LTSHE

Learning and teaching space in higher education

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KEY ACTION

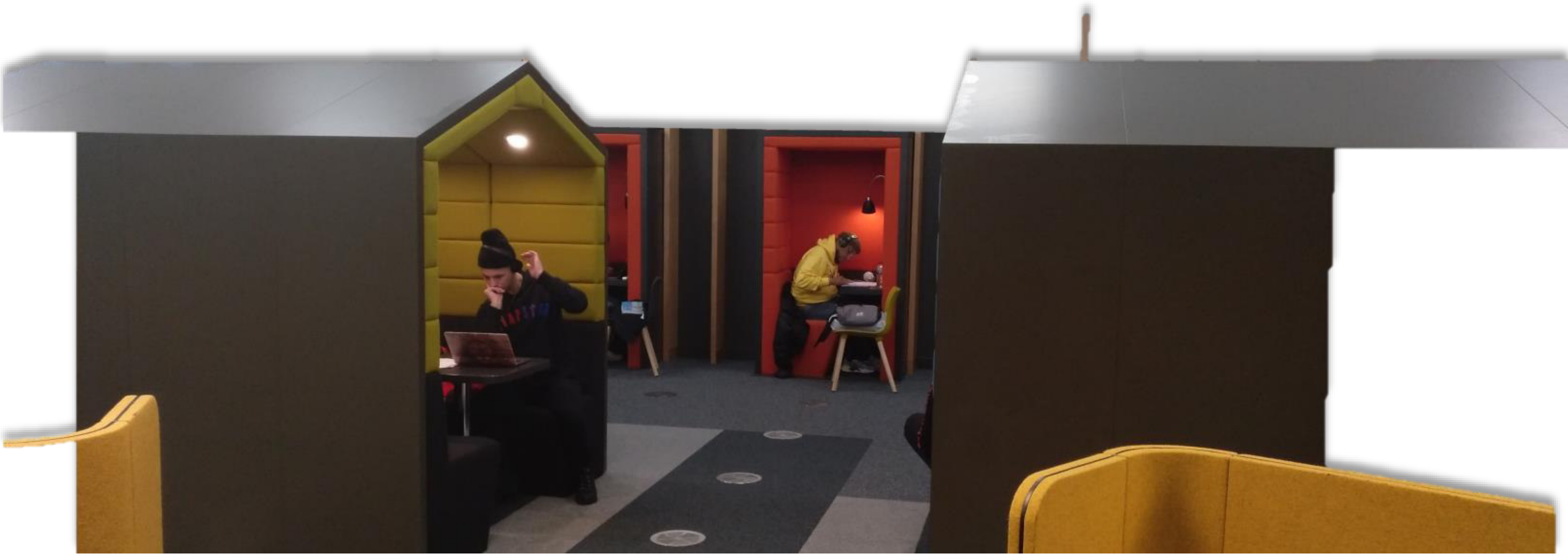
Cooperation for innovation and the exchange of good practices

ACTION TYPE

Strategic Partnerships for higher education

WEB INFORMATION

https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2019-1-UK01-KA203-061968
https://www.evalag.de/ltshe



INTELLECTUAL OUTPUT 2

Case Study of Experience: designing, developing and using learning and teaching spaces in German higher education

The Case of Stuttgart Media University (Hochschule der Medien Stuttgart – HdM)

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Executive summary

This report is a case study of experience on designing, developing and using learning and teaching (L&T) spaces in German higher education. It was produced in the context of the Erasmus+ Strategic Partnership "Learning and Teaching Space in Higher Education" (LTSHE, 2022). The concrete institution in the focus of the case study is Stuttgart Media University (Hochschule der Medien Stuttgart – HdM)[1], a university of applied sciences with about 5,000 students which is situated in the capital of the German federal state of Baden-Wuerttemberg, Stuttgart.

The case study is based on qualitative document analysis of strategic core documents of HdM, qualitative analysis of HdM projects on innovative L&T spaces and interviews and focus group discussions with various HdM stakeholders. Based on these sources, a strategic SWOT analysis is carried out which identifies strengths, weaknesses, opportunities and threats at HdM on issues of design, implementation and use of L&T spaces, particularly innovative L&T spaces.

The analysis shows that institutional policies for the design and implementation of L&T spaces at HdM exist and include the Structure and Development Plan 2017-2022, HdM's guiding values and HdM's institutional mission statement as well as a specific mission statement for teaching (section 3).

Further, it is demonstrated that HdM has been active for years now in theory and practice of the design and implementation of L&T spaces. In particular, HdM carries out projects of applied research in the area and has suggested five topic areas in the field: higher education politics; university organisation; university pedagogy; digital structures; and physical L&T spaces. These areas come with several challenges from which recommendations for any university can be derived and suggested (section 4). Among them are the following selected suggestions: Improve financial endowment in L&T, particularly to improve on the shift from teaching to learning and the design and implementation of innovative L&T spaces, secure funding of long-term innovations in L&T and develop new financing concepts. Develop a gratuity system for teaching excellence, including the use of innovative L&T spaces. Develop mission statements, principles and Structure and Development Plans about L&T including pedagogy, digital structures and physical L&T spaces. Establish inclusion of students in strategy and decision processes about L&T including pedagogy, digital structures and physical L&T spaces. Create unified access to digital structures and physical L&T spaces in L&T for students and other stakeholders. Change the role of the teacher in the direction of learning support and moderator. Make learners fit for self-regulated learning. Shape activating and participative change processes for digitalisation and physical L&T spaces. Implement the European General Data Protection Regulation (GDPR) or similar approaches.

Finally, stakeholders' perceptions on the design, implementation and use of L&T spaces were gathered (section 5). The approached stakeholder groups were the rectory, vice deans, teaching staff, QM and pedagogy staff, students, and HEI estate staff.

[1] https://www.hdm-stuttgart.de/en

The summarising strategic SWOT analysis, recommendations and conclusions (section 6) show that HdM is on a good way with respect to the focus of this report: design, implementation and use of L&T spaces, particularly innovative L&T spaces. However, the focus of this critical analysis is on (potential) development gaps and options for further improvement. In this respect, several recommendations for action are suggested (section 6.2) that, hopefully, may help the university for future developments.

Among the derived tentative recommendations for action are the following, which serve as examples for all recommendations here (and may not only be related to the HdM): There is the need for developing comprehensive and transparent strategies for the design and implementation of physical and virtual L&T spaces. Stakeholders should be better included in the processes of planning, designing and implementing L&T spaces. More L&T spaces, particularly innovative L&T spaces should be implemented including those that are required by the university's stakeholders (e.g., smaller innovative L&T spaces for groups from 5-10 students; individual student workplaces; Maker Spaces and Design Spaces). The pedagogical meaningfulness of frontal teaching should be critically reflected and communicated among stakeholders. The pedagogical requirements and technical options and needs of virtual (and hybrid) L&T should be critically reflected and implemented accordingly. The university should generate an overview over existing and used virtual L&T environments and platforms to inform organisational day-to-day activities, organisational development and planning. Students should be better involved in the processes of design and implementation of L&T spaces. Finally, opportunities should probably be sought to further involve into political debates about higher education and its provision at the HdM, including the design and implementation of L&T space.

1. Introduction

This report is one of eight similar reports that make up for the Intellectual Output 2 (IO2) of the LTSHE project (see LTSHE, 2022). Thus, LTSHE IO2 comprises eight intensive case studies of experience about designing, developing and using L&T spaces in higher education in Austria, Germany, Italy, Kosovo, Poland, Portugal, Spain, and the United Kingdom. Among other things, each case study gathers, analyses and interprets various stakeholders' perspectives (e.g., approaches, attitudes, assessments) on designing, developing and using L&T spaces at University of AAB College (Kosovo), University of Aveiro (Portugal), Birmingham City University (United Kingdom), Jagellonian University in Kraków (Poland), University of Milan (Italy), Public University of Navarre (Spain), Stuttgart Media University (Germany), and Vienna University of Economics and Business (Austria). All information and data gathered for/in LTSHE IO2 is understood to be oriented at serving the final LTSHE goal to compose a set of principles and guidelines of implementation and design of L&T spaces in higher education which will be the core of LTSHE Intellectual Output 4 (IO4).

The main goal of this IO2 report is to investigate into the design and implementation of innovative L&T spaces at a particular German higher education institution (HEI). Since the LTSHE partner **evalag** is not itself a HEI, a project-external HEI had to be organised. A natural choice was Stuttgart Media University (Hochschule der Medien/HdM Stuttgart, see Images 1-4) because **evalag** has year-long successful collaboration with HdM. In addition, it was relevant for the LTSHE project that HdM has a remarkable history of developing innovative L&T spaces. **evalag** is grateful to HdM for the external participation in the LTSHE project, in particular for the opportunity to conduct interviews and focus group talks.

Image 1 | Stuttgart Media University – Hochschule der Medien (HdM) Stuttgart

Source | Silesia711 – Own work, CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=74916224

Image 2 | HdM – East side of the Nobelstraße location, in the foreground the cafeteria leased from a company

Source | Silesia711 – Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=74916224

Image 3 | HdM's Faculty of Information and Communication, new building from 2014

Source | Silesia711 – Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=74916221

HdM is a public university of applied sciences based in Stuttgart, the capital of the German federal state of Baden-Württemberg situated in the South-West of Germany. The university was founded in 2001 from the merger of the University of Printing and Media (founded in 1903) and the University of Library and Information Science (founded in 1942). At the end of the 2014 summer semester, the university's Information and Communication Department moved from downtown Stuttgart to the Stuttgart-Vaihingen research campus, in the immediate vicinity of the Vaihingen campus of the University of Stuttgart. Accordingly, HdM itself is a pure campus university.

Image 4 | HdM's extension south, new building from 2014

Source | Silesia711 – Own work, CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=74916221

HdM has about 5,500 students and more than 300 staff including around 150 professors. HdM offers around 30 accredited bachelor's and master's courses to choose from. They cover teaching and research fields from printing to audiovisual media, information management and computer science, advertising or media production to media management and packaging technology.

In view of the Covid-19 pandemic and the extensive closure of HdM at the time the interviews and focus group discussions for this report were being conducted, they were all carried out online in summer 2021. Due to the previous experiences and developed expertise with the pandemic-triggered digitalisation, this was no longer a significant challenge from a technical point of view.

2. Methodology

From the outset, this report is an institutional case study of experience about designing, developing and using L&T spaces at Stuttgart Media University (Hochschule der Medien/HdM Stuttgart). Accordingly, in this respect the report focuses on HdM as an instructive (non-representative) example of German HEIs and uses material, information and data primarily from HdM. More specifically, this report uses available institutional documents of HdM as well as information drawn from interviews and focus groups discussions with various staff and students at HdM. Among the former are publicly available project descriptions, reflections and project results about the design and implementation of L&T spaces published by HdM as well as strategic core documents such as Structure and Development Plan and mission statements.

2.1 Qualitative document analysis of strategic core documents

For the qualitative document analysis the following institutional strategic core documents and text sources were used (see particularly section 3):

- Structure and Development Plan 2017-2022 (HdM-SDP, 2022);
- HdM's guiding values (HdM-GV, 2022);
- Institutional mission statement (HdM-MS, 2022);
- Mission statement for teaching (HdM-MST, 2022).

For the document analysis the following search terms were used: didactics; digitalisation of L&T formats; digital transformation; L&T spaces; lifelong learning; pedagogy/ies; self-directed learning; space design; spatial flexibility; time flexibility. These terms reflect the insights gained form the LTSHE project so far, for example through the LTSHE explorative reports on policy and practice of the design and implementation of L&T spaces in the LTSHE partner countries' higher education (LTSHE-IO1 reports, 2021) and a comparative analysis of German and Portuguese higher education with respect to the principles of design and implementation of L&T spaces (Leiber et al., 2021).

2.2 Qualitative analysis of HdM projects on innovative L&T spaces

HdM has carried out several research projects and theory-led practice during the last decade or so. The most important and publicly documented projects are characterised in section 4 based on qualitative analysis.

2.3 Interviews and focus group discussions with various HdM stakeholders

In general, data and information about stakeholders' perspectives might be gathered from

- Semi-structured interviews with selected individuals (Edwards & Holland, 2013, 29)

  Semi-structured interviews are organised along a number of pre-determined topics/questions that are flexibly used and applied by the interviewer as seems appropriate to experience the interviewees' opinions and assessments and ensure a dialogue; semi-structured interviews can be carried out as face-to-face or online interviews but not (individual) telephone interviews.

- Semi-structured group interviews or guided focus group discussions with groups of individuals

  Semi-structured group interviews are often carried out with selected key informants of relevant stakeholder groups (recommended group size: between 3 and around 10 group members). They can be conducted as face-to-face or online discussions but not as telephone interviews.

- Unstructured interviews with individuals or groups (Edwards & Holland, 2013, 29)

  They can be carried out as face-to-face or online discussions but not as telephone interviews; unstructured interviews were not used in the present investigation.

Interview groups usually are composed of minimum three and maximum ten interviewees, despite the size range of groups vary among authors. Typically, individual as well as focus group interviews should take about 60 minutes (maximum of 90 minutes). It is generally advised to record and transcribe the (qualitative) interviews and discussions, respectively, for further analysis (for example, by Qualitative Content Analysis; e.g., Mayring, 2014).

For the present report, the plan was to gather data and information about stakeholders' perspectives about the design and implementation of L&T spaces at HdM by approaching the following interview participants and applying related interview types:

- Institutional top managers, at the rectorship level (e.g. vice-rector responsible for L&T; vice-rector responsible for infrastructure, including both buildings and spaces as well as ICT) – at least one or, if appropriate, two or more structured interviews or semi-structured interviews with selected individuals

- Directors of schools and/or departments and/or deans of faculties including deans of study – semi-structured group interview/guided focus group discussion with a selected group of directors

- Teaching staff (including directors of study programs) – semi-structured group interview/guided focus group discussion with a selected group of teachers

- QM staff and pedagogy staff with responsibilities in QM of digitalisation of L&T spaces, distance education support and hybrid L&T – semi-structured group interview/guided focus group discussion with a selected group of QM staff and pedagogy staff

- Students – semi-structured group interview/guided focus group discussion with a selected group of students

- Non-teaching staff directly involved with L&T (e.g. ICT personnel with responsibilities in digitalisation of L&T spaces, distance education support and hybrid L&T) – semi-structured group interview/guided focus group discussion with a selected group of non-teaching staff

- Architects – at least one or, if appropriate, two or more structured interviews or semi-structured interviews with selected individuals

Further selection criteria for interview partners were decided by the LTSHE partnership. Accordingly, it was recommended to (try to) select individuals and group members, respectively, that are responsible for the issues at stake and can be assumed to be well-informed and engaged. This is especially relevant for the stakeholder groups of teachers, students and non-teaching staff. Further, selection should be guided as far as possible by the attempt to cover diversity issues such as include representatives from different subject fields (e.g. teachers), different schools and/or departments (e.g. directors), different study levels (e.g. Bachelor, Master, graduate students), different needs and different expectations with respect to L&T (e.g. international students, students with specific needs).

