooms layouts (Temple, 2009) have been found to be important factors in students' perceptions on the environment. However, an interesting finding of the research was the annoyance demonstrated by the students about the inability to find their way round the university, to the correct classrooms or to their intended destination. It was suggested that this impacted their sense of belonging.

Phase 3

Sense

Sense refers to the feeling that the environment instils in the students. This is that the environment is a motivating place to work, that it is welcoming but also provided a sense of safety and security for the students. A positive working environment was said to be conducive to learning. A student noted, a bad environment *"...makes you tense up it doesn't make you feel like I will go in and get my work done and make you feel positive straight away when you walk in."* With another stating, if a space is *"all dark and dingy it just not nice, not conducive to learning I don't think."* By making welcoming environments a students noted *"its nice place to be in because they obviously think we want people to come in."* therefore, they are more likely to use the space. Motivating spaces have said to be 'easy and pleasurable' places to be (JISC, 2006, pg.4) and are important for higher education spaces. They can be spaces that have easy access to what a student's requires, such as wireless in social spaces or the smell of coffee from a good coffer shop (JISC, 2006). They motivate students to want to learn in these spaces, whilst making students feel safe and comfortable.

Integrated Spaces

Integrated spaces for BE students refers to the mix of work and social space, the flexibility of the space and the ability to have contact with staff. Additionally BE students noted that a 'common room', a specific learning/social space for their subject group is preferable, a space for *"each built environment, law, business, whatever should have their own [space]."* This supports previous research where it was identified that BE students like to work with others, however, not outside of their subject (Farrow, Liu, & Tatum, 2011). Having flexible workspaces that are *"multi-functional, so you have got space for a quiet zone but if you wanted it, you also have space for a meeting and so you can always mix it about."* This gives students the ability to individually work but to also learn with their peers which has been found to be a preference in their learning style (Harfield et al., 2007). This may also be why students choose to go into the BE field as it allows them to work socially.

Similarly, to this social spaces should be considered, as one student noted, *"it's not all about work, you're here to socialise so I don't think there are enough social spaces."* In addition, there should be space in the learning space for breaks *"there is never enough places to sit and have your dinner."* Finally contact with staff is vitally important for BE students, with one student noting,*"that sense of community with your lecturers, not just you fellow students, is important like integration I don't know if other universities encourage communal areas with lecturers as well".* This preference has been identified on several occasions that BE students "demand easy contact with tutors" (Farrow et al., 2011, pg. 123; Harfield et al., 2007).

Phase 4

Aesthetics

This factor is generally not rated highly for all students. This factor relates to the aesthetics of the inside and outside of the building and the fit and finish of the space. Interests in aesthetics has been found to be negatively related to those in scientific disciplines (McManus & Furnham, 2006), which may explain the low rating. Although this is not rated highly, students have identified that a motivation for working at home is due to a combination of comfort and

aesthetics (Beckers et al., 2016). In the current research, students confirmed this by identifying that it was important to work in *"somewhere that looks nice."* If this is not the case that I will impact students decisions to say with one student strongly insisting this, *"I would say if it looks nice to me I am going to use it, if it just looks horrible and uninviting I am not going there."* Therefore, if we want to enable students to study at university it is important that we consider this in our design process. The façade also appears to feature in BE students' perceptions, *"aesthetically if it looked good I think, I am looking at it form and architectural perspective… it is probably more conducive to a learning environment."* A meta-analysis (Gunter & Shao, 2016) supports this, identifying that the building condition is related to academic performance, even at a weak effect size. The façade of the building also appears to influence the perceptions of the quality of the university. Consequently, it is important to ensure that the outside meets the expectations of the students. This may be because *"it does look dated so you would assume that the inside of the building is dated as well"*. The building condition therefore may lead to preconceived ideas about the quality of teaching and learning.

Identity

Finally, the identity is the last consideration in this phase; this is how they experience a cohort identity and sense of community. Students like to feel identity with their cohort and university with one student noting they were disappointed that they felt they *"have got no identity"*. Although this factor was the least important for BE students it perhaps should be a higher consideration in the design process. Higher levels of depression, anxiety and stress has been identified in BE students (Sunidijo & Kamardeen, 2018), which can lead to a higher level of attrition. Therefore, by stimulating community this can reduce feelings of loneliness and help counteract these higher levels of attrition (Baskin, Wampold, Quintana, & Enright, 2010). A sense of identity appears to be important to students, for both personal and academic development (Temple, 2009). Subsequently, it is important to consider how develop that sense of BE environment identity in the development of academic spaces.

