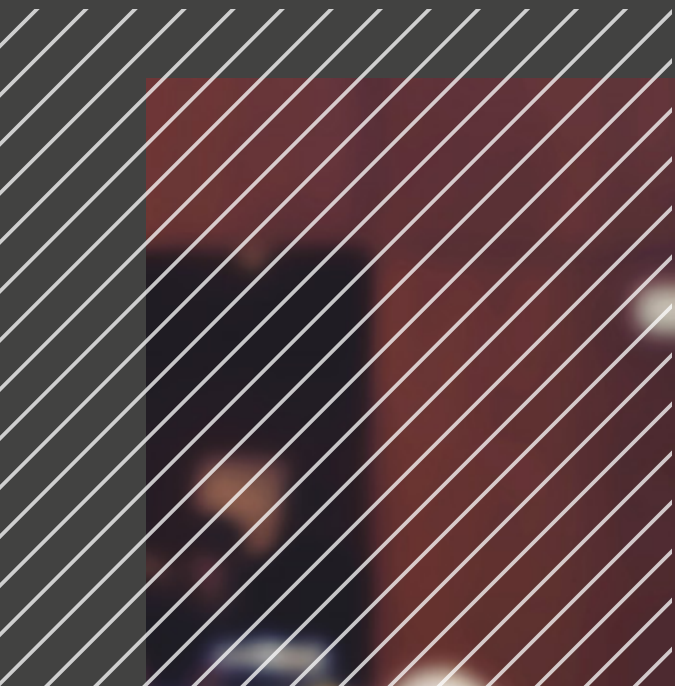

THE FUTURE OF LEARNING ENVIRONMENTS



ACKNOWLEDGEMENTS

This document is authored by Hiral Patel. Many thanks to Caroline Paradise for her valuable feedback and constructive discussions throughout the project.

The project advisory group provided invaluable support; the advisory group included Hans Haenlein, Fiona Duggan, Sharon Wright, Ruth Hynes, Rupert Cook, Jonas Nordquist, Ian Caldwell, Ginny Gibson, Martin Hamilton, Despina Katsikakis, Helen Groves, Jane Shaddick and Simon Eden.



The Higher Education Design Quality Forum is an independent organisation which exists to promote high quality design quality across university campuses, buildings and facilities, in the knowledge that this enhances teaching, learning, research and public engagement.

Research is a core component of the charity's activities, supporting the higher education sector to create, maintain and deliver high quality environments through greater understanding and knowledge of how they affect the people that use them. Supporting early career researchers within institutions across UK & Europe to deliver research projects that address relevant issues relating to design of the built environment within the sector is an important component part of our long term strategy.

This study is a part of an ongoing exploration of the design and impact of learning environments within the Higher Education sector, focusing on the connection between curriculum and the physical learning space. Working with Hiral Patel from University of Reading/Exigo Consultancy has allowed us to examine this relationship from the perspective of the different stakeholders and we look forward to seeing how this project develops as we work through a series of pilot studies. Many thanks to Hiral and the wider HEDQF Research Group for the effort and enthusiasm for this project.

Dr Caroline Paradise
Co-chair HEDQF Research Group

EXECUTIVE SUMMARY

This project was commissioned by HEDQF in order to:

- identify key themes for research into future learning environments in university estates and
- devise a research methodology which can be adopted by HEDQF to explore similar research topics

The work was carried out by means of workshops, discussions and written submissions involving an advisory group and a literature review.

KEY THEMES

Six topics were identified as being of importance. The topics, and indicative issues for further research, are:

1. **Higher education models in the UK** - critique of the UK model; international comparisons; space implications of learning models such as new apprenticeships and online learning.
2. **Impact of AI and robotics on learning methods and learning spaces** - curriculum implications of labour market, digital capability needs and learner exposure to immersive environments from an early age.
3. **Shifting focus from teaching to learning** - implications for design of, and access to, space where students are partners in a learning community and co-creators of knowledge.
4. **Learning modes and methods** - learning as a continuum across formal/informal spaces both on and off campus; underlying principles of designing learning activities and their space implications.
5. **Diversity within the HE sector** - difference relating to nature of the academic institution or discipline; how students' personal characteristics affect their experience of the learning journey.

6. **Valuing higher education and its physical environments** - more holistic understanding of success and value in relation to how space is experienced and how it impacts wider communities.

RESEARCH METHODOLOGY

The 'engaged scholarship' methodology has been developed for this project. The rationale for this methodology was threefold: to shape the research in relevance to its audiences, to bring multiple perspectives and frameworks into the discussion, and to make the research process a co-learning experience.

'Learning-space compass' is a framework and toolkit devised with the purpose of articulating the relationship between learning activities and learning spaces. It aims to provide a shared vocabulary to help diverse stakeholders understand and discuss learning needs. An accompanying report describes the framework and provides guidance on how to integrate it into the different stages of learning space project.

This framework addresses a fundamental and overarching theme of articulating the relationship between learning activities and learning spaces. In turn, the framework addresses the issues raised in following research themes identified in this project: Learning modes and methods (4), Shifting focus from teaching to learning (3) and Impact of AI and robotics on learning methods and learning spaces (2). Valuing higher education and its physical environments (6)

NEXT STEPS

We are seeking pilot projects to test out the 'learning-space compass'. Lessons learned from the pilots will be fed back into the development of the framework/toolkit as part of a continuous learning process. We will organise an annual learning event to share findings from pilot projects and scope themes for further research.



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SECTION 1 ABOUT THE PROJECT

HEDQF COMMISSIONED A RESEARCH PROJECT TO SCOPE KEY RESEARCH THEMES PERTAINING TO THE FUTURE LEARNING ENVIRONMENTS IN UNIVERSITY ESTATES.

The project had two objectives. Firstly, the project aimed to identify pathways for further research including future empirical studies, which can be promoted by HEDQF. Secondly, the aim of this project was to devise a methodology, which can be adopted by HEDQF to explore similar research topics.

There are three outcomes of this project.

Firstly, six key themes pertaining to the future of learning environments have been identified for further research. These themes might be promoted by HEDQF as part of their research strategy.

Secondly, a participative methodology, based on the ideas of engaged scholarship, have been formulated and tested during this project. This methodology might be adopted for future research projects and enable to tackle challenges faced by the HE sector through engaging practitioners and academics.

The third outcome is the 'learning-space compass' framework and toolkit. Aligning curriculum and space has been the key focus during the latter part of this project. The 'learning-space compass' consists of a conceptual framework which links different modes of learning with physical space. A toolkit is also developed to assist in the practical implementation of this framework. The next step involves testing the framework through pilot projects.



SECTION 2 PROJECT METHODOLOGY

INTRODUCTION – ENGAGED SCHOLARSHIP

The methodological approach adopted for this project relates to the ‘engaged scholarship’ methodology proposed by Ven (2007), who describes it as:

“Engaged scholarship is defined as a participative form of research for obtaining the different perspectives of key stakeholders (researchers, users, clients, sponsors, and practitioners) in studying complex problems. By involving others and leveraging their different kinds of knowledge, the engaged scholarship can produce knowledge that is more penetrating and insightful than when scholars or practitioners work on the problems alone.” (p.9)

The rationale for this methodology was threefold: to shape the research in relevance to its audiences, to bring multiple perspectives and frameworks into the discussion, and to make the research process a co-learning experience for those involved in the advisory group. Through engagement with the project advisory group, this participative methodology was mobilised to scope the boundaries of the project and ensure the validity of the findings.

THE ADVISORY GROUP

The advisory group was formed for this project to bring multiple frames of reference into the discussion. The advisory group played a key role in framing the research problem and reviewing the conceptual framework. The advisory group was consulted through workshops, worksheets and discussions at different stages of the project.

At the beginning of the project, the advisory group was proposed to involve experts from different stakeholder units, as listed below. However, during the course of the project, it was not possible to consult certain stakeholder units.

A note is made below for the stakeholders which may be consulted during the future work following on from this project.

- **Higher education built environment specialist professionals**
- **Higher education built environment research experts**
- **University estates professionals**
- **Higher education teaching and learning experts**
- **Higher education student bodies** (to be consulted)
- **Higher education policy experts**
- **Higher education senior management team** (to be consulted)
- **Built environment research experts**
- **Tech, financial and pharma industry specialist professionals**
- **Urban design research experts** (to be consulted)
- **Educationalists** (primary/secondary education)

IMPLEMENTING THE ENGAGED SCHOLARSHIP METHODOLOGY

Ven (2007) identifies four stages of engaged scholarship methodology namely problem formulation, theory building, research design and problem solving. The work undertaken in this project primarily focused on problem formulation and theory building stages, which are discussed in detail below.