For the present report, data and information about stakeholders' perspectives about the design and implementation of L&T spaces at HdM were gathered by conducting semi-structured interviews with selected individuals and semi-structured group interviews or guided focus group discussions with groups of individuals. Due to availability, the stakeholder groups approached include institutional top managers, teaching staff, QM staff, students and HEI estate staff, meaning that the semi-structured interviews and focus group discussions were conducted with selected members of these key stakeholder groups (see section 5 and appendix 1).

3. Institutional policies for the design and implementation of L&T spaces at HdM

This section provides information from key institutional documents of HdM about institutional policy and practice for the design, implementation and use of L&T spaces and is mainly based on document analysis. It provides the results from the analysis of key institutional documents of HdM – Structure and Development Plan ("5 Year Plan"); institutional mission statement; guiding values; mission statement teaching – with respect to what they are saying about institutional policy and practice for the design and implementation of L&T spaces (broadly).

HdM has a specific profile which is represented, among other things, in the institutional mission statement (HdM-MS, 2022) and a specific mission statement for teaching (HdM-MST, 2022). At the basis of these mission statements are the values HdM has adopted and advocates (HdM-GV, 2022). The mission statements are revised regularly every five years in the context of the university's Structure and Development Plan (HdM-SDP, 2022).

In the following, an overview is given over the institutional policies for the design and implementation of L&T spaces at HdM as depicted and reported in these sources.

3.1 Structure and Development Plan 2017-2022

This section is based on a qualitative content analysis of HdM's Structure and Development Plan (SDP) valid for the period from 2017 to 2022 (HdM-SDP, 2022).[2] The SDP was analysed along the following search terms (in alphabetical order of the English translations of the German search terms):

- "Didactics" [Didaktik]
- "Digitalisation of teaching and learning formats" [*Digitalisierung von Lehr- und Lernformen*]
- "Digital transformation" [*digitale Transformation*]
- "Learning and teaching spaces" [*Lern- und Lehrräume*]
- "Lifelong learning" [*lebenslanges Lernen*]
- "Pedagogy/ies" [*Pädagogik(en)*]
- "Self-directed learning" [*selbstgesteuertes Lernen*]
- "Space design" [Raumgestaltung, Raumsetting]
- "Spatial flexibility" [*räumliche Flexibilität*]
- "Time flexibility" [zeitliche Flexibilität]

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[2] A quantitative concept analysis (based on respective software) was not chosen because this analysis refers only to one document of about 130 pages length, SMU's SDP 2017-2022. Such a small sample makes the value of a quantitative analysis rather questionable.

First of all, the analysis showed that the search terms “digital transformation”, “learning and teaching spaces”, and “pedagogy/ies” as such are not mentioned in HdM’s SDP 2017-2022, while “didactics” is mentioned in terms of HdM’s didactics centre that should be further developed as a core service centre for teachers and students (HdM-SDP, 2022, p. 37). The other search terms from the list above are represented in HdM’s SDP 2017-2022 in ways as described in the rest of this section.

According to HdM, the future HEI follows several guiding principles (HdM-SDP, 2022, p.20) which try to grasp and react to the framework conditions of demographic change, heterogeneous education biographies, knowledge society, globalisation, and barrier-free access to education. Freely based on these guiding principles, the following list of three action principles and their sub-criteria for the design, development and implementation of L&T spaces can be compiled that exhibits references to L&T spaces[3]:

- From teaching to learning
    - Facilitate giving space to people and their passions
    - Facilitate the exchange of ideas and discourses
    - Enable unplanned interaction
    - Facilitate and activate self-directed learning
    - Enable lifelong learning
- Combining bricks and clicks
    - Enable location-independent work
    - Enable and realise the smart student (e.g., bring-your-own-device (BYOD))
    - Improve and innovate information access (e.g., digital library)
    - Enable project-oriented work in variable structures with changing people
- Sharing instead of owning
    - Share infrastructure on campus (e.g., flexible offices, shared function rooms, shared use of other resources)
    - Be part of the city: livable campus

In accordance with the above-mentioned action principles for the design, development and implementation of L&T spaces, library and Learning World, respectively, increasingly become (learning) spaces for self-directed learning at HdM (HdM-SDP, 2022, p.26).

In the view of HdM, digitalisation is ubiquitous in the university including effects on the requirements for staff. “This applies to all levels and functions, from in-house and lecture hall

[3] This compilation is a free adaptation and improving interpretation of the corresponding list in SMU’s SDP 2017-2022.

technology to internal administration to laboratory staff and the teachers themselves. Digitalisation thus has a direct impact on recruitment and appointment policies as well as personnel development measures" (HdM-SDP, 2022, p.37; translation by the author). This also includes to use the options of digitalisation for qualified consulting and promotion of students (e.g., Learning Analytics) and in administration (e.g., new Campus Management System) as well (HdM-SDP, 2022, p.37).

In this vein, digitalisation of L&T formats is a core issue. Particularly, it is an education political mega trend, according to HdM, to complement traditional teaching formats with digital L&T elements to react to multiple contemporary tasks of (higher) education.[4] In addition to implementing an adequate technical and spatial infrastructure, it is therefore necessary to support teachers by staff who primarily provide technical support for the implementation of digital L&T elements and advise for the use of proven elements (HdM-SDP, 2022, p.39). To illustrate and exemplify this in more detail Table 1 shows important measures, required human resources and mile stones of digitalisation development of L&T formats, i.e. L&T spaces.

Table 1 | Measures, human resources and mile stones for supporting digitalisation of L&T formats at HdM

Measures	– Extension of infrastructure for lecture recording and streaming – Development of tool chains and templates for the efficient development of digital teaching materials – Development of technical and spatial infrastructure for the creation of digital L&T elements – Creation of best practice examples for digitally supplemented L&T formats and networking of teachers
Human resources	Teachers should be supported by staff • Who offers technical support in setting up digital L&T elements • Who advises on the use of proven L&T elements
Mile stones	• Provide a sufficient number of lecture halls and seminar rooms with technical equipment that allows both lecture recording and the streaming of events (deadline: end of summer semester 2018) • Set up a tool chain and a media server that allows the recorded L&T materials to be called up and to work with these materials (deadline: end of summer semester 2019)

Source | Adopted from (HdM-SDP, 2022, p.39), English translation by the author

HdM's SDP 2017-2022 also addresses the need of increasing "spatial flexibility" because modern L&T settings 'often require room settings that differ significantly from conference, plenary or U-arrangements and can be changed during the teaching unit. A flexible use of media is also required' (HdM-SDP, 2022, p.40). According to HdM, 'experiences from foreign universities show that new flexible furniture and room/space design[5] support these L&T settings very well. In addition to spatial flexibility, the promotion of creativity-supporting spatial equipment is a central concern of this measure' (HdM-SDP, 2022, p.40). These beliefs and assumptions caused

[4] The HdM's view is thus in line with the current analyses and recommendations of the Science Council (Wissenschaftsrat, 2022).

[5] This is the only place in SMU's SDP 2017-2022 where L&T "space design" is explicitly mentioned.

HdM to set up measures and milestones for increasing spatial flexibility in L&T as shown in Table 2.

Table 2 | Measures, human resources and mile stones for increasing spatial flexibility at HdM

Measures	Provision of two different room settings and creation of lecture rooms with high flexibility
Human resources	A spatial concept should be developed by professors together with the Didactics Center; professors will receive a budget of 4 to 6 semester week hours teaching load discount
Mile stones	• Conception of two different room settings with highly flexible furniture (deadline: summer semester 2018) • Two seminar rooms equipped with highly flexible furniture (deadline: winter semester 2018/19) • Experimental use of the rooms in different L&T settings with evaluation of the respective use (deadline: summer semester 2019 and winter semester 2019/20) • Expansion of use and regular operation (deadline: summer semester 2020)

Source | Adopted from (HdM-SDP, 2022, p.40), English translation by the author

Accompanying spatial flexibility requirements are increasing needs of "time flexibility" caused by the variety of physical, hybrid and virtual L&T forms. According to HdM, 'the necessary flexibility concerns both the frequency of the face-to-face appointments and their respective scope' (HdM-SDP, 2022, p.40).

3.2 HdM's guiding values

The Guiding Values were developed by HdM's members in a participative procedure that was coordinated by the Senate's committee for the development of the mission statement. Senate and University Council unanimously adopted the Guiding Values on November 5th, 2020 (HdM-GV, 2022).

Adequately, HdM's guiding values are conceptualised and formulated on a fairly general level. Accordingly, they do not explicitly refer to roles and functions of L&T spaces. Nevertheless, the values are relevant and have to be considered when designing, implementing and using L&T spaces.

The main values are

- Mutual appreciation of all university members including professional skills and personality skills as well
- Participation and trust in each other and the organisation
- Responsibility for all performance and towards the broader society
- Transparency and reliable communication
- Critical thinking, creativity, innovation, and courage to change
- Diversity with respect to thinking, ways of living, culture

These values may be relevant in the context of L&T spaces in the following ways: The design, implementation and use of L&T spaces should be realised in participative ways, i.e., all relevant stakeholders should be incorporated and nobody excluded. The institution, its organisational units and individual representatives should take on their responsibilities in transparent ways for designing and implementing quality L&T spaces that serve the intended and profile-related L&T processes. Specifically, L&T spaces – physical, virtual, and hybrid – should be designed and implemented that support and foster creative and innovative L&T processes, learning outcomes and learning gains.

In this sense, obviously, HdM's guiding values lead to the following general principles of the design and implementation of L&T spaces in HE:

- The institution should take on their responsibility for the fulfilment of the mission in transparent ways.
- L&T spaces should be realised in participative ways.
- Innovative L&T spaces should support and foster creative and innovative L&T processes, learning outcomes and learning gains.

3.3 HdM's institutional mission statement

The institutional mission statement of HdM (HdM-MS, 2022) further characterises its profile by dealing with the following six topics:

- Qualification of media specialists

  HdM sees itself as a scientifically sound educational provider for media specialists. The university trains specialists and executives for media-related activities in all areas of economy and public service. HdM intends to enable its graduates to assert themselves successfully in international competition.

- Personality development

  The HdM sees itself as a platform for the personality development of students. In addition, thinking and acting at HdM are based on personal and academic integrity and scientific standards.

- Application orientation

  The courses offered by the HdM are oriented towards the requirements of the professional world and are continuously updated. Well-founded, application-oriented training is ensured by high-quality equipment.[6]

- Structured acquisition of competencies

[6] This statement obviously translates into the provision of L&T spaces that are adapted to the options of physical and digitalised spaces and pedagogies.

HdM understands the study phase as a phase in lifelong learning and therefore fulfills the task of further training. Using current didactic concepts, it ensures sustainable skills acquisition.

- Internationality

  HdM is committed to the European idea and sees itself as part of an internationalised society. Appropriate measures are taken to enable prospective media specialists to work in an international environment.

- Catalyst for innovation

  HdM sees itself as part of the innovation system of the media industry and organises the creation and distribution of knowledge for qualified media specialists in relation to technical, economic, social, ethical, content and design aspects.

These profile topics may be relevant in the context of L&T spaces in the following ways: The design, implementation and use of L&T spaces should be realised in such ways that HdM can adequately fulfil its role as scientifically sound educational provider for media specialists who are competitive on national and international levels specifically in economy and public service. L&T spaces must fulfil requirements of high-quality equipment.

3.4 HdM's mission statement for teaching

HdM puts its specific mission statement for teaching (HdM-MST, 2022) under the motto of dealing with the opportunities and threats of digital transformation and its implications for L&T. This is immediately relevant for the design, implementation and use of L&T spaces because the latter are broadly and deeply affected by digital transformation.

Specifically, the mission statement for teaching deals with several topics the contents of which are all relevant in the context of L&T spaces and must be considered appropriately in the design, implementation and use of L&T spaces. In a condensed and partially reformulated way, these topics and their implications for L&T spaces read as follows:

- Learner support

  Among other things, HdM intends to *support learners with different requirements*, regardless of their origin and length of stay at HdM, and *support them in the further development of their (study) skills*.[7]

  Accordingly, the design and implementation of L&T spaces must be informed and guided by the different requirements of different learners such as, for example, the possibilities of individual learning and interactive group learning; script-based, auditory and visual learning; theoretical and vivid learning.

- Teacher competencies

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[7] Emphasis by the author

HdM's teachers are required to *instruct and accompany learners*. In doing so, teachers rely on the continuous *further qualification of their technical expertise* as well as their *methodological-didactic, personal and social skills*.[8]

This must include teachers' competencies and further qualification with respect to technical and didactic expertise and social skills related to using physical, virtual and hybrid L&T spaces, and with respect to participating in their design and development, if appropriate.

- Self-directed learning

  HdM students are required to take on a role as *independent and active learners* (self-directed learning). Specifically, by studying at HdM students should strive to continuously develop skills on a professional, methodological, social and personal level.[9]

  This must include the development of students' competencies with respect to technical and didactic expertise and social skills related to using physical, virtual and hybrid L&T spaces, and with respect to participating in their design and development, if appropriate.

- Shared responsibility for the L&T process

  Summarising, L&T is an active process where *teachers and students share responsibility for successful studies*. To achieve this, L&T activities are carried out in a planned and reflected manner and *various forms of learning interactions are encouraged*. According to HdM's culture of L&T, L&T rely on communication and feedback within a culture of mutual confidence where mistakes are perceived as learning experiences. Hence, corresponding learning processes are supported on all organisational levels (e.g., courses, study programmes, university).[10]

In this sense, HdM's mission statement for teaching leads to the following general principles of the design and implementation of L&T spaces in HE:

- The design and implementation of L&T spaces must consider the diversity of learners, i.e., the different requirements of different learners (e.g., the possibilities of individual learning and interactive group learning; script-based, auditory and visual learning; theoretical and vivid learning).
- The competencies of teachers with respect to designing, implementing and using innovative L&T spaces must be continuously developed.
- The competencies of students with respect to technical and didactic expertise and social skills related to using physical, virtual and hybrid L&T spaces, and with respect to participating in their design and development, must be facilitated, if appropriate.