Discussion and Conclusions

To provide high quality education, it is important that we have high quality learning spaces. With research exploring the individual requirements of students in their learning (Harrop & Turpin, 2013; Vinales, 2015), noting that there is a need to meet these individual needs through the teaching and learning that takes place. Research has identified that it is also important to consider these needs in the design of learning spaces (Pawlowska et al., 2014), as high quality learning spaces have positive effects on achievement (Gunter & Shao, 2016) and students' experiences (Kariippanon, Cliff, Lancaster, Okely, & Parrish, 2017). This research suggests that the individual needs of the students be considered when designing academic spaces.

The aim of this research was to develop a framework to inform on the design of space considering the specific requirements and preference of students from the built environment discipline. This research has identified and outlined specific features of the environment that students, and specifically BE students, identified as being important to consider when developing and managing spaces for them to learn. For BE students this research is highly beneficial as it

has been reported they would like their course to be taught at a "destination school" (Farrow et al., 2011, pg.123). With a general higher education move to online learning, due to the professional and hands on nature (Lamond et al., 2013) of BE courses, making this option far less appealing, it is important to develop suitable physical learning spaces. This research also supports what is known about BE students and their pedagogical learning experience moving away from traditional lectures, and needing to provide increased opportunity to interact with staff and the use of technology (Cross, 2016).

The ultimate goal of understanding students' requirements of the learning space is to encourage and enable effective learning. Achieving spaces that allow this, requires a holistic understanding of students' preferences, which this research hopes to contribute too. This research identifies eight key areas of attention; convenient workspaces, access to resources, environment, layout, sense, integrated spaces, aesthetics and identity. Specific areas that could be vital in integrating these into design and refurbishment of spaces, could be considering spaces such as home buildings. These spaces could be areas that are specific for BE students, that allow for specific design considerations. This would allow for suitable and accessible work areas and places that students can create and engage in a way that would most suit their needs (JISC, 2006). What this research does highlight is that students are aware of, and seek out features in their learning spaces that meet their learning needs; therefore consulting these key stakeholders in refurbishment or design processes should be co-ordinated in development strategy.

Overall, this research has identified that BE students do have specific preferences in their learning spaces which therefore should be considered in the design. Furthermore a framework for the bespoke design of BE students' learning spaces has been presented that outlines key factors that students find important in their learning spaces, which can be used as a guide for future strategy or use as a catalyst for discussion and development partnerships.

Limitations and Future Research

This research found some emergent differences in preferences for features of the learning spaces between difference disciplines; however, the research could be expanded further. Although, the intent of the research was focused on students' specific requirements in their learning space, there may be some important pedagogical considerations that are missing by speaking only to students. Therefore, to develop the research could be extended to speak to those who teach in the built environment, and therefore identify within the framework what specific aspects are important in terms of the teaching and learning required in built environment courses.
A second limitation of this research is the small size and limited number of focus groups. The focus groups were conducted at the end of lessons in the middle of the second semester. This is thought to have impacted on the sampling of participants for this research. Future research should look to expand on this qualitative data to explore in more depth students' experiences and the meaning that they give to their higher education learning environments. Another limitation of this research was the use of an instrumental case, although this was used as an exemplar of other institutions students who attend the specific HEI may not provide a complete overview of the population. Furthermore, the spaces that the students currently occupy may have an impact on their perceptions and preferences on space. Therefore, to fully understand the preferences of BE students it would be beneficial to extend this research into other institutions considering factors

such as age of institution, location and campus type. Additionally, this research only viewed built environment students as one subject discipline, it did not look to analyze the differences within this discipline. Further research could take a deeper look and examine specific subject groups within the built environment discipline.

Originality/ Value

Although small scale research projects, such as the beacon project at Sheffield Hallam University, (McDonald & Glover, 2016) take into consideration students' perceptions and use of space, this research is in its infancy and presently research rarely informs on the design processes (Rullman & Van den Kieboom, 2012). Therefore, this research adds to this growing direction of research valuing the importance of students' specific requirements. Specifically research has not yet considered subject specific requirements of the learning space. The current research provides a new perspective by exploring students own perspectives and individual requirements. To further ground this research within the context of teaching and learning research it would be beneficial to explore the extent to which students' requirements are due to the needs of the curriculum. Therefore, this research could have a beneficial impact on how pedagogy is enacted within the learning space. This research could have beneficial practical implications for HEIs both to the students' experiences whilst within university but the commercial implications of attracting new students to the university. Additionally, by considering what students actually need, this research could have beneficial economic impact for the university by supporting appropriate and practical design considerations, reducing the need for redevelopment or refurbishment.

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