Figure 1 describes the methodological stages of this project. In the problem formulation stage, six key themes were identified which articulate the research problems facing the future of learning environments. Theory building has been carried out for a particular strand cutting across these themes – linking learning with space. The theory building process has thus led to the development of ‘learning-space compass’. Future work beyond this project can focus on research design for testing ‘learning-space compass’ and solving the problem of aligning learning with space.

PROBLEM FORMULATION STAGE

The first workshop was an essential part of the problem definition for the project. The purpose of this workshop was to articulate the research problems facing future learning environments and curate an emerging bibliography of sources and empirical studies for further review. Rather than assuming a research problem, Workshop 1 was organised to reflect on the nature of research questions which might be pursued. The participants for Workshop 1 are listed in Table 1.

The point of departure for the workshop was a list of scoping themes which had been identified through conversations with Caroline Paradise (HEDQF Research Group Chair), Hiral Patel’s ongoing research and from the presentations at HEDQF 2018 conference. The Advisory Group members were invited to respond to the initial scoping themes through worksheets. The worksheets responses were analysed to identify discussion themes for the workshop.

Through the workshop, six key themes were identified which articulate the research problems facing the future of learning environments. These themes are discussed in Section 3 of this report.

THEORY BUILDING STAGE

The findings from the first workshop were further discussed at the HEDQF Research Group meeting on 28th September 2018. The need for a shared language between different HE stakeholder groups was considered as a key issue. It was further suggested that this project can aim towards making an impact at the institutional policy level.

Following the meeting, discussions were conducted with Caroline Paradise to further articulate the research problem. Considering the foregoing discussions, it was agreed to focus on the fundamental and underexplored issue of linking learning to the physical space.

The purpose of the second workshop was to test concepts and methods to link learning methods, learners and physical space. The 'learning-space compass' framework was proposed to achieve a dialogue between various stakeholders involved in designing and using learning spaces. The anticipated outcome of this workshop was to test the relevance and viability of 'learning-space compass' for the design of learning spaces, by drawing on the expertise of the advisory group members. The participants for Workshop 2 are listed in Table 2.

A briefing paper outlining the proposed 'learning-space compass' framework was circulated to the workshop participants prior to the workshop. The workshop participants were suggested to prepare a response to the paper. In particular, the participants were encouraged to gather thoughts on the attributes linking curriculum and learning space. The workshop began with each participant identifying the key challenges when linking learning to the physical space. During the workshop, a role-play method was used to test the 'learning-space compass' framework to redesign a fictional course module and reflect on its spatial requirements.

Following the workshop, discussions were held with the advisory group members to develop the 'learning-space compass' toolkit which could be adopted for pilot projects.

FUTURE WORK - RESEARCH DESIGN AND PROBLEM SOLVING STAGES

For the next phase of this project, pilot projects are sought to test the ‘learning-space compass’. In order to promote continuous learning and development around the topic of linking space and curriculum, an extension to the engaged scholarship methodology is proposed (Figure 2).

This methodological phase involves collecting feedback from the pilot project and organising an annual learning event based on the project experiences. The outcomes from the learning event might feed into the framing of new research projects. Moreover, the lessons from the pilot projects should be captured through a continuous learning approach. Such an approach will allow continuous development and refinement of the framework/toolkit. A databank of pilot projects may also be curated to create a knowledge base for the framework/toolkit; however, considerations might be required in terms of ownership and access to such a databank. An annual event to share findings from pilot projects and scope themes for further research.

METHODOLOGICAL REFLECTIONS

Organising the workshops is a resource-intensive activity. Support is required in terms of venue, catering, communications and personnel help with scribing during the workshop. Resources for these tasks need to be built into the project plan.

Ethical protocols need to be developed for collecting data via worksheets and during the workshop. Particularly, an emphasis is required on obtaining informed consent for publishing the datasets. The informed consent would cover the whole data lifecycle including storing the data on the HEDQF repository and making it available for secondary analysis.

The schedule of the project may be developed to include the dissemination channels such as presentations, articles, workshops, events and events.

If the project aims to develop a toolkit or framework for practical implementation, pilot projects may be identified in parallel to the development of the framework/toolkit. This will allow the project partners and the research team to develop a shared understanding of the framework/toolkit.



SECTION 3 RESEARCH THEMES FOR FUTURE LEARNING ENVIRONMENTS

INTRODUCTION

Six research themes, as listed below, have been identified to develop our understanding of the future of the learning environments:

- Higher education models in the UK
- Impact of AI and robotics on learning methods and learning spaces
- Shifting focus from teaching to learning
- Learning modes and methods
- Diversity within the HE sector
- Valuing higher education and its physical environments

These themes are based on the discussions held at the two advisory group workshops as well as the outcomes from analysing worksheets completed by the advisory group. Based on these themes, research topics are suggested for further inquiry into the future of learning environments.

HIGHER EDUCATION MODELS IN THE UK

University education in the UK is historically rooted in the Oxbridge model. History of the creation of UK universities is very different from Europe.

During the workshop, a need for a total critique of the HE sector, with the emphasis on the experience and value of higher education, was suggested. Such a critique might be conducted through conceptualising learning in terms of ‘head, heart, hand’ model, rather than focusing on developing just the cognitive abilities.

POTENTIAL RESEARCH TOPICS

A historical study of the role of the university in the UK, critically reviewing the Oxbridge model in light of the current funding model of university education, is required.

This research can also compare the UK higher education model with that of other countries in Europe and beyond.

A comparative review of different models for higher education such as apprenticeships and MOOCs is required; such review can include a discussion on the implications for space resulting from these different models.

The history of how universities in the UK developed should consider the separation of skills-based trades from higher education. Young people go to universities as society has framed this expectation and there are no other options. Apprenticeships are making a comeback as an alternative model to university education. Apprenticeships now exist for a wider range of professional careers, in addition to traditional apprenticeship schemes. MOOCs, distance learning and other online options are providing a different way to access HE learning.

The role of the university also needs to be reviewed. The purpose of university education depends on disciplinary traditions. For instance, the university is seen as the custodian of knowledge for the medical profession. Universities are rich in knowledge but are severed in many silos.

Such research would also include an assessment of the socio-economic context of the UK. Economics forms the basis of how education is valued currently, which does not capture the value of higher education in a holistic manner. Constitutionally, the UK does not state the importance of lifelong education for all, and so it may not filter through in the policy and funding, and as a result, does not allow for free education. This has led to fee increases in recent years, which has been driving the competition between universities on the basis of monetary metrics of value.

IMPACT OF AI AND ROBOTICS ON LEARNING METHODS AND LEARNING SPACES

Artificial intelligence (AI) has been identified as one of the grand challenges in the UK Government's Industrial Strategy White Paper (HM Government, 2017). In particular, the paper suggests supporting collaboration between universities and businesses to develop training programmes, as well as to work with the industry to develop peoples' skills in AI applications through conversion courses and lifelong learning.

Moreover, the White Paper also lays the importance of collaboration between universities and industry for research and innovation (HM Government, 2017). An introduction of Knowledge Exchange Framework, alongside the Research Excellence Framework and the Teaching Excellence and Student Outcomes Framework, will benchmark how well universities are doing at fostering knowledge sharing and research commercialisation (p.79).

The connections between work and learning will become closer and developing lifelong learning skills in students will become critical. Doucet (2018) describes the trio of literacies, competencies and characters, as proposed by World Economic Forum and The Boston Consulting Group (pp.59-60); she asserts that these are foundational skills which the 21st-century classroom must develop within the students:

- **Literacies** – literacy and numeracy, scientific literacy, ICT literacy, financial literacy, cultural and civic literacy.
- **Competencies** – critical thinking, creativity, communication and collaboration.
- **Character** – persistence, adaptability, curiosity, initiative, leadership, social and cultural awareness.

The Jelly Bean campus model explores the key themes that need to be addressed to educate today's ten-year-olds (Makhzani and AUDE, 2018). The authors suggest that new ways of immersive and interactive teaching and learning will be required which utilise virtual reality technologies. Designing learning in immersive environments will require an understanding of the interaction between digital and physical environments and will also require changes in the design of digital tools and information provision.

The Jelly Bean campus model also suggests that partnering with different organisations will be necessary to effectively use the space. The boundaries between campus and non-campus will blur as students will have a seamless experience between working, learning and socialising.

POTENTIAL RESEARCH TOPICS

How will the developments in robotics and artificial intelligence influence the future of learning?

What developments will be required in curriculum design?