[8] Emphasis by the author
[9] Emphasis by the author
[10] Emphasis by the author

4. Theory and practice of design and implementation of L&T spaces at HdM

4.1 Research projects and theory-led practice

Among other things, HdM is an interesting study case and an example of good practice (in the context of the German higher education system) because HdM with its Learning Research Centre has undertaken several research projects including theory-led practice for the design and implementation of innovative L&T spaces since 2009 (cf. Bernhard et al., 2015; Stang, 2016).

At HdM, such projects and related activities are underpinned by a certain understanding of contemporary changes in education including conceptual changes in didactics which are accompanied by a growing sensitivity for the relevance and importance of the design of L&T arrangements. This applies to the physical and the virtual space as well. As a consequence, new L&T environments are conceived at many public education institutions such as schools, HEIs, further education institutions, libraries and museums (HdM-LRC, 2022).

To contribute to such developments from a more theoretical point of view and from the practical interest perspective of one's own institution as well, HdM has put effort into the issue of adequate and expedient design of innovative L&T spaces for more than a decade. According to HdM, four perspectives were in the focus (HdM-LRC, 2022):

- Design of physical spaces and offer scenarios
- Design of digital spaces and offer scenarios
- Pedagogical concepts
- Organisational contexts

Against this backdrop, a multi-perspective approach towards learning, teaching and knowledge generation is required. Therefore, HdM defined its foci of research as "Learning Worlds", "Mobile Learning" and "Pedagogical and Organisational Concepts" with the following differentiations (HdM-LRC, 2022):

- Didactic-methodical L&T settings

  Investigation and concrete design of L&T processes with regard to didactic-methodical need for change

- Organisational design concepts

  Development of organisational concepts that take into account the different requirements of lifelong learning

- Physical learning spaces

  Research and development of architectural design options for learning spaces that are informed by the results of L&T research and perception research

- Digital learning spaces

Research and development of the design of learning settings that are media-adequate, build on previous experiences with e-learning and focus on mobile learning

- Hybrid learning spaces

  Research and development of interfaces between physical and digital L&T arrangements

As already mentioned, following these strategic ideas and operational goals HdM has undertaken a range of projects in innovative L&T spaces carried out by HdM's Learning Research Centre (HdM-LRC, 2022):

- Expert forum "Designing innovative educational spaces/learning centres"
- LearnerLab/Learning World in cooperation with a specialty furniture factory
- Research consulting learning worlds
- Mobilising and transforming teacher education pedagogics
- Digital narration as an innovative didactic approach for economic education in retail

Core issues and conclusions of HdM's research and practice in innovative L&T spaces were recently published in the volume "Shaping the Future of the Learning World at University. A construction kit for change processes" [original in German] (Petschenka et al., 2020). This work is continued by HdM's activity "Lerning World University 2020" [original in German] (Stang & Becker, 2022) which follows a few guiding questions oriented at the core issues of student-centred teaching and organisational development:

- How can students be taught the competences and skills they need to master future challenges in work, practice and research?
- Particularly, how can competence-oriented and student-oriented teaching be designed and supported by innovative L&T spaces?
- How must internal university communication and organisation be conceived to be successful in these endeavours?
- What can higher education policy and politics contribute to these endeavours?

In tackling these questions and the above-listed issues as well, HdM based their considerations and activities on the PST (Pedagogy – Space – Technology) framework for designing and evaluating learning spaces (Radcliffe et al., 2009). The PST framework is extended and supplemented to the following five core elements, the five subject areas of the tool kit for the Learning World university (Petschenka et al., 2020, 214)[11]:

- Higher education politics
- University organisation

[11] These five subject areas have also been used for structuring the analysis of LTSHE IO1 (LTSHE-IO1 evalag Report, 2021).

- University pedagogy
- Digital structures
- Physical L&T spaces

For these five areas, HdM has derived challenges and recommendations for action for the relevant and affected stakeholder groups. An evaluated selection of these challenges and recommendations for action is presented in sections 4.2-4.6 below. This is done under the general assumption that many of the topics are already being worked on in the universities, but are often limited to individual funding and limited projects, while in the future it must be a matter of establishing ongoing and sustainable activities in these areas (Petschenka et al., 2020, p.214).

4.2 Higher education politics

4.2.1 Challenges and recommendations

Loosely based on (Petschenka et al., 2020, pp.216–217), three core challenges for higher education politics related to L&T spaces in the German context are

- Disadvantages arising from federalist higher education politics of 16 different federal states;
- Notoriously underfinanced public higher education, particularly in the area of L&T;
- Lacking data about digital structures and physical L&T spaces on institutional, federal state and nationwide levels (Table 3, left column).

These challenges can be met with various practical recommendations for action. In essence, these consist of the following: (1) Mitigate or overcome differences in higher education politics inborne to the federal system of Germany; (2) improve the financing situation with all available legitimate means; (3) document university development plans nationwide, map learning management systems and physical L&T spaces, and establish nationwide research institutions on innovative L&T spaces (Table 3, right column).

In general, these recommendations for action are directed at various stakeholders. However, the members of the university have hardly any feasible options for action at the level of higher education politics and therefore cannot substantially contribute on their own to responding to the challenges listed in Table 3. The main addressee of the recommendations listed in Table 3, therefore, is higher education politics on the level of the federal states, i.e., the federal states' ministries, and some nationwide organisations and networks which are described in the next section and, at the same time, represent cases of good practice in higher education politics referring to innovative L&T spaces and digitalisation of higher education.

Table 3 | Challenges and recommendations for action in higher education politics related to L&T spaces in the German context

Challenges	Recommendations for action
Disadvantages of federalist higher education politics of 16 different federal states	Better coordinate the higher education legislation of the 16 federal states of Germany Improve comparability in the federal system Create unified, nationwide valid structures of Structure and Development Plans Create unified, nationwide valid structures of goal agreements
Underfinanced public higher education, particularly L&T including L&T spaces	Improve financial endowment in L&T, particularly to improve on the shift from teaching to learning and the design and implementation of innovative L&T spaces Secure funding of long-term innovations Develop new financing concepts
Untransparent or lacking information and data about digital structures and physical L&T spaces on institutional, federal state and nationwide levels	Create database for orientation of different stakeholder groups Document structure and development plans nationwide Document goal agreements nationwide Map learning management systems Map physical L&T spaces Establish nationwide research institutions on innovative L&T spaces

Source | Own compilation

4.2.2 Good practice

The[12] science ministries of the federal states set the framework conditions and support projects.[13] The Federal Ministry of Education and Research (BMBF) is funding projects to develop the university landscape.[14] There are joint funding programs from the national and federal state governments such as Quality Pact for Teaching[15] and University Pact[16] which shape the framework conditions for the work of the universities. The Centre for Higher Education Development (CHE) observes the higher education system and provides studies and rankings.[17] The German Initiative for Network Information (DINI) attempts to contribute to the development of ICT infrastructure in L&T (spaces) at German universities.[18] The University Forum Digitalisation (HFD) is a think tank that intends to orchestrate the discourse of higher

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[12] In parts this section relies on (Petschenka et al., 2020, pp.232–233).
[13] https://www.kmk.org/kmk/mitglieder.html
[14] https://www.bmbf.de/de/studium-70.html
[15] https://www.bmbf.de/bmbf/de/bildung/studium/qualitaetspakt-lehre/qualitaetspakt-lehre.html
[16] https://www.bmbf.de/bmbf/de/bildung/studium/hochschulpakt-2020/hochschulpakt-2020_node.html
[17] https://www.che.de/
[18] https://www.dini.de/

education in the digital age and provides studies and working papers for higher education practice.[19] The University Information System (HIS) provides data on higher education planning and development.[20] The University Rectors' Conference (*Hochschulrektorenkonferenz – HRK*), among other things, draws up recommendations for the university and science system, in particular for quality-oriented academic teaching, the promotion of scientists at all career levels, the principles of international university exchange, for innovation and transfer and for models of good university management.[21] A key task of the Conference of Ministers of Education (*Kultusministerkonferenz – KMK*) is to ensure the highest possible level of mobility for learners, students, teachers and academics through consensus and cooperation, to contribute to the equality of living conditions throughout Germany and to represent and promote the common interests of the federal states in the field of culture.[22] The Donor's Association for German Science (*Stifterverband für die Deutsche Wissenschaft*) is a joint initiative of companies and foundations, which is the only one that provides holistic advice, networks and funding in the areas of education, science and innovation.[23] The German Science Council (*Wissenschaftsrat – WR*) advises the federal government and the governments of the federal states on all questions relating to the content and structural development of science, research and higher education. The Science Council accompanies important science policy issues such as educational expansion and the expansion of the university system, questions of effectiveness and efficiency in science and research, German reunification and its consequences, tendencies towards differentiation and internationalisation of the science system.[24] The Joint Science Conference (*Gemeinsame Wissenschaftskonferenz – GWK*) is the organisation in which the federal and state governments jointly make the priority for science and research a reality. Within the framework of the GWK, they negotiate and decide on joint programs to promote science. The members of the GWK are the science ministers and the finance ministers of the federal and state governments.[25] The European University Association (EUA) is a European network that represents more than 800 universities in Europe and provides studies and overviews on good practice.[26]

4.3 University organisation

4.3.1 Challenges and recommendations

Following considerations of (Petschenka et al., 2020, pp.217–219), for the area of university organisation five core challenges related to L&T spaces can be identified:

- Imbalance between research and teaching;

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[19] https://www.hochschulforumdigitalisierung.de/
[20] https://www.his.de/
[21] https://www.hrk.de/
[22] https://www.kmk.org/
[23] https://www.stifterverband.org/
[24] https://www.wissenschaftsrat.de/
[25] https://www.gwk-bonn.de/
[26] https://www.eua.eu/

- Lack of strategy about L&T including pedagogy, digital structures and physical L&T spaces;
- Lack of participation of stakeholders;
- Lack of intra-university communication and cooperation of organisational units and individual stakeholders;
- Deficient services and access concepts to L&T spaces (Table 4, left column).

These challenges can be met with various practical recommendations for action which can be summarised in the following way: (1) Develop a criteria-based gratuity system for teaching excellence, including the use of innovative L&T spaces; (2) develop mission statements and Structure and Development Plans about L&T including pedagogy, digital structures and physical L&T spaces; (3) establish inclusion of students and other stakeholders in strategy and decision processes about L&T including pedagogy, digital structures and physical L&T spaces; (4) develop effective communication and cooperation models between different organisational units and individual stakeholders; (5) improve services of L&T spaces and create unified access to L&T spaces for students and other stakeholders (Table 4, right column).

Table 4 | Challenges and recommendations for action in university organisation related to L&T spaces

Challenges	**Recommendations for action**
Imbalance between research and teaching	Develop a gratuity system for teaching excellence, including the use of innovative L&T spaces Develop a criteria grid for evaluating excellent teaching, taking into account the use of innovative L&T spaces
Lack of strategy about L&T including pedagogy, digital structures and physical L&T spaces	Develop mission statements and principles about L&T including pedagogy, digital structures and physical L&T spaces Develop Structure and Development Plans about L&T including pedagogy, digital structures and physical L&T spaces
Lack of participation of stakeholders	Develop participation models Establish inclusion of students in strategy and decision processes about L&T including pedagogy, digital structures and physical L&T spaces
Lack of intra-university communication and cooperation of organisational units and individual stakeholders	Develop communication and cooperation models Reduce the barriers to communication and cooperation between different organisational units
Deficient services and access concepts to L&T spaces	Improve services of L&T spaces Create unified access to digital structures in L&T for students and other stakeholders Create unified access to physical L&T spaces for students and other stakeholders

Source | Own compilation

Again, these recommendations for action are generally directed at various stakeholders. The main addressee of the recommendations listed in Table 4, however, are university leadership, interested and engaged (teaching) staff and interested and engaged students as well. Exemplary universities are described in the next section and, at the same time, represent cases of good practice in university organisation referring to innovative L&T spaces and digitalisation of higher education.

4.3.2 Good practice

HdM in its Faculty for Information and Communication has implemented organisational structures fostering transdisciplinary activities (Mildenberger & Vonhof, 2020). Another example of good practice at HdM in university organisation with respect to digitalised learning processes is the Learning Analytics for Examination Performance and Study Success (LAPS)[27] approach which supports students individually, specifically in the study entrance phase.

4.4 University pedagogy

4.4.1 Challenges and recommendations

Loosely based on (Petschenka et al., 2020, pp.220–222), for the area of university pedagogy, three core challenges related to L&T spaces can be identified:

- Deficient or lacking didactic centres;
- Deficient or lacking mission statements for teaching as a feature of quality and culture;
- Deficient or lacking shift from teaching to learning (Table 5, left column).

Table 5 | Challenges and recommendations for action in university pedagogy related to L&T spaces

Challenges	Recommendations for action
Deficient or lacking didactic centres	Recognise and establish didactic centres as key facilities and institutions
Deficient or lacking mission statement for teaching as a feature of quality and culture	Establish mission statement for teaching as a feature of quality and culture throughout the university
Deficient or lacking shift from teaching to learning	Design and implement innovative pedagogies and L&T scenarios including innovative L&T spaces Enable collaborative L&T Change the role of the teacher in the direction of learning support and moderator Make learners fit for self-regulated learning Establish experimental spaces for innovative L&T

Source | Own compilation

[27] https://www.hdm-stuttgart.de/laps/

These challenges can be responded to with various practical recommendations for action, which can be summarised as follows: (1) Recognise and establish didactic centres as key facilities and institutions; (2) establish mission statements for teaching as a feature of quality and culture throughout the university; (3) design and implement innovative pedagogies and L&T scenarios including innovative L&T spaces that enable and foster the shift from teaching to learning (Table 5, right column).

While these recommendations for action are generally directed at various stakeholders, the main addressee of the recommendations listed in Table 5 are interested and engaged staff, particularly teaching staff, and students as well as university leadership. Exemplary addressees are described in the next section and, at the same time, represent cases of good practice in university pedagogy referring to innovative L&T spaces and digitalisation of higher education.

4.4.2 Good practice

In the area of university pedagogy, an example of good practice at HdM is that key competencies are given a core status in teaching (Burmester & Seidl, 2020).

4.5 Digital structures

4.5.1 Challenges and recommendations

Loosely based on (Petschenka et al., 2020, pp.222–225), for the area of digital structures, six core challenges related to L&T spaces can be identified:

- Deficient or lacking digitalisation strategy;
- Deficient or lacking change processes for digitalisation;
- Deficient or lacking profiles and cooperation activities in the area of digitalised L&T spaces;
- Deficient or lacking overview over digital structures and their interfaces;
- Deficient or lacking penetration of almost all work processes by digital structures ;
- Deficient or lacking data privacy (Table 6, left column; also cf. Leiber, T., 2022).

The responses to these challenges could be represented by the following recommendations for action: (1) Implement a digitalisation strategy for L&T spaces; (2) shape change processes for digitalisation; (3) create incentives for profile-building and innovation in L&T with respect to digitalisation; (4) create overview over all digital infrastructure at the university; (5) extend digitalisation of university work processes; (6) implement reliable and comprehensive data privacy regulations (Table 6, right column).

While these recommendations for action are generally directed at various stakeholders, the main addressee of the recommendations listed in Table 6 are leadership at various university levels focussing on strategic issues, teaching staff (and students) focussing on cooperation activities and profile building, ICT staff for the infrastructural and related organisational issues while privacy issues affect everyone involved. Exemplary addressees are described in the next section and, at the same time, represent cases of good practice in digital structures referring to innovative L&T spaces and digitalisation of higher education.

Table 6 | Challenges and recommendations for action in digital structures related to L&T spaces

Challenges	Recommendations for action
Deficient or lacking digitalisation strategy	Create and implement a digitalisation strategy for L&T, particularly L&T spaces
Deficient or lacking change processes for digitalisation	Shape activating and participative change processes for digitalisation (Leiber, 2019; Leiber, 2022)
Deficient or lacking profiles and cooperation activities in the area of digitalised L&T spaces	Create incentives for profile-building cooperation in the area of digitalised L&T spaces Create incentives for digitally enriched L&T
Deficient or lacking overview over digital structures and their interfaces	Create overview, for example, over learning management systems and campus management systems Identify technical interfaces and their relations to actors and responsible individuals and organisational units
Deficient or lacking penetration of almost all work processes by digital structures	Further digitalise university work processes
Deficient or lacking data privacy	Implement the European General Data Protection Regulation (GDPR) (Leiber et al., 2020) or similar approaches

Source | Own compilation

4.5.2 Good practice

As already described in section 3.1, HdM's Structure and Development Plan 2017-2022 understands digitalisation as a ubiquitous phenomenon in the university. Specifically, digitalisation of L&T formats is seen as a core issue and an education political mega trend. Therefore, HdM continuously attempts to complement traditional teaching formats with digital L&T elements to react to the multiple contemporary tasks of (higher) education.

4.6 Physical L&T spaces

4.6.1 Challenges and recommendations

Following considerations of (Petschenka et al., 2020, pp.226–228), for the area of physical L&T spaces, six core challenges related to L&T spaces can be identified:

- Deficient or lacking strategy for physical L&T spaces;
- Deficient or lacking change processes for the implementation of physical L&T spaces;
- Deficient or lacking orientation at learning needs and processes of the design of physical L&T spaces;

- Deficient or lacking hybrid L&T space structures;
- Deficient services and access concepts to physical L&T spaces;
- Deficient or lacking overview over physical L&T spaces (Table 7, left column).

Table 7 | Challenges and recommendations for action in physical L&T spaces

Challenges	Recommendations for action
Deficient or lacking strategy for physical L&T spaces	Create and implement a strategy for physical L&T spaces
Deficient or lacking change processes for the implementation of physical L&T spaces	Shape activating and participative change processes for the implementation of physical L&T spaces (Leiber, 2019; Leiber, 2022)
Deficient or lacking orientation at learning needs and processes of the design of physical L&T spaces	Inform the design and implementation of physical L&T spaces by knowledge of L&T theories, psychology and practice of L&T processes Take care of equipment, amenities and accommodation qualities of the physical L&T spaces
Deficient or lacking hybrid L&T space structures	Check the options of feasibility of hybrid L&T space designs and offers depending on needs, L&T processes and available ICT infrastructure
Deficient services and access concepts to physical L&T spaces	Improve services of physical L&T spaces Create unified access to physical L&T spaces for students and other stakeholders Implement 24/7 physical L&T spaces
Deficient or lacking overview over physical L&T spaces	Create overview over physical L&T spaces Identify physical interfaces and equipment and their relations to actors and responsible individuals and organisational units Offer room booking systems

Source | Own compilation

These challenges can be responded to with various practical recommendations for action, which can be summarised as follows: (1) Implement a strategy for physical L&T spaces; (2) shape change processes for physical L&T spaces; (3) Inform the design and implementation of physical L&T spaces by knowledge of L&T theories, psychology and practice of L&T processes; (4) check the options of feasibility of hybrid L&T space designs and offers; (5) improve services and access to physical L&T spaces; (6) create overview and organise systematic use of physical L&T spaces (Table 7, right column).

While these recommendations for action are generally directed at various stakeholders, the main addressee of the recommendations listed in Table 7 are leadership at various university levels focussing on strategic issues and change management, teaching staff and students focussing on learning needs and processes and hybrid L&T spaces, ICT staff and administration staff for the infrastructural and related organisational issues such as services and open access. Exemplary addressees are described in the next section and, at the same time, represent cases of good practice in physical L&T spaces referring to innovative L&T spaces and digitalisation of higher education.

4.6.2 Good practice

In the area of physical L&T spaces an example of good practice at HdM is the design, research and implementation of Learning Worlds (“Lernwelten”) (Prill, 2019, pp.10–13; see also section 4.7).

4.7 Existent new, innovative L&T spaces and their use at HdM

For about 10 years, HdM has been designing and researching innovative L&T spaces and environments. In 2014 HdM’s Learning World (“Lernwelt”) was opened which offers L&T space(s) for 120 students on an area of 400 m^2.[28] According to HdM, the Learning World is conceived as a learning space that also works as a L&T research laboratory. The furnishing of the L&T space was designed in cooperation with a company for special furniture (Prill, 2019, p.10). The Learning World includes individual and group workstations, mobile furniture, partition walls and large displays that students can set up and use flexibly according to their individual needs. There are around 100 seats in total. A special highlight is an 82-inch wall display with an integrated touchscreen and special team software, which is ideal for interactive applications and presentations. The Learning World can be used during the usual opening hours of the HdM.

In addition to the Learning World, HdM has established innovative L&T spaces, for example, in the Learning Bar (“Lernbar”), the Learning Studio (“Lernatelier”) and the library, see Table 8. More recently, plans were also made for developing Maker Spaces.

Table 8 | Selection of innovative L&T spaces at HdM

Learning World	Area 440 m^2, approx. 100 seats Individual and group workstations, mobile furniture, partition walls and large displays 82 inch wall display with integrated touch screen and special team software
Learning Bar	Area 950 m^2, approx. 120 working places Flexible stools, tables, benches, comfortable sofas and bar tables
Learning Studio	Approx. 20 quiet workstations in the noise-protected area of the library
Library	Area 1200 m^2, approx. 180 working places Many reading corners with sofas and comfortable beanbags, quiet workspaces for self-directed learning and group workspaces with projectors and mobile displays

Source | Own compilation

According to HdM, flexibility and multifunctionality are key issues for Learning Worlds:

> ‘Tables of different sizes and shapes are available, which can be put together and put apart quickly, for example in a “puzzle-like” manner, because most tables are on castors or are very light. Compared to conventional tables, for example, the “puzzle tables”, due

[28] Parts of this section are adopted from (LTSHE-IO1 evalag Report, 2021, pp.48-49).

to their curved shapes, can accommodate more people than usual (cf. Image 5). There are also various functional seating options available to the students. These range from mushroom-shaped ottomans to ordinary height-adjustable swivel chairs to upholstered armchairs or upholstered sofas or beanbags on the floor. All seating and table options therefore also offer different learning settings or convey these to users. Be it concentrated individual or group work at the table, informal exchange in a "lounge" atmosphere or creative brainstorming for a common project. For example, there are also movable screens – which can be quickly connected to laptops and mobile devices – whiteboards, pin boards and flipcharts, which can also be used as room dividers to shield noise and create smaller private room atmospheres. This form of privacy also enables the central horseshoe-shaped seating set, the backrest of which is raised to a high level, thus protecting it from glances and noises from the surroundings. In this way, individual rooms in the room are always created. In general, care was taken to ensure that everything can be redesigned as flexibly and quickly and easily as possible. The flexibility and mobility of the furniture is also used intensively by the students, so that the Learning World looks different every day' (Prill, 2019, p.11).[29]

Image 5 | Spaces in space and "puzzle tables"

Source | Photo: Richard Stang (Prill, 2019, p.12)

The HdM Learning World was also used as a live research laboratory to learn more about the self-organised use of (flexible) L&T space, specifically students' use of learning spaces. To analyse learning activities and their related room settings established by students, three fish-eye cameras were installed that take a picture every ten minutes, whereby pictures of faces were immediately pixelated by a software to guarantee privacy and data protection rights. The produced sequences of pictures give insight into how students arrange the furniture according to their preferences. In addition, the background noise was measured by sound level meters. From several years of observational research, HdM concludes that individual preferences of students are pronounced with regard to seating and arrangement of workplaces. It can also be assumed that the various individual preferences can be met thanks to the flexible spatial structures of HdM's Learning World. According to the initiators and operators of HdM's Learning

[29] Translation into English by the author

World, the (increasing) support of the university leadership and the pedagogical expertise were two decisive success factors for the implementation of the design of the learning spaces (Prill, 2019, p.12).

In this vein, HdM co-designed and implemented a range of further innovative L&T spaces such as Learner Labs (see Images 6 and 7)

Image 6 | Presentation at LearnerLab

Source | (HdM-PLW, 2022)

Image 7 | LearnerLab lounge zone

Source | (HdM-PLW, 2022)

Another specific example of innovative L&T spaces at HdM is the library. It specializes in media and offers a wide range of media and services, covering an area of more than 1,200 m^2. According to HdM, the library team strives to support students in particular in their work and studies in a relaxed and pleasant atmosphere (cf. Images 8 and 9). To this end, recognizing the importance of attractive design, a large number of reading corners with sofas and beanbags are offered. In addition, there are workstations for quiet, independent learning and areas for group work, a large learning centre with a projector, mobile displays and a separate studio with additional workstations and freely available resources such as team tables with fixed displays, mobile partitions, whiteboards and flipcharts. Additional equipment (cables, adapters, remote controls and iPads) can be obtained from the library service point. Last but not least, the atriums of the building are barrier-free and offer an attractive place to linger and enjoy, especially in summer.

Image 8 | Open communication and learning spaces at HdM's library

Source | (HdM, 2022b)

Image 7 | Individual-open learning space(s) at HdM's library

Source | (HdM, 2022b)

Since around 2014, offices at the Stuttgart Media University (HdM) have been designed as innovative spaces of knowledge, learning and working (cf. Image 10) and have become part of everyday life for some of the teachers. Accordingly, they no longer work in individual offices, but in shared offices, which enable and promote encounters and communication with each other. In February 2022, the Donors' Association for German Science (Stifterverband für die deutsche Wissenschaft) awarded the HdM the "University Pearl" ("Hochschulperle") of the month (HdM, 2022a).

Image 10 | The office at HdM: a modern place and space of knowledge, learning and work

Source | (HdM, 2022a)

“University Pearl” was awarded to HdM’s Faculty of Information and Communication for the topic “Future-oriented learning spaces”, which, in this case, were realised by designing and implementing shared offices for teachers with up to 22 workstations, instead of individual offices. Eight years ago this was seen as a big developmental step, when the professors moved into a new building. Open spatial structures and communication elements were combined with retreat options in two-person and three-person offices. The entire work area was clearly separated into office spaces and public zones with multifunctional meeting rooms. The impulse to modernise the lecturers’ rooms came to those responsible as part of a relocation plan for the entire faculty. In addition to the new building, the curricula of all study courses in the faculty should also be modernised: In the future, teaching should focus on problem-solving and methodological skills, on project-oriented and interdisciplinary forms of L&T and on more imparting of key skills. In other words, collaborative L&T and teaching key skills were the new guidelines for the students. In line with this, the working areas of the teachers should also be adapted (HdM, 2022a).

According to the HdM, practical experience has shown that the change from the classic office situation to a meeting and communication room was successful. It is said that the goals and content of courses and teaching modules could be exchanged more quickly and better across subjects. This is seen as an elementary prerequisite for close coordination processes and cross-references in courses or for the design of interdisciplinary teaching and research projects. Social skills such as consideration, discipline, tolerance and the willingness to compromise are now not only taught by teachers in courses, but also practiced by teachers in their everyday work (HdM, 2022a).

5. Stakeholders’ perceptions on the design, implementation and use of L&T spaces at HdM

This section focuses on the perceptions of different stakeholders on the design, implementation and use of L&T spaces at Stuttgart Media University (Hochschule der Medien – HdM). These perceptions and assessments were gathered through semi-structured interviews and focus group discussions.[30] The following stakeholder groups were approached:

- Institutional top managers at the rectorship level (e.g. vice-rector responsible for L&T; vice-rector responsible for infrastructure, including both buildings and spaces as well as ICT)
- Directors of schools and/or departments and/or deans of faculties including deans of study
- Teaching staff (including directors of study programmes)
- QM staff and pedagogy staff with responsibilities in QM of digitalisation of L&T spaces, distance education support and hybrid L&T
- Students
- Higher education institution estate staff

Two further stakeholder groups of non-teaching staff directly involved with L&T (e.g. ICT personnel with responsibilities in digitalisation of L&T spaces, distance education support and hybrid L&T) and architects were not available for interviews at HdM.

All LTSHE partners agreed that it would be helpful to explore the following broad areas:

- The role of L&T physical spaces in supporting and/or promoting new approaches to L&T
- The existent L&T physical spaces and their relevance and usefulness for the development of an adequate and quality L&T process
- What new (innovative) L&T spaces does the institution have? What new (innovative) L&T spaces does the institution need? For/by whom are they needed/required?
- The digital structures needed for blended and hybrid L&T.

Accordingly, guidelines for the semi-structured interviews and focus group discussions were developed and agreed among all LTSHE partners. In the German study case, the interviews and discussions were carried out in German. Hence, the English question guide was translated into German to guideline the interviews and discussions at HdM. Both, the English and the German versions of the question guides for the various stakeholder groups are documented in Appendix 2.

Against this background, six individual semi-structured interview and three semi-structured focus group discussions were carried out in German with HdM representatives from the rectorate, deans of faculties, teaching staff, QM and pedagogy staff, students and HEI estate

[30] Due to the Covid-19 pandemic, all interviews and focus group discussions were carried out online via ZOOM meetings.

staff. The qualitative content analysis of the respondents' responses led to the identification of the several core topics which are used for structuring the responses of each stakeholder group. To anonymize responses the different responses per stakeholder group were combined and are ordered according to the identified core topics. They were then translated into English.

5.1 Rectory

In response to the interview questions, see Appendix 2, the rectorate members discussed the topics listed below.