What kind of learning spaces will be required to deliver that curriculum and how will the existing learning spaces be adapted?

How do learning and working overlap throughout the life of an individual?

What are the implications of a lifelong learning perspective on university estates?

SHIFTING FOCUS FROM TEACHING TO LEARNING

There is a growing interest in universities to adopt student-centred teaching and learning. Such an approach requires a change in the role of a teacher from 'sage-on-stage' to the 'guide-on-side'.

The role of the teacher might change during a course. At initial stages, the teacher might be required to take a more prominent role. But as the students start owning the learning process, the teacher takes on the role of a guide or mentor. Co-creating the curriculum with students is a very risky uncertain process for teachers (Bovill, 2014). In such a scenario, teachers have to continue learning as well. The term 'learner' is to include both students and teachers. Teachers, while being constantly engaged in the pursuit of new knowledge, are thought of as more experienced learners. The student-tutor relationship could be described as a relationship between a less experienced learner and an experienced learner.

POTENTIAL RESEARCH TOPICS

What are the implications on the design of the learning space of student-centred learning approaches?

What are the implications of the design process for student-centred learning environments, particularly in terms of stakeholder engagement?

What are the implications on the management of buildings for student-centred learning environments, particularly in terms of timetabling and accessibility to spaces?

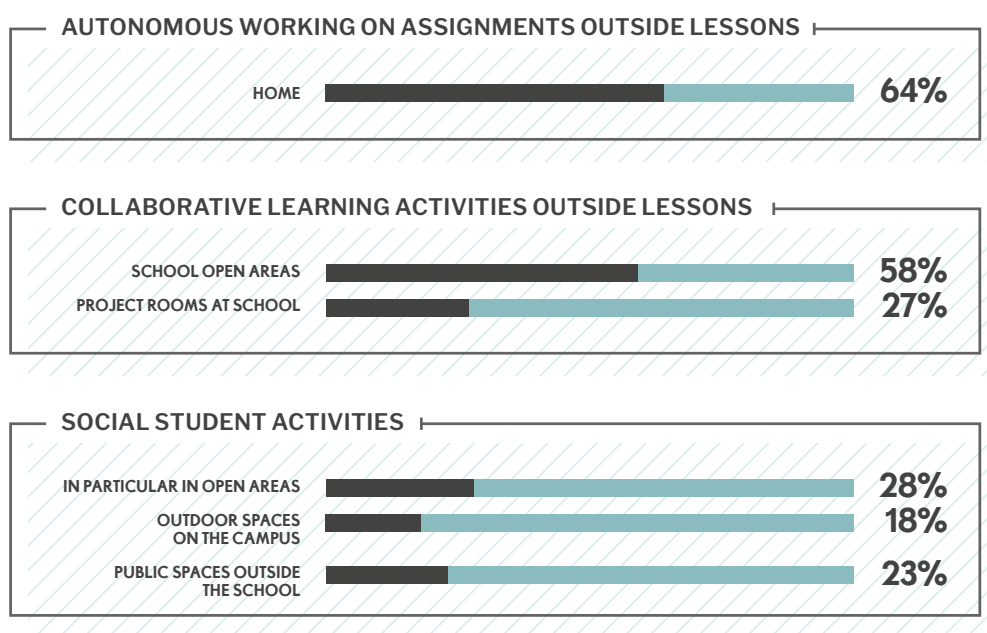
Student-centred learning also implicates rethinking access and ownership of spaces, and how to better share spaces with students. Particularly, further work is required in finding ways to share the state of art research facilities which are otherwise not accessible by students.

LEARNING MODES AND METHODS

Learning happens not just in the classroom, but also in wraparound spaces. HEDQF's (2019) research survey of full-time undergraduate students learning space preferences outside taught sessions suggests that most student respondents chose to study in the library or in their study bedroom.

The outcomes of this survey pose implications for the future provision of the university libraries as well as demand reflections from the student accommodation sector including Homes of Multiple Occupancy (HMOs). The learning experience of students is not restricted to the formal classroom. The learning experience is rather constituted of a wide array of spaces beyond the university campus. The findings from the HEDQF survey substantiates the need to connect learning spaces at different scales, an argument which has been made by Nordquist and Laing (2015).

van der Voordt (2016) discussed the usage of TU Delft BK City building by studying diaries of study activities of 52 business management students to understand student's preferences of study space. The study revealed the following patterns of usage:



GRAPHIC RECREATED WITH INFORMATION FROM VAN DER VOORDT (2016) STUDY

van der Voordt (2016) suggests that the main reason for studying at home were “vicinity (no need to travel), comfort, and personal control e.g. the freedom to combine learning activities with other activities.” On the other hand, the main reasons to study at university were “scheduled study activities at a particular place and social interaction”.

However, the preferences for study spaces are likely to differ between students from different disciplines and different levels of study (undergraduate, post-graduate, PhD). The study space preferences also depend on the availability of different types of spaces across the campus as well as at their residences. Many students are influenced by the rising cost of attending university and are choosing to study near their home and do not get to take part in the residential aspects of University life. The ways in which learners navigate and adapt physical spaces to suit their academic needs is an under-explored area.

In addition to the formal curriculum, the learning experience is also shaped by the hidden/informal curriculum. For instance, the experience of studying at Harvard Business School will also involve absorbing the cultural practices promoted/engendered by the School.

Knowledge creation is occurring at an increasing pace. There is a need to continually find new learning approaches and methods. The changing curriculum and ever-evolving knowledge and teaching and learning approaches is a challenge for designing learning spaces. A comparison of different learning methods is required as they are evolving very quickly and can require very different spaces. Rather than following fashion trends, it might be useful to articulate underlying principles of learning (such as dialogue, visualisation, peer learning) and link them to spatial configurations.

Attempting to design spaces for current learning requirements means these will be obsolete in the near future. Constant work is required to align learning spaces to learning methods and curriculum. Understanding the influence and interconnectedness between physical space and pedagogy is required. “Hardware vs software” offers one metaphor to explore the relationship between space and pedagogy; ‘software’ can be thought as pedagogic approaches and curriculum while ‘hardware’ might refer to the physical space and technological infrastructure (Nordquist and Laing, 2015).

POTENTIAL RESEARCH TOPICS

What is the relationship between the learning method and physical space?

Are learning space typologies dependent on the academic disciplines?

How to incorporate the discussions of learning methods in the learning environments design process?

How does the formal and informal curriculum relate to formal and informal learning spaces?

Which different kinds of spaces are entailed in the learning journeys of a student?

DIVERSITY WITHIN THE HE SECTOR

The diversity of higher education institutions

Universities differ in their focus and as a result grapple with different challenges. The differences might result due to their specialisms or the type of institution they are (Post1992, Russell group, private universities, further education institutions, etc.).

The diversity of academic disciplines

Disciplines might differ from each other due to their signature pedagogies. The disciplinary differences also include varied approaches to assessment as well as university-industry collaboration. Discipline-specific professional bodies play a major role in shaping the curriculum and assessment processes.

The diversity of students

Larkin, Nihill and Devlin (2014) have noted four dimensions of student diversity: education, dispositional, circumstantial and cultural. Thus, the experienced curriculum might vary between students due to such a diverse background. A better understanding of the diversity within the student body is required. Different student groups will access university education differently. With an emphasis on lifelong learning, students are likely to enter university education at different stages of their life. In the lifelong learning approach, various modes of learning might be adopted: learning for the love of learning, part-time students, CPD, professional routes, apprenticeships.

The diversity of time frames

The requirements for the learning environments of the future will be very different from those of near now. Different temporal horizons are at play for different stakeholders. Government policy changes are uncertain. For students, it may not be just their time at the university that matters, but also the relevance of the skills gained at the university during their career. University strategies may foresee up to 5-10 years in the future. A module convenor might be concerned with delivering a good quality learning experience to the students for given academic year. The university estates team need to keep the gap between best and worst of estates narrow. The estate department's budgets distinguish between funding for capital projects (shorter time frame) and business as usual (longer time frame). Further research is required to explore the implications of different temporal frames on the design and management of learning spaces.

The briefing process is critical in understanding how space enables learning. Thus, user engagement is the key to the future of education. It is important to assess what is actually done by both learners and teachers, and what they would like to do in the future. One approach to unpack learner diversity is to adopt the user research method of creating personas. The 'learning styles' approach, developed within learning theory literature, might be useful in some contexts. However, it can be critiqued as a reductionist approach.