5.1.1 Self-directed learning, creative and entrepreneurial thinking, and teachers as enablers

According to the rectorate, HdM's approach to L&T is based on the idea that students participate a lot and that there is an active learning part for the students in each teaching unit. It is important for HdM that students contribute and are active in class and working groups. Complementary to the activated self-directed student is the role of teachers and professors to understand themselves as enablers and companions of the learning processes at HdM. This is seen as the most important feature and learning principle of HdM's approach to L&T.

The rectorate emphasizes that the unique feature of HdM is the topic of media which is at the core of all HdM study programmes. Since media work and media use relate to creative procedures and independent action, the HdM sees it as a competitive task to support and encourage students in their creative projects and ventures, said the rectorate. The students are therefore required to be willing to take on responsibility and to think in an entrepreneurial spirit and HdM is supporting them in this learning process. This is the basis for all teaching in the degree programmes and includes that HdM L&T should enable students to deal with learning later in society and put it into practice. This means there is not only the challenge regarding the content – providing students with a good qualification for the job market – it is also a challenge regarding students´ ability to deal with problems and learning challenges later on. In this sense, HdM pursues a holistic approach to L&T where students acquire not only qualifications but competences that allow them to be self-confident and learn to deal with different challenges in a difficult contexts they meet in the job market.

5.1.2 Consequences for the design, equipment and furnishing of buildings, L&T spaces and offices

Therefore, according to the rectorate HdM pursues a policy of making available the supportive and required physical and digital organisational structures, among them most prominently the necessary buildings and L&T spaces for self-directed learning, creative thinking and entrepreneurial approaches. It is seen as very important that learning spaces are available to students on a very low threshold so that easy and broad accessibility is fulfilled. HdM's leadership is clear that, for the learning process, it is crucial not to have additional barriers and obstacles such as, for example, dispensable security instructions etc.

Furthermore, the design and implementation of L&T spaces at HdM is accompanied by theoretical and evidence-informed analyses (Becker & Stang, 2020a; Becker & Stang, 2020b) which flow into the debates and are considered for strategy building and practice on the levels of the university management and the senate.

Against this background and criteria, HdM designed and implemented several types of innovative L&T spaces which together constitute HdM's Learning World[31] (cf. Image 11):

- Library as a learning space endowed with cooperative work spaces

  In the library as a learning space, students have access to digital and non-digital learning materials. In addition, the library supplies cooperative work spaces where students can work together to prepare presentations. A most crucial point of progress is that the furniture in these learning spaces can be used in different ways, students can use it and arrange it in ways they prefer, said the rectorate. In the past, the limited flexibility of L&T spaces used to be a problem, because, for a very long time, teachers encouraged students to act in the ways described while the university did not provide adequate spaces.

- Maker Space in the library

  Students can use the Maker Space according to their interest and preferences. A technician is present who supports adequate use of the Maker Space and helps to avoid activities that may be dangerous for the students' health.

- Production Space

  Students can use the Production Space according to their interest and preferences to implement their ideas. The access to the Production Space is limited since it has some prerequisites such as basic knowledge.

- Specialised laboratories for research-related teaching

  Study programmes decide about whether specialised laboratories should be established while individual institutes are in charge of creating these laboratories.

- Large storage room for media technologies

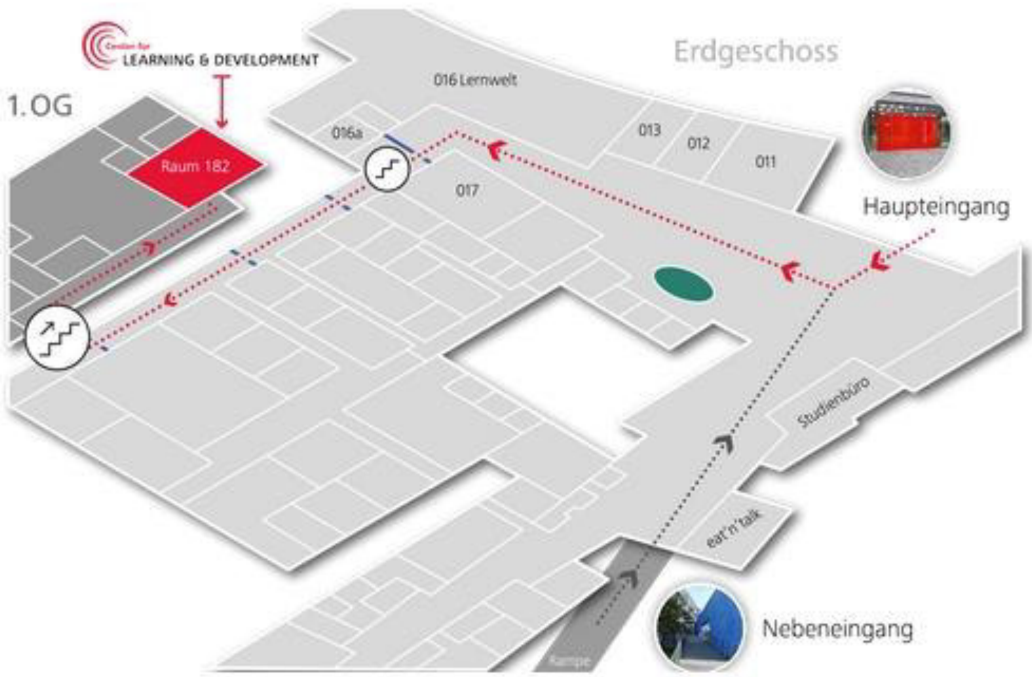
  Students have to talk to a professor in advance and then, they can go to the storage room with his/her approval and the material will be made available (for example to tape a video). There is a list about which material was used how many times. This information is used to keep track of the frequency of the usage of the material and the L&T spaces.

These L&T spaces are supported by a wide variety of materials such as screens, closets and lockers that can be used in different contexts.

[31] For the topic of Learning World University see, for example, Becker & Stang, 2020a; Becker & Stang, 2020b.

The importance of simulation games for L&T in education and vocational training at a media university of applied sciences was also taken into account when L&T spaces were designed and implemented. For example, there are no fixed principles for the type and arrangement of the furniture that is available in the different learning rooms.

Image 11 | Location and spatial arrangement of “Lernwelt” and the Centre for Learning and Development



Source | https://www.hdm-stuttgart.de/studierende/abteilungen/lnd

Another important issue is the innovative teaching technology and required supply hardware. L&T spaces are provided with new white boards which are very flexible L&T tools. Further, L&T spaces are equipped with pillar with pluck sockets for students and teachers, and glass fibre cable-based systems are now introduced in all HdM buildings. When the buildings were created about 20 years ago, it was not clear yet that there would be a need for glass fibre cable connections. This is a lot of work, but we are working on it, the rectorate said.

In addition to L&T spaces, HdM also pursues a new approach to the organisation of offices. Behind this is the assumption that teaching staff needs meeting points for themselves as well as for meeting students. Further, in this context HdM intends to get rid of the strict separation between administration and teaching. The separation is to be abolished and administrative processes are to be more closely integrated into the interaction with the students. This requires larger areas and rooms that can be used by the community, as well as smaller rooms with the opportunity for individual personal discussions.

An example which intends to realise such an approach is HdM’s Centre for Learning and Development (cf. Image 11) which provides further education offers, advice and coaching for teachers, offers for young academics, support offers for students and advice for prospective students and students as well as offers at organisational and university level including quality management.

Another issue at HdM related innovative L&T spaces is the intention of adequate and efficient use of these spaces during the semester and the event-free time between the semesters as well. To achieve this several initiatives are taken. For example, spaces are leased during the event-free time between the semesters. Another initiative is to offer the working spaces and innovative L&T rooms for students' use during the "semester holidays". The observation is that rooms are often used with no further ado and students show up and prefer being at the university than at home. This intensive use is made possible, among other things, by the fact that the university and its L&T and working group infrastructure is easily accessible from 6 am to 9 pm on weekdays, and even on weekends between 8 am and 4 pm.[32] In addition there are also lectures on a regular basis on Saturdays which are actually reserved for lectures, while during the week students prefer to meet and work in groups.

5.1.3 Future prospects around innovative L&T spaces

According to the rectorate, HdM's virtual learning platforms such as Moodle will be (further) integrated into study programmes, and the university further invests in these technologies. However, HdM developed the understanding that there are also many disadvantages regarding online learning and face-to-face L&T is still seen as the preferable option by the rectorate – HdM is seen as a face-to-face university. Further, the HdM rectorate is convinced that hybrid L&T options do not work out adequately, they are of limited utility at best for students and teachers as well. Rather, physical spaces and face-to-face meetings are needed for enabling 'the meeting of minds and unplanned interaction'. This is seen as an important point, which is therefore taken seriously.

In accordance with this understanding, the rectorate thinks about restricting the relative share of online L&T to 20 %. At the same time, it is the adequate combination of online and face-to-face L&T that counts. There are study programmes where it reasonable to offer virtual teaching, and others where this is less reasonable. We have to ask ourselves, also in comparison to other universities such as, for example the distance learning university Hagen or Duale Hochschule Baden-Württemberg: How do we explain our profile to the public and how do we explain our uniqueness? Explain what we do differently. Why do students come to our university? What is the added value for them? And we would like to tell people: We prefer that you are physically present at the university.

Nevertheless, in favour of online L&T there is a new proposal from the rectorate to change the traditional schedule that is based on 90 minutes for each teaching unit. The proposal is based on the observation that this traditional structure is no longer fit for purpose. This is relevant in particular once digital and face-to-face meetings are mixed, because this is very demanding for the infrastructure at the university. There is a need for more time blocks that are interconnected. Therefore, there is this idea of organising more teaching units in blocks.

[32] Due to liability issues the university has always to be closed between midnight and 6 am.

Currently, the HdM has old buildings in the range of 23,000 m^2. In the rectorate, it is assumed that with an additional 5,000 m^2 the needs for the next 20 years could be met. Against this background, a further plan relates to the conception and design of a new building with 3,000 m^2 use area. HdM leadership has concocted a plan and would like to initiate construction works in 2023. The building is planned to be ready in 2025. The plan says that these 3000 m^2 will extend over four floors and each floor will be divided into two parts. One of these parts will be reserved for workplaces, coworking spaces and creative labs for students. On this basis, this new building will represent a good combination of workplaces for students and L&T spaces with working spaces for research staff and third-party funded employees in the area of research and space for professors. The design and implementation of this new building is seen as a chance to introduce a new fundamental change with respect to infrastructure, particularly L&T spaces, including a clear sustainability dimension.

While the rectorate is enthusiastic about this spatially open, flexible and multiple-use-oriented new building, it is also assumed that it would not make sense to build all buildings of the university in this way. Instead, leeway should be left and possibilities to students and employees so that they can choose where and how they would like to learn and work.

Overall, the rectorate sees an advantage of HdM in the fact that the university is rather small which makes keeping development paths transparent easier as well as pushing forward reforms and changes.

5.2 Vice Deans

5.2.1 L&T spaces: organisational tradition, digitalisation and deficits

The HdM is a university of applied science with the motto "Studying, Knowing, Doing": Doing is very important for the L&T setting. The aspects of application and L&T space are therefore of great importance. What distinguishes the HdM is “learning in spaces”, in the laboratory, in the film or music studio etc. – for us this is an essential part of education and vocational training. Rooms are therefore more than lecture halls and seminar rooms, but integrated places for HdM’s teaching concepts and curricula. Regarding the strategy: rooms have always been part of learning arrangements for HdM.

The approached Vice Deans appreciate that HdM’s leadership (rectorate) supports them in the design (and implementation) of physical L&T spaces away from auditoriums and seminar rooms, for example, in the innovative design of the library and the Learning World, and the redesign of unoccupied spaces. Another positive aspect is that the university leadership gives the responsibility for L&T spaces to the study programs as organisational units, for example concerning the redesign of the seminar rooms, provided that the resources are available.

The Vice Deans agree upon this inherited understanding and practice: Anyone who needs something is initially responsible for themselves and can decide/design themselves. What must be solved, however, the basic problem of missing spaces. Significantly more space is needed for joint projects, for working together in project teams. This cannot be solved by individuals, rather an institutional strategy is required that is missing so far. Such strategy is necessary, for example, to create more student workspaces – at present students have to organise themselves outside because the HdM does not provide enough adequate L&T space. Compared to other universities, the Vice Deans say, HdM has come a long way, at least the problem is seen and areas have already been reallocated.

With respect to digitalisation of L&T spaces the Vice Deans see a lack of coherence and support, however. For this area, a ”fragmented landscape“ is stated while a unified concept of learning space does not exist – if that is desired and possible at all, the interviewees add. Currently there are two learning platforms, several conference systems and different tools for online collaboration that are welcomed. However, in the view of the Vice Deans as a media university HdM does not have a strong tradition of digital L&T – even if many (outside the university) expect it differently. Instead, presence, project-oriented teaching and vocational training, doing things on site – that's what HdM was before Corona.

With respect to student satisfaction, it is recognised that course assessments by students show an increasing spread and variance of judgements. Digital teaching usually works great for high-performing students, but it becomes very problematic for others. The mean values of the satisfaction ratings appear unchanged, but are not meaningful on their own due to the wide spread.

5.2.2 Strategy for face-to-face, digital and hybrid L&T

As at many places in educational settings, the Corona pandemic has been experienced as a trigger for new ways of action at HdM. The interviewed Vice Deans express their opinion that this experience must be evaluated to determine the advantages and disadvantages of face-to-face and digital L&T, respectively. Face-to-face L&T and physical presence and action always had a high priority at the university. HdM is now in need to bring together the digital and presence approaches and activities to develop a strategy that encompasses both.

According to the Vice Deans, there are fears, however, among the decision-makers about the negative consequences that the transition from the physical to the digital space could have such as, for example, decreasing cohesion among the colleagues; altered and diminished perception by the students; insufficient use of buildings. This reluctance of the decision-makers still seems to prevent HdM from developing a strategy for the digitalised future. Actually, the university plans to return to presence in (autumn) 2022, only a quarter of the student body should be allowed to take place digitally – according to the plan.

In the view of the Vice Deans, the fear of losing controllability for the fall of 2022 has narrowed the view and led to a narrow management policy, while there are much greater opportunities in hybrid forms, including the possibility to avoid permanent overcrowding of the rooms or to compensate for the missing rooms and to achieve flexibility for teachers and students.

For the Vice Deans, the Covid-19 pandemic has generated (more) awareness of the topic of L&T space, for example, it made obvious that learning takes place differently on site and online. Content and knowledge can be conveyed well online, while analog settings remain important, even if the weighting has of course shifted in comparison in the recent past. The pandemic phase has shown that some things also work hybrid or exclusively online – this raises new questions and requires new decisions.