Moreover, different stakeholders such as funders, staff, students and designers differently value space and its performance. Reflective practice is required to respond to the power dynamics of stakeholders; there is a concern that the brief can be dictated by the strongest voice. Moreover, developing a shared understanding is vital. For instance, the term ‘flexibility’ has very different meanings for different stakeholders. A shared language and a shared mental model is required to communicate with different stakeholder. Reaching a shared understanding is a process which requires time and collaboration opportunities between different stakeholders.

POTENTIAL RESEARCH TOPICS

Do existing learning space typologies take into account the institutional diversity within the UK?

How are current briefing processes addressing the diversity of students?

How can we investigate the learning journeys of students?

What are the learning space needs for a diverse student body?

How to evaluate the performance of learning spaces based on diverse student needs?

How can learning spaces become more flexible to address the pedagogic needs of different academic disciplines?

What are the implications of varied temporal frames of different stakeholders on the design and management of learning spaces?

VALUING HIGHER EDUCATION AND ITS PHYSICAL ENVIRONMENTS

The social value of higher education is in the development of the individual and society. Relationship with the community and the wider socio-economic system is an important function of higher education; this idea resonates with various presentations made during the HEDQF 2018 conference.

The challenge for universities is to demonstrate the social value to the local communities and beyond. The UPP Foundation Civic University Commission (2019) has presented a case for universities to be civic institutions in a manner that reflects the aspirations and needs of their local communities. The civic university framework engenders collaboration with local authorities, Local Economic Partnerships (LEPs) and NHS bodies. Such rethinking of a university’s role is likely to have implications for the university’s physical spaces, which requires further research.

Within universities, success tends to be measured differently by different stakeholders such as estates team, academic teams and students. Current university activities are influenced by metrics such as the National Students Survey and Research Excellence Framework. The metrics for space management in the universities favour efficiency in terms of space utilisation over effectiveness. However, the evaluation criteria for the impact of learning space on learning activities are under-explored. Shared language among different stakeholders becomes critical in establishing such evaluation criteria.

Post-occupancy evaluations (POE) need to be measured in relation to the project brief. POE should include an understanding of the briefing process for a particular project to ascertain whether a learning space has been successful. However, risk aversion attitudes can hinder uptake of POE.

To understand the impact of space on business objectives, lessons can be drawn from other sectors such as retail, hotel and healthcare sectors. Insights should be sought regarding how space standards are articulated with a particular focus on the relationship between chargeable space (cf. lectures/classrooms), backstage (cf. offices, support services) and the in-between/informal spaces (cf. atrium, social spaces, catering venues). In particular, further research is required in how student experience might be valued and associated with learning spaces. For this, lessons can be drawn from the retail and hotel sector as customer experience is of paramount importance for business success.

POTENTIAL RESEARCH TOPICS

How to evaluate learning space in relation to learning outcomes?

How is space valued and measured in different sectors, especially when it is treated as a commercial asset?

How do other sectors measure the success of space standards and what can we learn from these?

What is the impact of space on the university's success?

What is the impact of metrics and audit culture on the higher education sector?

What are the implications of rethinking of a university's civic role on design and management of its physical spaces?



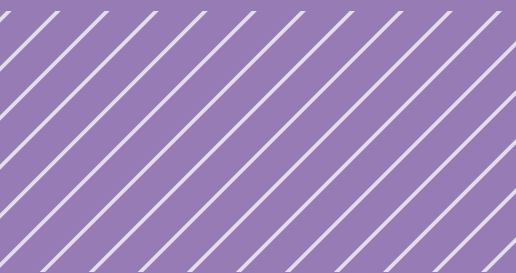
SECTION 4 LEARNING-SPACE COMPASS: RATIONALE

INTRODUCTION

From the discussions and workshops conducted as part of this project, the fundamental issue of articulating the relationship between learning activities and learning spaces was identified.

The 'learning-space compass' framework addresses the following research themes that were identified in previous section:

- **Learning modes and methods** – The framework maps different typologies of learning and assessment and develops a vocabulary to express modes of learning to a range of stakeholders.
- **Impact of AI and robotics on learning methods and learning spaces** – The framework is devised to prompt reflection on curriculum development in response to new challenges and relate the evolving curriculum to learning spaces.
- **Valuing higher education and its physical environments** – Through closely relating learning activities with learning spaces, the framework aims to reconceptualise how learning spaces are valued in relation to learning outcomes. The framework connects briefing, design and management of learning spaces to learning outcomes.
- **Shifting focus from teaching to learning** – The framework gives emphasis to how a curriculum is experienced by the students and prompts discussion around the kinds of learning activities that students will undertake.
- **Diversity within the HE sector** – The framework aims to capture the diversity of academic disciplines by allowing the stakeholders to map their curriculum using a basic vocabulary. By capturing students' experiences of curriculum, the framework enables a dialogue around the learning needs of a diverse student body.



Temple & Fillippakou's (2007) extensive literature review for the design of future learning spaces in the higher education sector highlighted a need for further work in this area eleven years ago. Since then, a limited number of studies have attempted to tackle this task (Marmot, 2006, Beckers, Van Der Voordt, & Dewulf, 2015). However, given the diversity of teaching and learning practices, disciplinary traditions, and institution-specific contexts, further research is required in this field. For instance, findings from a more recent review in the health profession education further reinforce a need for a framework to link learning activities with physical space (Nordquist, 2016). Implications of such research may lead to developing a shared language around learning spaces between university executives, academic staff, university estates staff, students and designers.

Relating physical space to performance outcomes and success of the university would also require rethinking the physical space as a university's competitive advantage. Such reconceptualization would in turn entail a different perspective on space standards and facilities management which is not focused on sole efficiency measures. Impact of stakeholders' different temporal frames on design and management of learning spaces is yet to be explored, and lessons can be learned from other sectors which have explored 'space as a service' model.

Universities are focused on creating an academic community which fosters collaboration between disciplines and between academics and students. The role of physical space in facilitating the creation of academic communities is yet to be explored, and there is an opportunity to learn from the workplace sector organisations such as WeWork. Moreover, current emphasis on the civic contribution of universities also require us to explore the connections between learning and

working, thus highlighting the value of societal and cultural contribution of HE sector. The role of estates in enabling the civic engagement of the universities remain to be explored.

LINKING LEARNING TO SPACE

Much of the current research on learning environments is positioned within the supply-side thinking, with its point of departure being the design of the physical environment. There is a danger of conceding to environmental determinism with such a frame of reference, whereby it might seem that particular types of spaces only enable particular kinds of learning (collaborative, solitary).

Beckers, Van Der Voordt and Dewulf (2015) presented a conceptual framework linking the typologies of learning theories to that of learning processes and learning space. However, the authors suggest that in practice, space is not used in such a deterministic manner but rather in a flexible and multifunctional way. The authors also suggest that different types of spaces are needed to support learning processes. It is very likely that a curriculum will involve sessions using a range of different learning methods. Thus, an analysis of the relationship between learning and space needs to focus on the curriculum.

In this project, a learning space is not conceived as merely a physical space. Learning space is rather conceptualised as an interaction of physical, technological and human; a learning space is enacted in the socio-material practices of learners (Patel and Tutt, 2018; Boys et al., 2014). A 2012 student survey by Gensler suggests that the respondents spent 44% of their on-campus time studying alone (Gensler, 2012). The library individual study spaces are hence are much more in demand as they offer a quiet study space which the students' value.

Moreover, the respondents also reported a very low occurrence of in-class collaboration. Gensler reports that the traditional campus design is based on lectures as a dominant mode of teaching, while collaboration occurs in non-classroom spaces. However, a multi-modal pedagogy, where a teacher is a facilitator, could create collaborative experiences for students in the class. This issue is both of the learning space and curriculum design.

CURRICULUM MATTERS

The word curriculum can be interpreted in a variety of ways.

Fraser and Bosanquet's (2006) study of different conceptions of the curriculum in higher education reveal four categories of description: the structure and content of a unit; the structure and content of a programme of study; the students' experience of learning; a dynamic and interactive process of teaching and learning (p.272). The authors suggest that these categories fall into two different orientations towards curriculum: a product orientation and a process orientation. The former is seen as focusing on the content and the structural framework of the study, while the latter conceives the curriculum as an ongoing social activity involving interactions between students, teachers, knowledge and milieu (p. 278). The manner in which 'curriculum' is conceptualised by the teachers plays a critical role in how the learning activities and student experiences are designed. For instance, co-creation of the curriculum (akin to the process orientation) results in "students having greater group cohesion, high levels of self-directed learning, individual responsibility, engagement and autonomy" (p. 21, Bovill, 2014).