5.2.3 L&T spaces: expectations for the future

According to the stakeholder group it is unclear which spaces will be available with the third new building. The vice deans were not informed so far. The interviewees ask the question how the entire university and the expertise available in the university could be involved in the design and allocation of the new building and spaces. For example, there are experts for Maker Spaces and engineers at HdM but they have not been included into the planning of the new building.[33]

According to the interviewees, there are suitable rooms for (almost sufficiently) many needs, but there are not enough of them. This affects the timetables in an unfavourable way: the priority given to special rooms leads to unfavourable off-peak times and long breaks while lounges are lacking. Or the timetable is pleasant, but the rooms are inadequate. In addition, the students have a wide range of options, as there is only a fixed timetable for the first three semesters. However, this freedom makes it difficult for the spatial organisation to know in advance who will be where and when (at home or in the university rooms and if so, in which ones). Digital teaching is further tightening the timetable here. Digitalisation thus creates new organisational and structuring tasks. The interviewees also object that the HdM's need for space is known to the state government, but is used there as a means of political argumentation and is not seen as a factual problem.

To the knowledge of the interviewed stakeholder group there is no explicit HdM strategy for the design and implementation of L&T spaces. However, there is an institutional mission statement and a mission statement for teaching that was created under the leadership of the Centers for Learning and Development. The basic principles of the HdM on L&T are anchored here, i.e., a derivation in relation to L&T spaces would be possible.

Further to the strategy question, the interviewees remark that a systematic and broader evaluation of L&T spaces does not exist. The assessment of L&T spaces is mainly based on individual positive impressions and feelings. In addition, research is even being carried out in the area of the Learning World, with different room arrangements being tested in observational studies (frequency of use, etc.). However, the results have not yet been reflected in the planning of the university. There is also no specific needs assessment among the students.

Another important topic for the future is the workspace situation for teachers. There is a tension here between open-plan offices and individual offices. New room concepts therefore not only affect teaching and recreation rooms as well as laboratories, but also the consultation and preparation rooms of the teachers. Combination options between open-plan offices and small flexible rooms are also needed here in order to be able to switch to short-term discussions with individuals or for group work or for concentrated work.

Other future topics in the area of creating university buildings are the choice of building material and the establishment of integrated centers for changing usage scenarios. With regard to the first aspect, the HdM relies on the material concrete, which allows flexible floor plan planning

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[33] According to another focus group discussion, however, those significantly involved in the earlier development of the Learning World are also involved in the planning of the new building. This may not have been sufficiently communicated within the university, it seems.

through the multi-storey construction and allows great flexibility in room integration. Integrated centers, which are becoming important in urban development, are about community use and changing usage scenarios: now a daycare center, later a senior citizens' café. The stakeholder group raises the question of whether the university's current focus on the "We build for us" approach - which every university in Stuttgart also does - may no longer make sense. It should perhaps be thought more in the direction of community use and access concepts, building management. The HdM is still far away from a campus that combines life and study. In this context, it is also noted that the quality of stay in the HdM area can be significantly improved. For example, there are too few offers for catering (e.g. cafeteria). And the HdM buildings are architecturally appealing, but the immediate surroundings are clearly inferior: the university location Stuttgart-Vaihingen is more of a "science factory city", a "university industrial area".

Finally, the stakeholder group interviewed draws an interim conclusion on digital and hybrid teaching in the pandemic, which is currently being processed in various working groups. Accordingly, teachers offer added value in direct social interaction, while the pure transfer of knowledge can take place in other ways. Discourse and reflection need physical spaces, especially smaller spaces for assembling, for meetings. Lecture halls are unsuitable for this. However, there are relatively few smaller rooms for around 10 people at the university. The rooms of faculty 3 are a positive exemplary exception here, there are, for example, pre-installed screens for sharing and visualisation and good workspaces for groups. It is important that new, innovative L&T spaces are supported by clear, functional and needs-based usage perspectives.

Internal university blockades in the area of design and implementation of L&T spaces are not identified. When it comes to rooms, there is a high level of sensitivity.

5.3 Teaching staff

5.3.1 Advantages and disadvantages of L&T spaces: physical, virtual, hybrid

Like other interviewed stakeholder groups, teaching staff at HdM appreciates the existing innovative L&T spaces such as the Learning World, the Maker Space, spaces endowed with flexible furniture and individual working places in the library. Further, the interviewed teaching staff clearly expresses the view that physical L&T spaces and virtual L&T spaces are both important for a contemporary, up-to-date implementation of L&T processes. According to the interviewees, the physical L&T spaces such as the Learning World are central to the design of new L&T arrangements. For example, only a few didactic concepts can be implemented in a classic lecture hall. As in this example, in many cases it is primarily the spatial structures that strongly predetermine the feasibility of didactic possibilities. At the same time, teaching staff appreciates the performance and options of virtual L&T spaces such as realised, for example, by MS Teams which offers a lot of functions (e.g., build teams; store documents; joint processing of documents; conduct voting) in addition to video conferencing. There is positive experience during the Covid-19 pandemic with such systems and the intention to transfer this into the post-pandemic time.

It is clear to the stakeholders that spatial planning and room booking for courses are complex undertakings given the variety of room types, the requirements of teachers and students and the basic shortage of space. However, there is a clear wish that improvements should be made here.[34] In this context, stakeholders also express the suspicion that room bookings are made to a not inconsiderable extent, which are then not used but are blocked for other interested parties. In addition, the problem of "feudal" claims to space is addressed by the interviewees. Rooms "belong" to faculties, study programs or professors, who ultimately measure their importance by the amount of "room ownership". As a result, there is a lot of unused space as these "room owners" do not make these spaces available to the other university members. Finally, a slightly simpler problem is that the release of a previously booked room is relatively complicated and without feedback, so that teachers who would release a booked room again for certain reasons ultimately do not do so. These problems also contribute to the noted "lack of space". A transparent, centralised and participative-democratic room register and room booking system could help to solve such problems common in universities.

The interviewees had bad experience with hybrid L&T events during the Covid-19 pandemic. The main reason for this is ultimately various asymmetries between the participants in terms of communication and social psychology. Only an optimised, dynamic audio-visual transfer of information from physical space to virtual space and vice versa (e.g., dynamic camera and microphone management) allows reasonably satisfactory results. As a rule, professional moderation with a good overview of the situation is also required in order to permanently integrate as many participants as possible. The larger and more heterogeneous the participating groups are in physical and virtual space, the more difficult this becomes. With regard to spatial-physical contacts (e.g., eye contact; body language), a hybrid event ultimately always remains asymmetrical. This is why hybrid courses are particularly problematic when it comes to intensive contact with the students and when there is also a lot about soft skills. All these problems together make it very difficult for a regular course with one teacher to implement a successful hybrid course.

The interviewees have some experience with architects and are somehow critical about them in the German higher education system. The criticism refers mainly to the orientation of architects towards aesthetic design features, particularly the external and general aesthetic appearance of the buildings. According to the interviewed stakeholder group, issues of enabling innovative and creative L&T processes often is not part or at the core of the architects' portfolios.[35] However, this problematic situation also seems to be gradually changing in Germany. In particular, architects are now suddenly very open to new forms of university architecture for the new building of the HdM.

5.3.2 Desires and expectations for innovative L&T spaces

The stakeholder group, like several others, points out that there are too few innovative L&T spaces such as maker spaces at HdM. Therefore, to get a desired innovative L&T space booked

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[34] Some progress is reported here insofar as individual study programs maintain a partially decentralised room booking system which includes the non-trivial nomination of persons – professors and employees – responsible for the space equipment and security of users while using the space.

[35] Ironically, the criticism goes even a step further when interviewees characterise the design and implementation of L&T spaces as a difficult undertaking: the ministry wants innovation, the building authority wants innovation, and when you then start with innovation, you realise: actually they just meant: it should look a bit smarter.

for a certain class is often not easy or even impossible. In particular, desired room functions often cannot be specified in room planning because the level of availability is too low. On the other hand, there are also cases where innovative L&T spaces appear as available at the fringes of the timetable, but could not be booked before. Finally, it is also mentioned as a deficit that individual innovative L&T spaces are converted into offices, for example, due to the general lack of space, without the users of the L&T spaces having the impression that they are involved in the planning of such processes.

Another desideratum mentioned is to have more small rooms for groupwork of groups between 5 and 10 participants. These rooms have to equipped with innovative furniture and infrastructure (e.g., pin walls; white boards; electronic technology such as computers and screens). A further future need of universities is project offices for students which can be rented by student project groups per semester. Such project offices very much mimic the work situation in industry and help to prepare for the job. They should also include spaces where project results, that may be needed at another point in time, can be temporarily stored. In addition, the Innovation Space of the Technical University Eindhoven is mentioned which implements a "non-hierarchic" large L&T space area where professors and students work together in various ways as enabled by the innovative space equipment. By its own account, the Innovation Space is "the centre of expertise for challenge-based learning and student entrepreneurship at TU Eindhoven, a learning hub for education innovation and an open community where students, researchers, industry, and societal organisations can exchange knowledge and develop responsible solutions to real world-challenges."[36]

This is followed by an emphasis on the importance of L&T spaces being available that students can use fully autonomously and without the direct involvement, presence and responsibility of professors. This means that students should have secure access to certain L&T spaces independently of the teaching staff, which they can use unsupervised and leave and return at any time (e.g. to spend a break outside).

A development perspective of L&T, which is already being pursued in some schools and universities throughout Europe (e.g. Alto University in Finland; University of Delft; University of Eindhoven, SRH Hochschule Heidelberg), envisages organising the study fundamentally differently and equipping it with the appropriate spatial structures. For example, classrooms and inflexible seminar rooms are dispensed with. Rather, each student organises their learning processes individually in group work and in individual work, for example also according to the inverted classroom model, and decides when they take their exams etc. Or courses take place exclusively as block courses, i.e. four or six weeks intensive, team-oriented daily block events alternate with freely configurable learning, reflection and exam preparation phases.

Overall, it still seems to be a desideratum to organise the design and implementation process of L&T spaces in a systematic and participatory-democratic manner. At least it is not always

[36] https://www.tue.nl/en/education/tue-innovation-space/

transparent for all those affected how the integration between leadership, needs assessments or needs-relevant groups and architecture or architects works.[37]

5.4 QM staff and pedagogy staff

5.4.1 L&T spaces: opportunities, limitations and needs

From the perspective of educational IT, Centre for Learning Development and QM, it is emphasized that L&T space including its physical, virtual and hybrid structures and organisational options is the basic framework for L&T. In other words, L&T space co-determines which L&T methodologies and technologies can be applied, which L&T situations can be realised. In addition, the design and equipment of L&T spaces can generate an atmosphere that is very important for the success of L&T of students and teachers and for their well-being with respect to the L&T context. Spaces can be inspiring but also limiting with respect to emotional life, cognitive processes and, sometimes, privacy. For example, the furnishing of a room can inspire people to consider, use and further develop new forms of L&T. However, innovative L&T processes can also be hindered if no suitable L&T spaces are made available. The motivation and enthusiasm of both teachers and students can quickly reach their limits if innovative projects cannot be implemented with the available equipment.

Flexibility of L&T spaces is also supportive or even required if experience-based group work is to be carried out and the mood and learning process of individual groups is to be effectively supervised. It can also be important to be able to redesign rooms according to the situation in such a way that a trusting atmosphere can be created for a unit, because perhaps critical thoughts should also be expressed that teachers would like to receive.

Based on the experience during the pandemic, there is a perception that much more could be realized in virtual and hybrid form beyond the pandemic "emergency program".

According to the interviewees, HdM has some very good innovative L&T spaces which allow for the combination of virtual and hybrid events, group work and individual work phases etc. However, innovative L&T spaces are so rare that given the high demand on the part of the users, there is quite a high level of competition. At the same time, the majority of L&T spaces is "classic" in the sense of lecture halls, seminar rooms with heavy tables and chairs, relatively narrow seating, also because of the lack of space, where it is also a logistical challenge to implement a somewhat more open concept with the tables.

HdM's Learning World is mentioned as a positive example and model for innovative, more flexible and multi-functional L&T spaces. However, the interviewees mention the observation that in non-pandemic times and high presence level of students, the Learning World is usually crowded. So, more such L&T spaces are needed.

In this context, it is pointed out that when implementing modern digital settings, care must be taken to ensure that conception, design and specific equipment plans first have to be developed

[37] Further research could certainly bring more information and clarification here. However, this exceeds what is achievable within the framework of the LTSHE project.

and that procurements are only made after the conception has been optimally clarified. In this context, the interviewees generally refer to occurrences of bad planning and bad investments, since the most modern technology procured could not be used for various reasons (e.g. non-suitability in the existing premises; rejection by the potential users; too complicated operation).

As far as decisions about the design and implementation of L&T spaces at the HdM are concerned, QM and pedagogy staff are only sporadically involved, for example in the workshop of the Fraunhofer Institute for planning the new building that is to be built in the next few years. There is no systematic overview of who is otherwise regularly involved in decisions about the design and implementation of L&T spaces.

5.4.2 L&T spaces: expectations for the future

With regard to digitalisation and the implementation of innovative L&T spaces, the interviewees express the following views: If digitalisation is actually to be pushed further, which is desirable, and one does not simply go back to the “pre-pandemic normal”, then many more rooms will definitely be needed , in which hybrid courses or both forms of teaching are possible and can be combined. This means that flexible rooms are required that have the equipment to realise different L&T settings. For example, the furniture must not be stationary and intended for “I sit and write in my place”, but it must be movable and height-adjustable, for example, it must be possible to form small groups in order to work together on a computer, but also on a document together and papers or anything practical. This flexibility of L&T spaces is not only important for the students, but also for teachers, for whom, for example, further training events on innovative teaching are offered. So here L&T spaces are needed in which teachers can try things out and gain experience: How does that affect me as a participant when I suddenly have the opportunity to stand up or lean back without having a desk, etc. ? What does that do to me as a teacher when I sit in a different setting?

In addition, this stakeholder group also addresses the urgent need for more individual study places for students and the need for more Maker Spaces and Production Spaces. Possibilities of effective and creative inter-university collaboration in L&T on the basis of virtual and hybrid L&T spaces are also mentioned and foreseen as a future promising task. With respect to individual study places for students it is seen as a desirable option that L&T spaces can be made more “individualized” at times – e.g. during exam preparation phases – and outside of these phases more open and more group-oriented. In general, the stakeholder group emphasizes the importance of aligning the L&T processes and the equipment of the L&T spaces with the current job market requirements that the graduates are confronted with.[38] For example, with regard to individual and group-specific study work places, the study conditions should to some extent anticipate the conditions that actually exist in the professional field in order to train the students’ skills accordingly and to avoid disappointed expectations as far as possible.

With regard to the future of hybrid L&T at the HdM, the stakeholder group made the following statements: There are different representatives at the university when it comes to the

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[38] In principle, such requirements are checked in the accreditation procedures by external practitioners from industry.

proportion of digital and “the-how-we-always-had-it” teaching. There are those who can't wait for things to finally go back to how they were used to. Then there are those who say: it's clear, the last three semesters - nobody wants that in the long run. That is why now is the time to think about the characteristics and conditions of good teaching under modern technical conditions. Further, the experience with hybrid L&T events was very negative at HdM, in technical, organisational and pedagogical terms. In the view of the interviewees, hybrid sessions in which some participants are present on site and some remotely connected at the same time can only be useful for trans-university (research) projects but not for typical L&T sessions at an individual university.

On the other hand, blended learning, which is actually already considered the standard, is rated positively, since on-site and online phases alternate equally for all students involved (e.g. online self-study for preparation in the inverted classroom model and on-site critical discussion, application and reflection of what has been learned).

Nevertheless, blended learning also generates organisational and infrastructural problems in the course of a study week and every study day that are not trivial. If, for example, a large number of the 5,000 students have to go online from time to time while analog courses are taking place before and after – where do the students stay in the transition and intermediate phases? Similarly, if larger parts of the study week are taking place online, how will students (and teachers) organize their housing situation with regard to a second home close to the university if their first home is further away from the university? For teachers, questions of working time accounting also play a role here, which currently do not seem to have been finally legally clarified. According to the interviewees these and related questions are tackled at HdM. For example, a working group on the digitalization strategy exists.

In assessments of L&T, students primarily complain about the equipment or specially available rooms that there are too few sockets. Another desideratum mentioned by student feedback is that different teachers prefer different software for online L&T such as ZOOM or BigBlueButton or others. Students experience the need to constantly adjust to other systems as complicated and expect more unification based on mandatory requirements. However, this student criticism is in turn counteracted by the fact that after completing studies, the job often requires flexibility in dealing with different software systems, which is also emphasized by practice and agency representatives in accreditation procedures. In this respect, the knowledgeable handling of different software systems is actually to be understood as an advantage for professional life.

Finally, it was mentioned that in Educational IT a project is funded to develop a HdM-specific competence model of 21st-century competences in digitalisation and usage of innovative L&T spaces which should ultimately also provide a basis for a range of courses for all faculties of the HdM.

5.5 Students

5.5.1 Critical views on existing L&T spaces and their use

The individual representative of the stakeholder group of students highlighted, that there is a general lack of rooms at HdM which is particularly noticeable because many students have free periods for which they cannot book rooms. In addition, the rooms include more or less the same furnishing and equipment and are not context-specific and use-specific equipped. For example, silent rooms for individual work and specially equipped rooms for group work are not sufficiently differentiated with respect to their respective furnishing. Even as there is a lot of group-oriented work at the university, the equipment of rooms is largely all the same. Another critical point are rooms without daylight – usually lecture halls – which some students classify as hindering learning. It is seen positively, however, that In many rooms the furniture arrangement is variable.

Further, although in some cases specially equipped L&T spaces for collaborative work exist, they are still not suitable. For example, the library, would be a well-equipped room but cannot be used adequately because of the noise.

A large proportion of the teaching is in the manner of frontal teaching, which is why modern forms of room furnishing tend to not play a major role at HdM and might even be a hindrance. In this sense, it seems to be a good fit, that many rooms are more traditionally equipped while some rooms are well designed for group work. In other words, according to the student interview many teachers are still using traditional methods and this fits to traditionally equipped L&T spaces. Only few rooms support creative L&T methods. Modern or creative ways of L&T are rather not part of the some programmes at least.[39]

In general, there is a lack of acquaintance of students with L&T processes. Particularly, there are students who are interested, but many don't care. There are also projects in this direction and an exchange about L&T at the university.

Despite all criticism, it is appreciated that there are innovative activities at the university, for example, the Learning World ("Lernwelt") or the White Egg ("weißes Ei"), and that many L&T spaces support innovative variations of the equipment. In the virtual area, the university is limited to Moodle and Zoom which is not seen as innovative from the students point of view.

According to the surveyee, there were no options to collect experience with simultaneous hybrid L&T settings, the only options offered by HdM being either digital or in present. Further, digital teaching in the student's case did not include different methods but the traditional on-site methods were transferred into the digital space and there was no use of new media. In this sense, hybrid teaching and/or learning does not adequately take place at the university, the student said.

Starting in summer and autumn 2021, the transition back to presence L&T was overshadowed by discussions on hybrid formats, but nothing noteworthy has been implemented yet. The student confirms that hybrid formats could lead to asymmetries in L&T options and use among students, However, the current situation with its unclarified interplay of contesting and

[39] However, the interview does not provide a clear distinction between creative teaching methods and creative teaching content on the side of the interviewee. Further, the interview cannot provide reliable information on the relation of modern teaching methods and (traditional) room equipment in other study programmes.

competitive approaches is difficult. Anyway, it calls for teachers to try out more methods and gain experience.

An additional point of criticism is that student evaluation of teaching (e.g., through student satisfaction surveys) does not adequately refer to the premises and L&T spaces. While learning success is surveyed, no explicit reference is made to L&T spaces.[40]

5.5.2 Concerns and desires about future L&T spaces

In general, the student interviewee thinks that HdM is already well equipped and that responsible people at the university are concerned about L&T spaces and its equipment. The student expresses the view that she cannot foresee the digital possibilities of the future, but new developments should always be considered in terms of their suitability for the university, while costs also play a role. L&T space equipment always depends on the situation. Many things are also in flux and it is certain, that we cannot set up rooms for 20 years from now, while many L&T formats will also remain.

From the students' point of view, important developments in the future would be to implement options and L&T space facilities to write down and visualise short-term thoughts, for example by implementing Maker Spaces and Design Spaces. Important tools are

- Digital Whiteboards
- Flexible table design
- Comfortable furniture, so that you can sit well

Equality and inclusion should also be taken into account so that disadvantaged groups can also be integrated into the university, as there is a need for improvement at HdM, for example, with respect to wheelchair access, access for people with visual impairments (lettering), etc.

When asked whether students are involved in the development of new L&T spaces the answer is ambivalent. On the one hand, students committee members are involved in many discussions including discourses about L&T spaces, but there are no systematic processes that involve student participation in the processes of design and implementation of L&T spaces.[41] A situative exception to this were some interviews of the Fraunhofer Institut in the context of planning a new building. Such occasions may be suitable for facilitating students' to be more and more interested and involved in participating discussions about L&T spaces. On the other hand there seems to be only little interest from students to participate. For example, In a concrete attempt to interest students in a discussion, three or four ended up participating. From their point of

[40] Further, the student thinks that the didactic centre offers workshops: e. g., mental health week, how healthy am I doing under the Corona pandemic. However, the workshops had very different and low bookings and utilisations – students seemed not to be prepared to deal with this.
[41] A concrete example, but not directly related to L&T, is a parking lot that was eliminated through the construction of a new building. Unfortunately, although students were involved in the planning process, no solution was found and students even considered protesting against it, as the decision was made at state level without considering local interests.

view, the university would give the students more participation, but due to the low level of interest, this is often not thought of at all he HdM's organisational levels.

In the students' view, the willingness and professional training of teachers and technical staff in L&T space issues is very important so that teachers are also able to develop innovative ideas, such as for example, recording lessons and making them available as a stream. However, students should also receive good support because whether digital and innovative learning formats can stimulate discourse is often not comprehensible for students.

Young learners straight out of school certainly have difficulties with fully digital teaching formats at first. The student suspects that the university's didactics centre offers classifications of learning types, but that students do not systematically think about what kind of learner they are. This topic does not generate much interest among students and often does not go beyond defining types. As recommendation, students should not be confronted with abstract models, workshops would be better, though this often does not work online.

According to the above criticism, it is recommended that L&T spaces should be recorded in evaluations.

The student, being in her final Bachelor semester, said that she copes well with virtual forms of learning and enjoys doing it. She looks forward to the flexibility of learning in online study and is looking forward to more digital offerings. Less travel time is very attractive and part-time jobs can be integrated well into the daily schedule. In group formats, however, there is a great potential for conflict, as the participation of the individual in the overall result can be grasped even less. Thus dissatisfaction of individual students with the overall grade is very common. The student said, that many exam performances are designed for equal marks in group work, which is a big problem at present, but it is being worked on. As a result, interpersonal problems can also be raised by digital and hybrid L&T processes.

5.6 HEI estate staff

5.6.1 Existing L&T spaces: advantages, disadvantages and needs

In their self-image, HEI estate staff feels responsible for the equipment and furniture of (physical) L&T spaces, while the responsibility for the virtual, digital L&T spaces' equipment and infrastructure is with the IT department.[42] HEI estate staff emphasizes that they are dependent on the feedback from L&T, teachers and students. According to HEI estate staff, HdM still has relatively many classical L&T spaces, i.e., traditional lecture halls and seminar rooms. In addition, HdM has a considerable number of very special L&T rooms, in the sense of laboratories or practical training rooms, where the technical equipment is actually very specifically adapted to the corresponding subjects or lectures. According to HEI estate staff, the equipment of classrooms is sometimes so special that a room can then only be used by one course for a lecture, and then, if things go wrong, it is empty half the time because someone else cannot

[42] Remark: The interviews and focus group discussions suggest that a more intensified communication and collaboration between HEI estate staff and IT department might be helpful for together designing and implementing physical, virtual and hybrid L&T spaces.

effectively use this space.[43] To make a more flexible, wider and permanent use of class rooms possible is a task that HEI estate and technical staff is working on.

With respect to virtual L&T spaces HEI estate staff gives the following assessment: HdM was planning to establish a centralised, university-wide virtual learning environment already before the Covid-19 pandemic appeared. However, this virtual learning environment was not yet implemented and somehow usable. Because of the pandemic, there was actionism in many places, which led to the fact that there are currently many different virtual teaching rooms at the HdM, which are then again very specifically adapted to the courses and users. And there are various platforms on which this takes place, and because the faculties, subjects and teachers developed them themselves, the estate staff and the ICT department lack an overview of how many virtual classrooms and platforms there are in the end and which exactly is used everywhere at the end.

According to HEI estate staff, HdM is on a good way with respect to the implementation of hybrid L&T spaces, for example, equipping rooms with camera and streaming technology. There are L&T spaces with in-house transmission, which are also well used, and also individual well-equipped rooms with the possibility of external transmission. The technical basis for the design and equipment of hybrid L&T spaces is therefore in place. However, there is still a need for standardization because at the moment, for example, different users of hybrid L&T spaces are using different software solutions that do not always match the room equipment, so that malfunctions can occur or teachers have to bring their own streaming device for outside broadcasts, which not all teachers are able to manage.

Concerning pure student learning spaces, according to HEI estate staff HdM is relatively poorly equipped in terms of sheer numbers: HdM has very few student learning places for self-study. HdM now has the library that can be used, and also the Learning World area with a total area of 400 m², which is relatively innovative in terms of furniture and technology, where the students can in principle design the learning space freely: they can, for example, move furniture and arrange computers, screens and partitions as needed. This is actually relatively modern, according to HEI estate staff, and is also used very well, but of course it is not sufficient in relation to 5,000 students. HdM therefore uses a lot of space in foyers and corridors where it is possible and permissible, also in terms of fire protection and escape routes, to offer additional space. However, it remains an essential part of the requirement for the new building, to have more innovative spaces for student self-study and student learning.

HEI estate staff also confirms that before the Covid-10 pandemic, a lot of L&T activities took place at the HdM on-site in person, more than one would expect at a media university. The assessment is that there are other universities where more digital/virtual or hybrid activities took place even without pandemic restrictions. The reluctance or rejection of more digitalised L&T activities may sometimes be due to the needs of the subject and the teaching-learning processes, sometimes also to the lack of L&T space equipment, but often simply to the

[43] Examples of such specific L&T spaces are the recording studio, the TV studio and the television studio, some with large areas. Here other uses are sometimes really difficult. Nevertheless, this is attempted, for example by the Institute for Moderation using the television studio instead of a lecture hall for moderator training.

preferences of the teachers who want personal and physical contact with the students or reject the digital design of the L&T processes. It remains an exciting question as to how virtual and hybrid L&T activities will continue after the Covid-19 pandemic.

5.6.2 Innovative and future L&T spaces: provision, needs and expectations

According to HEI estate staff, HdM is usually equipped with state-of-the-art technical and digital equipment which is oriented at the up-to-date technology standards available in industry (the working places of most alumni), so that education and vocational training can take place on the levels of current industry standards which is a core goal of HdM. An example is the equipment of three large lecture rooms at HdM equipped with streaming technology where the complete functional menu can be controlled with a touch screen. Another well-known example is the HdM Learning World with its 400 m² area of flexible room layout and flexible furniture. Attempts are also being made to apply this concept in the library, insofar as this is possible due to the spatial requirements and furniture such as bookshelves.

HdM's HEI estate staff sees various reasons for designing and implementing innovative L&T spaces, while HEI estate staff, due to their core tasks and responsibilities, are usually not involved in the design processes of L&T spaces but only during procurement or tendering, when it comes to what needs to be illuminated, which escape routes need to be clear and how can this be done, or which media technology equipment is relevant and applicable. The leading ideas for the implementation of L&T spaces, according to HEI estate staff, include technical and didactic requirements from teaching, didactic requirements for the learning places, to be up to date with the range of courses and the L&T spaces or to try something new, but also a high level of practicality in everyday life for users, in particular lecturers and students who are not very tech-savvy or who do not want to go through a lengthy basic instruction before using it (which actually applies to almost all users). From a technical point of view, the simple, self-evident handling through learning by doing is a central feature for a successful conception and implementation of innovative L&T spaces.[44]

As already mentioned, according to the HEI estate staff, the focus of demand with regard to innovative L&T spaces is in the area of learning workplaces for students, which can be used freely, especially for self-study, and can be used dynamically and flexibly. This should be taken into account in the currently planned new building. The intention is to design the areas as flexibly as possible, i.e. not to restrict or specify the use structurally as far as possible, but to leave as much as possible open during construction. This should make the HdM flexible and responsive, for example in order to be able to react to changing needs for self-study places or seminar rooms at short notice in the semester cycle by redesigning the room equipment. The conception and approach here is fundamentally based on the successful model of the Learning World. Another reason for the desired flexibility of the L&T spaces is seen in the fact that students are challenged and encouraged constructively and creatively when they are more or less forced by the L&T

[44] As an example at the HdM that probably does not meet this condition, a larger digital touch display in the learning world is mentioned, which can be used as a digital whiteboard, but is obviously not used much, especially by students, since the wireless connection of end devices with the Whiteboard is not sufficiently user-friendly (e.g. difficult dialing in, conflicting software).

spaces to first think about how I would like to work: what furniture should I use now and with which device do I want to work.