Curriculum design is of particular interest when it comes to the design of physical space. A curriculum may draw on a range of different pedagogies (such as cognitivism and social constructivism). For a given curriculum, the pedagogical differences would put differing demands on the learning space. Moreover, the nature of the curriculum will differ according to the level of study ranging from undergraduate up to doctorate (Savin-Baden, 2008). Thus, curriculum analysis might offer a more holistic overview of the learning journey and the range of spaces that are required at different stages of that journey.

Contact hours in UK universities are lower as compared to European universities, and the emphasis is on developing independent learning skills (Willetts, 2017). As a result, learning continues beyond the classrooms and into the homes of students as well as other spaces within the university. While the distinction between formal and informal spaces remains to be well-defined, Lim et al. (2012)'s study suggests that the role of the teacher (his/her position, movement, and gestures in a classroom) is an important factor in creating formal and informal spaces. Their study highlights that it's not just physical space settings which engender a certain kind of learning environment, but other factors also play a definitive role in attributing meanings to space. Radcliffe et al. (2008)'s framework of pedagogy-space-technology is particularly useful. However, the inter-relationships between pedagogy, space, and technology are complex and further exploration of their interfaces is required.

Lippman (2013) has suggested that informal spaces need to support a variety of interactions such as teacher-student(s), student-student(s) and teacher-teacher. To this, we might add teacher-student(s)-guest(s) and student(s)-guest(s) in order to enable relationships with the local communities and prospective employers of the students. Such interactions might become critical if they

form the cornerstone of a curriculum. Fung (2017) connected curriculum is one such example where students make connections across disciplines, connections with each other and alumni, connections with research and researchers, connections between academic learning and workplace learning, connections with external audiences. Bovill (2017) suggests that physical space is an important consideration to foster teaching and learning conversations between students and teachers. Thus, a joint approach to curriculum design and learning space design is required.

Focus on the curriculum can be further justified from the policy point of view. A coherent university-wide curriculum framework is high on policy agendas for universities in order to ensure a quality learning experience to students. While the Teaching Excellence Framework (TEF) is in its formative stages, a curriculum framework might enable to align university level goals with department/school disciplinary goals. However, how often curriculum design is carried out in collaboration with the learning space design remains to be explored. McNeil and Borg's (2018) assert that the relationship between space and pedagogy is complex and requires a nuanced description. The authors assert that:

“A better understanding of the relationship (between pedagogy and space), therefore, is needed, so that research on learning spaces can have more impact on policy and practice.” (p.229)

If space is considered as a “matter of concern”, rather than a “matter of fact” as Latour (2005) in the curriculum framework, then there is a strong policy impetus on creating engaging learning spaces as well as monitoring the performance of those spaces.

CURRICULUM AS CONTINUOUSLY CHANGING - IMPLICATIONS FOR LEARNING SPACE

Mulcahy et al. (2015) discuss the perspectives regarding the pedagogic changes in new learning spaces school. They analysed the perspective of leaders (senior management), teachers and students as respective practices of envisioning, enacting and experiencing pedagogic change. Their study revealed that each perspective differed from the other and at times contrasted with each other.

Mulcahy et al. (2015) suggest that the relationship between learning and spaces is complex:

“We argue that much of the existing empirical research on learning spaces is limiting when it comes to an appreciation of the complexity of relations between learning space design and use, and between learning spaces and pedagogy. Thinking the term learning spaces as verb rather than noun, that is, as something we do (a matter of encounter), rather than something we have (a new learning environment, a finished design) affords acknowledgement of the multiplicity and mutability of spatial and pedagogic practices, as reflected in the interview data.” (pp.590-591)

Constant work is required to align learning spaces with the curriculum. The curriculum is constantly evolving as new knowledge develops, new pedagogical approaches are explored and as students construct their learning journeys. Savin-Baden (2008) suggests that “Curriculum construction is, therefore, an active, interrupted and liquid process” (p.27). The enactment of a curriculum by the teachers in the classroom and the experience of the curriculum by students will generate new development opportunities

for the curriculum. Thus, alignment work cannot be limited merely to the duration of a learning space project. Integration of space-curriculum alignment needs to be embedded in business-as-usual activities.

LINKING LEARNING OUTCOMES TO LEARNING SPACE - LEARNING FROM OTHER SECTORS

Workplace

SPACE-AS-SERVICE

Sankari et al. (2018) found that the co-working space characteristic of 'space-as-service' is the least applicable to academic spaces. They suggest that academic space users might have such a view as they have a licence to use the space and do not have to pay rent for the same. However, moving beyond the renting model, Oksanen and Ståhle (2013) suggest that space-as-service is a conceptual shift from static buildings to a human-centred approach to space planning:

“Many traditional spaces such as libraries and museums are going through a significant change as they are no longer single static locations but a space with services through which users locate, use, and create various learning and research materials (Pritchard, 2008). The space-as-a-service approach emphasises human-centred space planning and requires a flexible mindset.” (p.283)

COMMUNITY

Sankari et al. (2018) suggest that the characteristics of co-working spaces namely community, accessibility and inspiring working environments are appreciated by the users of academic space users. Physical space is an actor in social interaction and can affect the way a teacher can interact with students or how students can interact with each other. Creating an academic community is high on the agenda for various universities and the co-working sector provides some useful lessons in this matter.

Leclercq-Vandelannoitte and Isaac (2016) suggest coworking spaces address five conditions of knowledge work: “access to information, access to knowledge, access to symbolic resources, access to social capital and opportunities for serendipity”. The authors suggest that the physical environment is a significant factor for knowledge creation. These conditions are also relevant to the university learning activities, especially in cases where interactions and connections are an important part of the curriculum (cf. Fung, 2017).

WELL-BEING

Retention of talented individuals is a key concern for the workplace sector. Universities are similarly seeking to attract talented students. Leclercq-Vandelannoitte and Isaac (2016) suggest that space widely affects people's emotional well-being which is key to creativity. The affordances of space to allow the users to create comfortable and supportive personal spaces engenders their emotional well-being. Academic space design can draw from the extensive developments in the workplace sector in terms of fostering holistic well-being of students.

Hotels

SPACE STANDARDS

Ransley and Ingram (2001) discuss the modification of space standards for the Golden Tulip Pegasus Hotel, Brussels. Typically a ratio of 3.2:1 is used to ascertain the space for sleeping/relaxation area and bathroom respectively; the total area of a typical bedroom is 28-38 sqm. However, a “lifestyle usage” survey of the hotel bedroom, revealed that the guests generally spend 50% of their wake time in the bathroom and the rest in the bed area. As a result, the designers for the Golden Tulip Pegasus Hotel modified the space standards to add a walking shower and dressing room yet reducing the overall bedroom to 26 sqm. The new design resulted in a reduction of capital costs while enhancing the trading and capital value of the hotel. Thus, focusing on usage patterns can provide opportunities for the effective use of space and enhance the experience of users. Often space standards are focused on efficiency rather than effectiveness. Sheffield Hallam University has modified its space standards in order to promote collaborative working between students in the classroom:

“Standard Cabaret is the default layout for the University’s teaching rooms and sets a new benchmark for room density (space per student). Protocols encourage staff to leave teaching rooms in this configuration at the end of class.” (Sheffield Hallam University, n.d.).

The additional space is useful for the tutor to move between the groups and the groups to sit around a table. Also setting the default layout in cabaret style saves the loss of valuable class time which would have been otherwise lost in re-arranging furniture.

CUSTOMER EXPERIENCE IS PARAMOUNT

Mody, Suess and Lehto (2017) analyse the case of Airbnb to affirm that how the organisation leverages different dimensions of experience economy for business success. These dimensions include entertainment, education, escapism, esthetics, serendipity, localness, communitas and personalization. The dimensions such as education, serendipity, localness and communitas resonate with the higher education sector. Oskam and Boswijk (2016) further suggest that the hotel of 2020 will focus on guest experience and hospitality employees will become experience managers. This has implications for the role of teachers as they are key in designing the learning experiences of the students; the learning space becomes an element to tinker in creating student experiences. Oskam and Boswijk (2016) further suggest that guest experience will become an important element in real estate valuations. The higher education sector has already seen some influence of the National Students Survey on the redevelopment of library facilities.

SPACE INFLUENCES REVENUE

The performance indicators in the hotel sector directly link space to revenue. Average Daily Rate (ADR) indicates the ratio of a number of rooms sold to the number of rooms available. Another indicator, Revenue per Available Room (RevPAR), indicates the ratio of total guest room revenue divided by the total number of available rooms. RevPAR differs from ADR because RevPAR is affected by the amount of unoccupied available rooms, while ADR shows only the average rate of rooms actually sold. Thus, linking revenue to space is relatively clear as compared to the higher education sector.

The HE sector's Key Estate Ratios (KER) were initially based on hard facilities management concerns (Hedley et al., 2002). From the 14 KERs, only one relates the estates to the income of the institution. Little information is presented in how the suitability of space is ascertained when calculating the KER for functional suitability. Moreover, the ratio of space per student is not indicative of students' use or experience of space. The emphasis of the KERS, as admitted by the authors, is toward efficiency rather than the effectiveness of space. But more tellingly, the functional suitability was ranked lower on average in terms of importance as compared to the utilisation rate by all the stakeholder groups (Vice-chancellors, Estates Directors, Finance Directors). This demonstrates a stronger need for establishing the dialogue between space and curriculum at the senior management level of universities.

The space design might have an indirect influence on the revenue as well. Doğan et al., (2013) suggest that architectural innovation in hotel design is perceived as a competitive advantage by customers, hotel managers and hotel employees. Ransley and Ingram (2001) suggested that "Good design can lead to increased sales, greater efficiency, reduced staffing levels, higher gross operating profit and the need for lower capital investment and maintenance costs"(p.86).

In the higher education sector, various student surveys are carried out: NSS, DLHE, HEPI-HEA, THE. However, current surveys prioritise the views of the students but do not engage with long term outcomes (Universities UK, 2016). Moreover, the students are unlikely to have a clear understanding of the importance of different elements assessed in the survey for their employment goals (Universities UK, 2016). Thus, a better understanding is required of the impact of learning and learning spaces on the long-term learning outcomes of the students.

LEARNING-SPACE COMPASS - FRAMEWORK

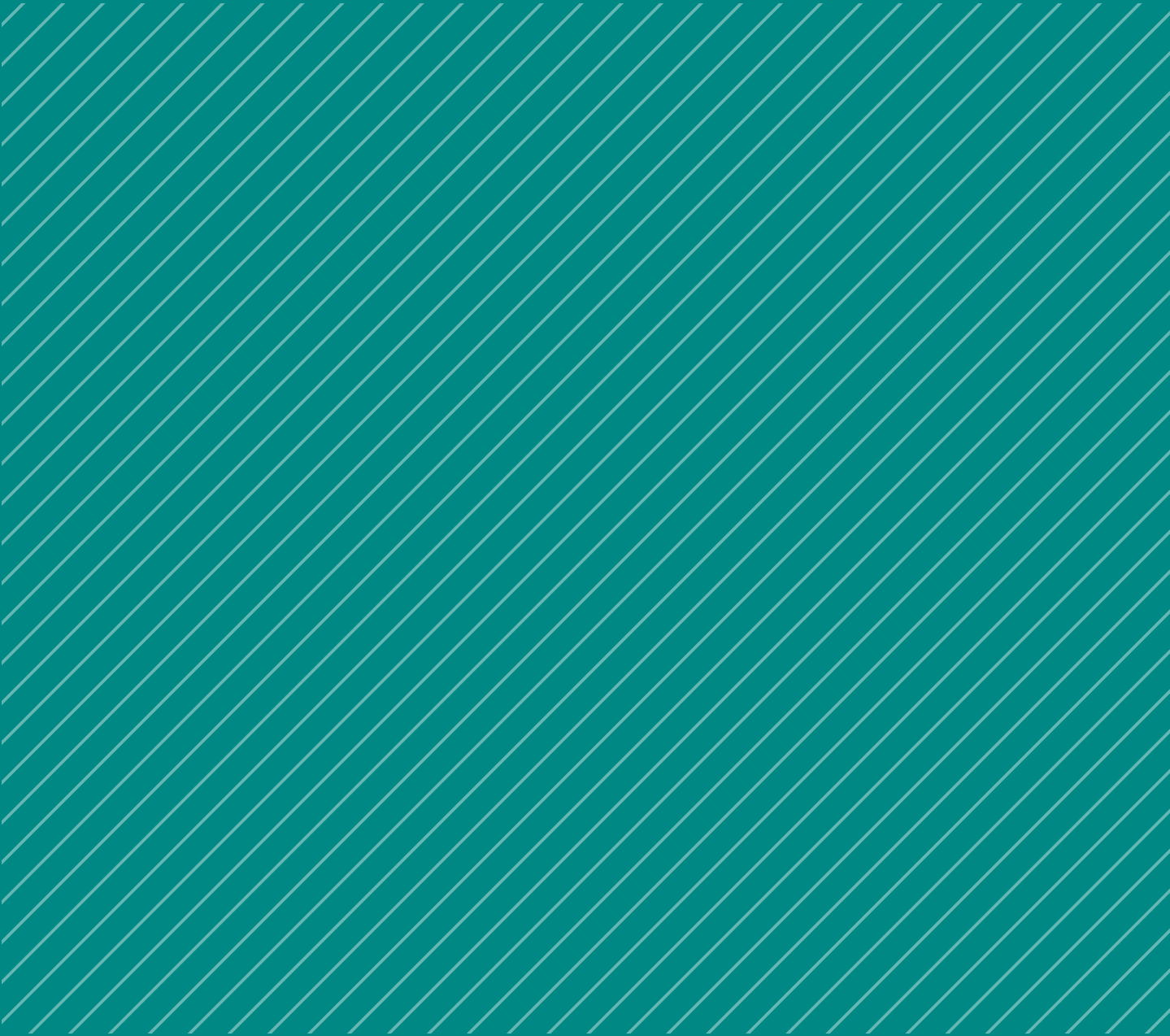
Based on the literature review discussed in this report and the workshops conducted for this project, 'learning-space compass' framework has been devised. The description of this framework can be found 'learning-space compass – Framework' report.

The purpose of this framework is to link the curriculum and learning space. The framework also aims to provide a shared language between academics, estates team and design team to create an understanding of the learning activities. A guide is available to integrate the 'learning-space compass' framework in the project workflow. The next step is to test the framework through pilot projects. Lessons from the pilot projects will help to develop and refine the framework (Refer Figure 2).



SECTION 5

NEXT STEPS



RESEARCH THEMES

Following research themes might be pursued for further inquiry into the future of learning environments.

These themes emerged from the workshops and subsequent literature review:

HIGHER EDUCATION MODELS IN THE UK

- A historical study of the role of the university in the UK, critically reviewing the Oxbridge model in light of the current funding model of university education, is required. This research can also compare the UK higher education model with other national contexts in Europe and beyond.
- A comparative review of different models for higher education such as apprenticeships and MOOCs is required; such review can include a discussion on the implications for space resulting from these different models.

IMPACT OF AI AND ROBOTICS ON LEARNING METHODS AND LEARNING SPACES

- How will the developments in robotics and artificial intelligence influence the future of learning? What developments will be required in curriculum design? What kind of learning spaces will be required to deliver that curriculum and how will the existing learning spaces be adapted?
- How do learning and working overlap throughout the life of an individual? What are the implications of a lifelong learning perspective on university estates?

SHIFTING FOCUS FROM TEACHING TO LEARNING

- What are the implications for the design of the learning space of student-centred learning approaches? What are the implications of the design process for student-centred learning environments, particularly in terms of stakeholder engagement?
- What are the implications on the management of buildings for student-centred learning environments, particularly in terms of timetabling and accessibility to spaces?

LEARNING MODES AND METHODS

- What is the relationship between the learning method and physical space? Are learning space typologies dependent on the academic disciplines? How to incorporate the discussions of learning methods in the learning environments design process?
- How does the formal and informal curriculum relate to formal and informal learning spaces?
- Which different kinds of spaces are entailed in the learning journeys of a student?

DIVERSITY WITHIN THE HE SECTOR

- Do existing learning space typologies take into account the institutional diversity within the UK?
- How are current briefing processes addressing the diversity of users? How can we investigate the learning journeys of students? What are the learning space needs for a diverse student body?
- How to evaluate the performance of learning spaces based on diverse student needs?
- How can learning spaces become more flexible to address the pedagogic needs of different academic disciplines?
- What are the implications of varied temporal frames of different stakeholders on the design and management of learning spaces?

VALUING HIGHER EDUCATION AND ITS PHYSICAL ENVIRONMENTS

- How to evaluate learning space in relation to learning outcomes?
- How is space valued and measured in different sectors, especially when it is treated as a commercial asset? How do other sectors measure the success of space standards and what can we learn from these?
- What is the impact of space on the university's success?
- What is the impact of metrics and audit culture on the higher education sector?

LEARNING-SPACE COMPASS FRAMEWORK

The description of this framework can be found 'learning-space compass – Framework' report. The next step is to test the framework through pilot projects. Lessons from the pilot projects will help to develop and refine the framework (Refer Figure 2).

AVENUES FOR IMPACT

Further research around these themes can be pursued with an aim to create impact at different levels within the HE sector:

- Curating a 'living' knowledge-base which offers continuous learning opportunities for members of HEDQF community to improve design and performance of learning spaces. This knowledge-base is continuously refreshed as new case-studies and experiences are captured and researched.
- HEDQF's research can be developed and disseminated in collaboration with the local and national policy networks as well as Local Enterprise Partnerships (LEPs) in which HE institutions are embedded. HEDQF could provide an expert voice on learning space design and value of good design in these networks.
- The engaged scholarship methodology enables HEDQF to engage with different HE stakeholder units to create a dialogue on key issues. Framing the issues collaboratively can aid in bridging demand and supply sides of construction industry.
- Engage with other sectors such as workplace and culture and heritage for joined-up thinking.

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TABLES & FIGURES

FIGURE 1
PROJECT METHODOLOGY

	Tasks	Tools	Outcomes
Problem formulation	<p>Activity: Forming project brief</p> <p>DISCUSS THE PROJECT BRIEF WITH HEDQF RESEARCH GROUP MEMBER(S). DISCUSS METHODOLOGY FOR THE PROJECT. IDENTIFY ADVISORY GROUP MEMBERS.</p> <p>SCOPE THEMES AND LITERATURE ON THE TOPIC.</p> <p>PREPARE AND EXECUTE PRE-WORKSHOP SURVEY/WORKSHEETS TO IDENTIFY THEMES FOR THE WORKSHOP.</p> <p>PREPARE A POSITION PAPER ON THE TOPIC. PREPARE BRIEFING MATERIALS FOR WORKSHOP 1.</p>	<p>HEDQF STRATEGY DOCUMENTS, GOVERNMENT POLICIES, CURRENT RESEARCH PROJECTS RELEVANT TO THE TOPIC.</p>	<p>PROJECT BRIEF OUTLINING THE TOPIC OF RESEARCH.</p> <p>METHODOLOGY FOR THE PROJECT, SCHEDULE OF WORKSHOPS/EVENTS AND ADVISORY GROUP MEMBERS.</p> <p>POSITION PAPER OUTLINING RESEARCH QUESTIONS/THEMES. ANALYSIS OF PRE-WORKSHOP SURVEY/WORKSHEET. WORKSHOP 1 BRIEFING MATERIALS.</p>
	<p>Workshop 1: Problem definition</p> <p>REVIEW THE PROJECT BRIEF, THE POSITION PAPER, ADVISORY GROUP COMPOSITION, FINDINGS FROM PRE-WORKSHOP QUESTIONNAIRE/WORKSHEETS.</p> <p>IDENTIFY RELEVANT THEORETICAL FRAMEWORKS, GOVERNMENT POLICIES, EMPIRICAL STUDIES AND DATA SOURCES.</p>	<p>PRE-WORKSHOP SURVEY/WORKSHEETS, POSITION PAPER OUTLINING INITIAL REVIEW OF THE TOPIC, LESSONS FROM HEDQF CONFERENCE AND EVENTS TO IDENTIFY RELEVANCE OF THE TOPIC.</p>	<p>ARTICULATE RESEARCH PROBLEM AND PRIORITISATION OF RESEARCH THEMES.</p> <p>EMERGING BIBLIOGRAPHY FOR LITERATURE REVIEW AND EMPIRICAL STUDIES.</p>
Theory building	<p>Activity: Develop conceptual framework</p> <p>UNDERTAKE LITERATURE REVIEW AND ANALYSIS OF DATA SETS. SIFT THROUGH THE THEMES TO IDENTIFY A CORE PROBLEM. NOTE ANY TANGENTIAL THEMES FOR FUTURE CONSIDERATION.</p> <p>PROPOSE A CONCEPTUAL FRAMEWORK TO ADDRESS THE RESEARCH PROBLEM. DISCUSS WORKSHOP 1 OUTCOMES AND PROPOSED CONCEPTUAL FRAMEWORK WITH HEDQF RESEARCH GROUP.</p> <p>PREPARE WORKSHOP 2 MATERIALS - WORKSHOP BRIEF, ACTIVITY SHEETS.</p>	<p>WORKSHOP 1 FINDINGS, REVISED PROJECT BRIEF, EMERGING BIBLIOGRAPHY.</p>	<p>THE CONCEPTUAL FRAMEWORK PAPER, WORKSHOP 2 MATERIALS.</p>
	<p>Workshop 2: Test the framework</p> <p>REVIEW THE CONCEPTUAL FRAMEWORK AND RESEARCH THEMES. INCLUDE A ROLE-PLAY ACTIVITY TO EVALUATE THE FRAMEWORK FROM THE VIEWPOINTS OF DIFFERENT STAKEHOLDER GROUPS.</p> <p>IDENTIFY PRACTICAL ISSUES OF IMPLEMENTING CONCEPTUAL FRAMEWORK IN PROJECTS.</p>	<p>THE CONCEPTUAL FRAMEWORK PAPER, ACTIVITY SHEETS (FICTIONAL MODULE/ PROGRAMME SPECIFICATION, SAMPLE BUILDINGS, SAMPLE LEARNER PROFILES).</p>	<p>REVIEW OF THE CONCEPTUAL FRAMEWORK, IDENTIFICATION OF ISSUES FOR PRACTICAL APPLICATION OF THE FRAMEWORK, ADDITIONAL LITERATURE REFERENCES FOR REVIEW.</p>
	<p>Activity: Summarise conceptual framework</p> <p>DEVELOP THE CONCEPTUAL FRAMEWORK BASED ON THE FINDINGS FROM WORKSHOP 2. NOTE ANY NEW THEMES FOR FUTURE CONSIDERATION.</p> <p>DEVELOP A PRACTICAL APPLICATION PROCESS AND TOOLKIT.</p> <p>DISCUSS THE FRAMEWORK, APPLICATION PROCESS AND TOOLKIT WITH HEDQF RESEARCH GROUP.</p>	<p>WORKSHOP 2 FINDINGS, ADDITIONAL LITERATURE REFERENCES.</p>	<p>PROJECT REPORT CONTAINING THE LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK FOR THE RESEARCH PROBLEM.</p> <p>WORK PROCESS AND TOOLKIT FOR PRACTICAL APPLICATION.</p>
Events: Dissemination of conceptual framework	<p>DISSEMINATE RESEARCH FINDINGS THROUGH PUBLICATIONS/REPORTS, PRESENTATIONS, WEBINARS OR WORKSHOPS. WHERE APPROPRIATE, TEST THE FRAMEWORK AND TOOLKIT AT HEDQF BUILDING/CAMPUS VISITS AND OTHER LEARNING EVENTS. PREPARE A FEEDBACK SHEET/TOOL TO CAPTURE COMMENTS FROM AUDIENCES.</p> <p>ENCOURAGE AND IDENTIFY PILOT PROJECTS FOR APPLICATION OF THE CONCEPTUAL FRAMEWORK AND TOOLKIT.</p>	<p>PROJECT REPORT, WORK PROCESS AND TOOLKIT, SUMMARY LEAFLETS, PRESENTATIONS, FEEDBACK SHEET/TOOL.</p>	<p>FEEDBACK FROM HEDQF COMMUNITY AND COLLABORATION FOR PILOT PROJECTS.</p>

TABLE 1

WORKSHOP 1 PARTICIPANTS

Name	Organisation	Stakeholder Group
Hans Haenlein	Hans Haenlein Architects	Built environment research experts
Fiona Duggan	FiD	Higher education built environment research experts
Ginny Gibson	University of Reading	Higher education teaching and learning experts
Jonas Nordquist	Karolinska University Hospital	Higher education teaching and learning experts
Sharon Wright	The learning crowd	Educationalists (primary/secondary)
Rupert Cook	ArchitecturePLB	Higher education built environment specialist professionals
Caroline Paradise	HEDQF, Atkins	Higher education built environment specialist professionals
Ruth Hynes	Atkins	Higher education built environment specialist professionals
Hiral Patel	Exigo Consultancy, University of Reading	Built environment research experts

In addition to the above workshop attendees, the following experts had sent their contributions via worksheets:

Name	Organisation	Stakeholder Group
Despina Katsikakis	Cushman & Wakefield	Tech, financial and pharma industry specialist professionals

TABLE 2

WORKSHOP 2 PARTICIPANTS

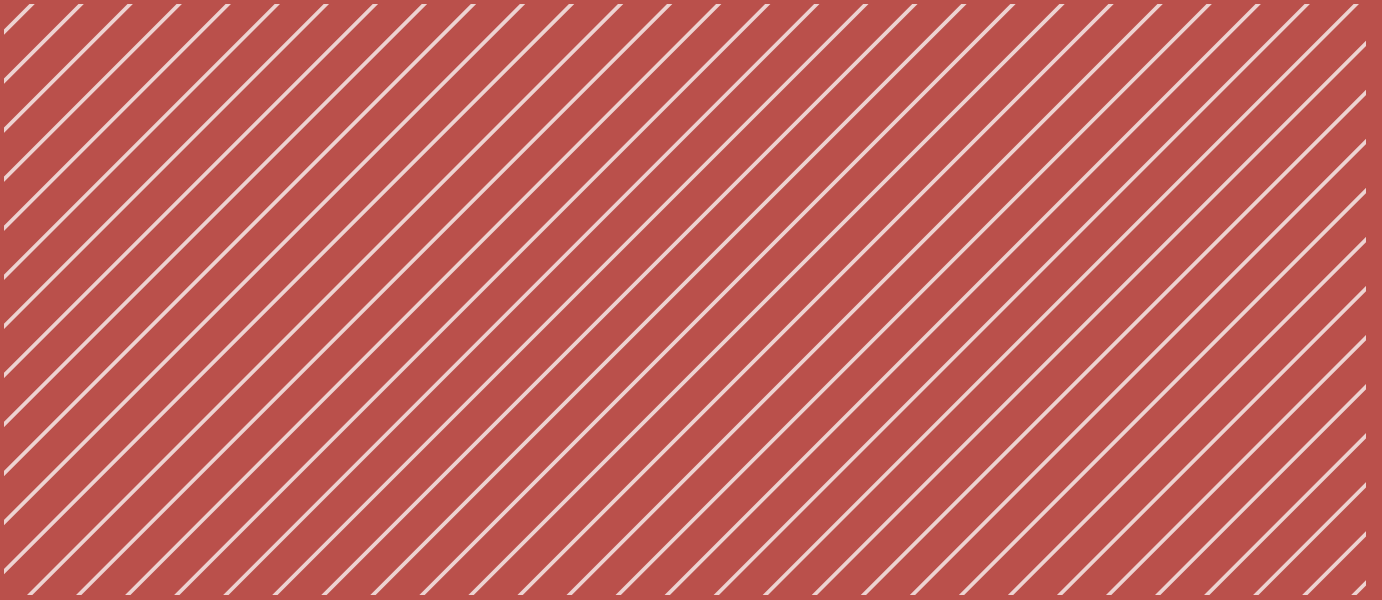
Name	Organisation	Stakeholder Group
Hans Haenlein	Hans Haenlein Architects	Built environment research experts
Fiona Duggan	FiD	Higher education built environment research experts
Helen Groves	Atkins	Higher education built environment specialist professionals
Ian Caldwell	King's College London	University estates professionals
Martin Hamilton	JISC	Higher education teaching and learning experts
Sharon Wright	The learning crowd	Educationalists (primary/secondary)
Rupert Cook	ArchitecturePLB	Higher education built environment specialist professionals
Caroline Paradise	HEDQF, Atkins	Higher education built environment specialist professionals
Ruth Hynes	Atkins	Higher education built environment specialist professionals
Hiral Patel	Exigo Consultancy, University of Reading	Built environment research experts

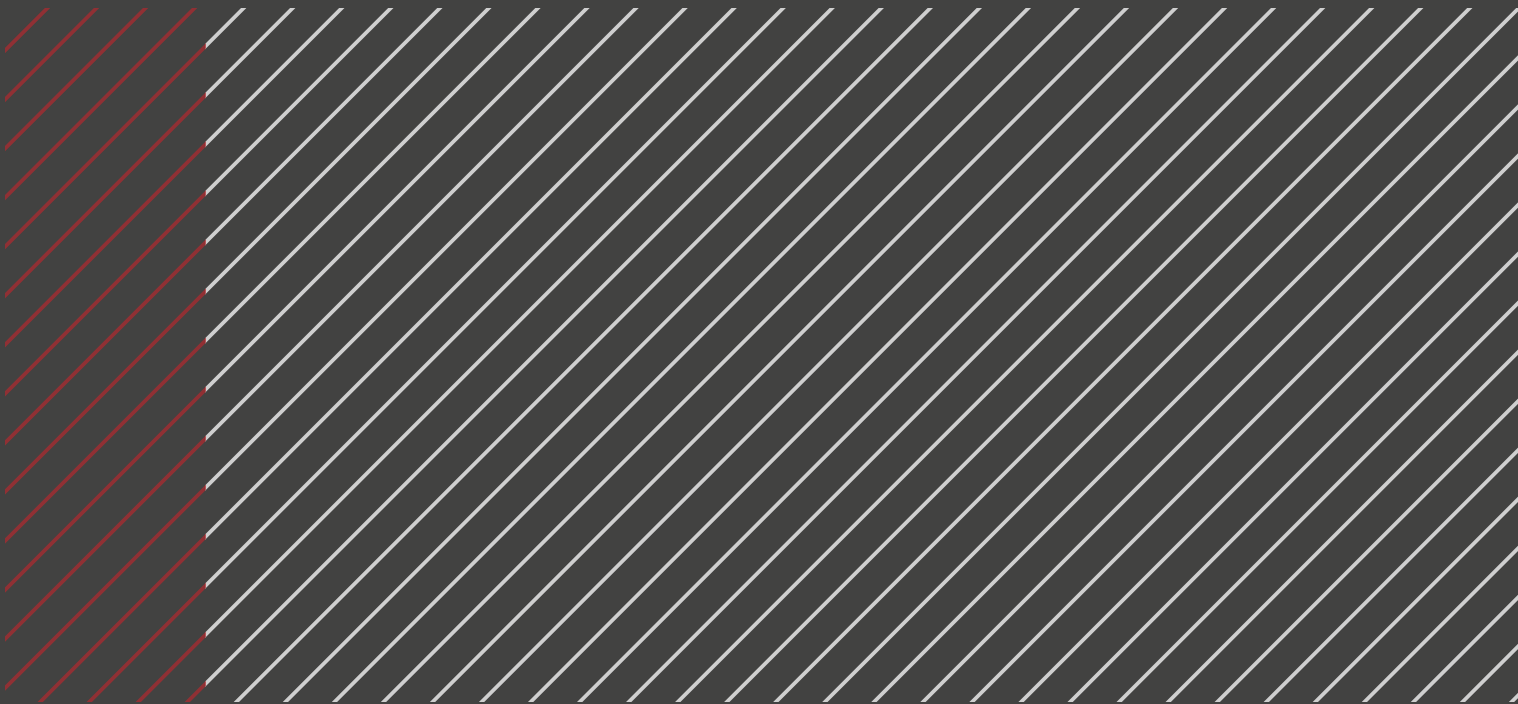
In addition to the above workshop attendees, the following experts had sent their contributions via email:

Name	Organisation	Stakeholder Group
Jane Shaddick	Bluevoice	Higher education built environment specialist professionals

FIGURE 2
PROJECT METHODOLOGY

		Tasks	Tools	Outcomes
Research Design ◀◀ ◀◀	Activity: Pilot projects	<ul style="list-style-type: none"> - Discuss the project brief with HEDQF research group member(s). Discuss methodology for the project. Identify advisory group members. - Scope themes and literature on the topic. - Prepare and execute pre-workshop survey/worksheets to identify themes for the workshop. - Prepare a position paper on the topic. Prepare briefing materials for Workshop 1. 	Feedback mechanisms	Stories/accounts of implementing the conceptual framework on pilot projects. Project sheets for sharing lessons with wider HEDQF community. Presentations for an annual learning event.
Problem Solving ◀◀ ◀◀	Annual Learning Event	<ul style="list-style-type: none"> - Present findings from pilot projects. Identify barriers/limitations of the framework and toolkit. Discuss modifications which can be made to the framework. 	Pilot project sheets/accounts	Pilot project sheets/accounts, outcomes of annual learning event.
Problem Formulation ◀◀ ◀◀	Activity: scoping research themes	<ul style="list-style-type: none"> - Stories/accounts of implementing the conceptual framework on pilot projects. Project sheets for sharing lessons with wider HEDQF community. Presentations for an annual learning event. 	Benefits and limitations of the framework and toolkit. Suggestions for modifications to the framework.	Proposals for further research.





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