For HEI estate staff, with respect to the support necessary for using the new L&T spaces the most important point and goal is to make later support superfluous – except in case of error and malfunction. It can certainly be the case that the adequate and effective use of the L&T spaces requires a healthy curiosity, and users might try something, whether they press the button now or not, and what happens then, but nothing must break , i.e., it has to be like that, that it doesn't need any support. Whether this is achievable is not certain, but of course it would be nice according to HEI estate staff.

Summarising, HEI estate staff and the technical operations manager often have the impression that in the context of a construction project, the focus is always on the concept for specialist planners or architects, and everyone thinks we now have a great concept or we are making a great concept. However, for the practice of implementing and equipping the new buildings and premises, the work and challenge begin only after the completion of construction. Now it has to be implemented in detail and practically what was considered theoretically or impractically or not at all in the conception.

6. Design, implementation and use of L&T spaces at HdM: synthetic analysis, recommendations and conclusions

In this section, a synthetic analysis of sections 3-5 is given including some conclusions and recommendations about the design, implementation and use of L&T spaces at HdM (Media University Stuttgart). This synthetic analysis (or analytical synthesis) is based on the identification of strengths, weaknesses, opportunities and threats (SWOT) of the approaches, perceptions and assessments collected in sections 3, 4 and 5 to identify development gaps and options for further improvement.

6.1 Strategic SWOT analysis

A strategic SWOT analysis asks how strengths (or other activities to be identified) can be used to mitigate or overcome weaknesses, to exploit opportunities, to respond to challenges, and to confront threats. The tentative answers to these questions create possible recommendations for action that might be supportive to improving the situation and solving the problems at stake. Obviously, the basis of a strategic SWOT analysis is a thorough identification and analysis of the respective strengths, weaknesses, opportunities and threats.

More specifically, to make a SWOT analysis strategic it must be supplemented by and integrated into a strategy matrix as given in Table 9. Such strategy matrix supports the analysis of how identified strengths or other measures can be used to overcome weaknesses, exploit opportunities and avoid threats (Leiber et al., 2018, p.355). Therefore, the core step of the strategic SWOT analysis consists in filling the respective cells in Table 9 by (tentative) recommendations for taking action to use strength number i) [i) = 1), 2), …] to overcome weakness number j) [j) = 1), 2), …], to exploit opportunity number k) [k) = 1), 2), …], and to avoid threat number l) [l) = 1), 2), …]. In case that some weaknesses, opportunities and threats cannot be adequately tackled by an identified strength, other measures must be introduced (see Table 9, lower lines) thereby bringing an additional creative-strategic element into the strategic SWOT analysis.

Table 9 | Matrix template for strategic SWOT analysis

	Weaknesses (W)			**Opportunities (O)**			**Threats (T)**		
	1)	**2)**	**…**	**1)**	**2)**	**…**	**1)**	**2)**	**…**
Strengths (S)	Strengths-based strategies to overcome weaknesses (S-W)			Strengths-based strategies to take advantage of opportunities (S-O)			Strengths-based strategies to avoid threats (S-T)		
1)	S1-W1	S1-W2	…	S1-O1	S1-O2	…	T1-O1	T1-O2	…
2)	S2-W1	S2-W2	…	S2-O1	S2-O2	…	T2-O1	T2-O2	…
…	…	…	…	…	…	…	…	…	…
Other measures (M)	Other measures-based strategies to overcome weaknesses (M-W)			Other measures-based strategies to exploit opportunities (M-O)			Other measures-based strategies to avoid threats (M-T)		
1)	M1-W1	M1-W2	…	M1-O1	M1-O2	…	M1-T1	M1-T2	…
2)	M2-W1	M2-W2	…	M2-O1	M2-O2	…	M2-T1	M2-T2	…
…	…	…	…	…	…	…	…	…	…

Source | (Leiber et al., 2018, p.355, Table 3)

Before the matrix template for strategic SWOT analysis (Table 9) can be made fruitful, a detailed and thorough identification of SWOTs referring to the design, implementation and use of L&T spaces is needed. In the present case, these SWOTs are given in Table 10 (strengths), Table 11 (weaknesses), Table 12 (opportunities) and Table 13 (threats). As already mentioned, these SWOTs are drawn from qualitative content analysis of publicly documented institutional policies (section 3), qualitative reflection of theory and practice (section 4) and stakeholders' perceptions (section 5) of the design, implementation and use of L&T spaces, particularly innovative spaces, at HdM.

The interviewed stakeholders recognise the following strengths prevalent at HdM (Table 10): The much sworn shift from teaching to learning is taken seriously and implemented comprehensively – which does not imply that there are no desiderata in this respect any more (see, e.g., weaknesses).[45] Stakeholders also feel that the general equipment of L&T spaces often is sufficient or even good. It is positively received that there is flexible furniture in several innovative L&T spaces which is appreciated in view of the options for applying innovative pedagogy. In the same vein, stakeholders value as strengths of HdM that they have several innovative L&T spaces in the Learning World ("Lernwelt"), Learning Bar ("Lernbar"), Learning Studio ("Lernatelier"), and the library.

Table 10 | SWOT analysis on issues of L&T spaces at HdM: strengths

Strengths
Comprehensive shift from teaching to learning is taken seriously
General equipment of L&T spaces is good/ sufficient
Flexible furniture in several L&T spaces
Innovative L&T spaces at Learning World ("Lernwelt"), Learning Bar ("Lernbar"), Learning Studio ("Lernatelier")and library[46]
A new innovative building with L&T spaces, communication and research spaces is planned
Centre for Learning and Development[47]
Maker Space and Production Space[48]
Institute-related option for specialised laboratories for research-related teaching
Manageable size of the university facilitates planning and coordination between stakeholder groups

Source | Own compilation

[45] Methodological remarks: Because of the small numbers of interviewees of each stakeholder group no quantitative interpretation or weighting is given for any of the SWOTs. In general, it can be stated that the strengths, weaknesses, opportunities and threats mentioned by different stakeholder groups in the interviews and focus group discussions (see section 5) are either in close agreement with each other or complementary to each other, most notably because of the complementary perspectives different stakeholder groups usually have on matters of design, implementation and use of L&T spaces. In this context, it should also be clearly stated that due to the small number of interviewees, there are no representative results; they are rather fallible in a strong sense and may have to be corrected by further analysis.

[46] https://www.hdm-stuttgart.de/bibliothek/bibliothek/arbeiten

[47] https://www.hdm-stuttgart.de/studierende/abteilungen/cld

[48] https://www.hdm-stuttgart.de/productionspace

Practically all stakeholder groups appreciate that a new innovative building with L&T spaces, communication and research spaces is currently planned to alleviate the general lack of space at HdM. Further pluses are seen in the Centre for Learning and Development, a Maker Space and a Production Space as well as institute-related options for implementing specialised laboratories for research-related teaching. A final strength mentioned is the manageable size of the university that (according to leadership) facilitates planning and coordination between stakeholder groups.

Table 11 | SWOT analysis on issues of L&T spaces at HdM: weaknesses

Weaknesses
Deficient comprehensive, transparent strategy for physical L&T spaces
Deficient comprehensive, transparent strategy for digitalisation (of L&T spaces)
Deficient participation of stakeholders
Deficient intra-university communication and cooperation of organisational units and individual stakeholders
Deficient services and access concepts to L&T spaces
General lack of L&T spaces
Lack of smaller innovative L&T spaces for groups from 5-10 students
Lack of individual student workplaces
Lack of innovative L&T spaces, e.g., Maker Spaces and Design Spaces
Lack of adequate and sufficiently flexible equipment and furnishing of available L&T spaces
Too much focus on frontal teaching
Traditional on-site L&T methods often just transferred into the digital space
Virtual area restricted to Moodle and Zoom
Lacking clarification about the future of hybrid L&T
Deficient or lacking professional training of teachers and technical staff in L&T space issues
Deficient or lacking overview over existing and used virtual L&T environments and platforms
Lack of systematic processes that involve student participation in the processes of design and implementation of L&T spaces
Lack of acquaintance of students with L&T processes
Insufficient consideration of L&T spaces in student evaluations/satisfaction surveys
Difficult access for disadvantaged groups (e.g., visually impaired or otherwise handicapped people)
Lack of catering options on campus
Lack of integration of campus and city life
Political debates about higher education and its provision at HdM, including the design and implementation of L&T space, tend to be less frequent

Source | Own compilation

From the used sources several weaknesses can be identified (Table 11): Stakeholders note that there is room for improvement and improvements are needed in terms of a comprehensive, transparent strategy for the design and implementation of physical L&T spaces and the digitalisation of L&T spaces. Further weaknesses are a deficient participation of stakeholders, deficient intra-university communication and cooperation of organisational units and individual stakeholders, and deficient services and access concepts concerning L&T spaces, specifically innovative and novel L&T spaces.

Most stakeholders state that there is a general scarcity of L&T spaces, specifically a lack of smaller innovative L&T spaces for groups from 5-10 students, a lack of individual student workplaces, a lack of Maker Spaces and Design Spaces, and a lack of L&T spaces with adequate and sufficiently flexible equipment and furnishing. Further weaknesses mentioned by stakeholders are that too much teaching takes place in the frontal mode (traditional lecture mode), and traditional on-site L&T methods are often just transferred into the digital space without appropriately adapting to the new framework conditions and options of the digital space.

Another weakness is seen in the fact that the virtual spaces at HdM are restricted to Moodle and Zoom (at least in some study areas[49]). In addition, there are further important weaknesses such as the lacking clarification about the future of hybrid L&T and the deficits with respect to professional training of teachers and technical staff in L&T space issues. It is also a weakness that must be considered that a satisfactory overview over existing and used virtual L&T environments and platforms is not available. Furthermore, student participation in the processes of design and implementation of L&T spaces is not sufficiently systematic and transparent, there is probably a certain lack of acquaintance of students with L&T processes, and issues around L&T spaces are not sufficiently considered in student evaluations/satisfaction surveys. It is also stated that access for disadvantaged groups (e.g., visually impaired or otherwise handicapped people) to L&T spaces is often difficult, that there is a lack of catering options on the campus and a lack of integration of campus and city life. A final weakness identified from the semi-structured interviews is that political debates about higher education and its provision at the HdM, including the design and implementation of L&T space, tend to be less frequent.

Table 12 | SWOT analysis on issues of L&T spaces at HdM: opportunities

Opportunities
Contesting and competitive approaches to physical, digital and hybrid L&T could be clarified
Innovative hybrid L&T could be developed
An evidence-informed strategy that encompasses digital and presence approaches in L&T in an adequate balance could be developed
L&T spaces could be considered in student evaluations/satisfaction surveys

Source | Own compilation

In addition to opportunities that consist in improving existent strengths, reacting to the weaknesses (Table 11) further opportunities can be identified (Table 12): First, contesting and competitive approaches to physical, digital and hybrid L&T could be clarified. Second, innovative hybrid L&T could be developed. Third, an evidence-informed strategy that encompasses digital

[49] However, some stakeholders report that they also use MS Teams, for example.

and presence approaches in L&T in an adequate balance could be developed. Fourth, L&T spaces could be considered in student evaluations and satisfaction surveys, respectively.

Finally, several threats with respect to the design, implementation and use of innovative L&T spaces at HdM can be listed which affect well-functioning of the university: A first threat is the imbalance and asymmetry between face-to-face and online L&T, particularly because very different opinions are expressed across different stakeholder groups in this respect. It is very similar with the issue of untransparent or missing organisation of hybrid L&T – if that is generally supported at all at HdM; there are also very different opinions coming from different stakeholder groups here. A third threat mentioned in the stakeholder interviews are problematic consequences of the transition from the physical to the digital space: for example, there is the possibility and fear that the cohesion among teachers and other colleagues may decrease; that the contact between students and teachers may be altered to the negative and diminished; that socio-psychological relationships important for personality development of students may be reduced or lost; that on-site buildings may be not used efficiently.

A further threat is the rising student numbers while campus space is notoriously tight. A broader organisational and widespread threat is untransparent or lacking information and data about digital structures and physical L&T spaces on institutional, federal state and nationwide levels. The well-known imbalance between research and teaching, i.e., teaching is systematically undervalued, is another threat to the adequate expansion and implementation of L&T including the design and implementation of L&T spaces. Further politically based threats are the disadvantages of federalist higher education politics of 16 different federal states and the underfinanced public higher education, particularly L&T including L&T spaces.

Table 13 | SWOT analysis on issues of L&T spaces at HdM: threats

Threats
Imbalance and asymmetry between face-to-face and online L&T
Untransparent or missing organisation of hybrid L&T
Problematic consequences of the transition from the physical to the digital space (e.g., decreasing cohesion among teachers and other colleagues; altered and diminished perception by students; insufficient use of buildings)
Rising student numbers (?) while campus space is notoriously tight
Untransparent or lacking information and data about digital structures and physical L&T spaces on institutional, federal state and nationwide levels
Imbalance between research and teaching, i.e., teaching is systematically undervalued
Disadvantages of federalist higher education politics of 16 different federal states
Underfinanced public higher education, particularly L&T including L&T spaces

Source | Own compilation

6.2 Recommendations for action

6.2.1 Strengthen strengths

As usual, a general recommendation that can be easily drawn from a SWOT analysis is to further improve on the identified strengths which are, in the present case, listed in Table 10. Accordingly, in brief the respective recommendations are the following:

- The shift from teaching to learning should be continuously further developed.
- The physical and digital equipment of L&T spaces should be continuously improved, including innovative L&T spaces.
- The existing innovative L&T spaces (e.g., Learning World; Learning Bar; Learning Studio; library; Maler Space; Production Space etc.) should be continuously further developed.
- The Centre for Learning and Development should be further developed, if appropriate.
- The planned new innovative campus building should be realised.
- The option for institute-related specialised laboratories for research-related teaching should be further developed.

6.2.2 Overcome weaknesses

Some recommendations that are based on the idea that strengths are used to overcome weaknesses have already been mentioned in Section 6.2.1. In addition, informed by Table 11 the following recommendations can be suggested:

- A comprehensive and transparent strategy for the design and implementation of physical L&T spaces and digitalisation should be developed.
- The involvement and participation of stakeholders in the processes of planning, designing and implementing L&T spaces should be improved and expanded.
- Intra-university communication and cooperation of organisational units and individual stakeholders should be improved.
- Services and access concepts to L&T spaces should be further developed.
- More L&T spaces, particularly innovative L&T spaces should be implemented including those that are required by the university's stakeholders (e.g., smaller innovative L&T spaces for groups from 5-10 students; individual student workplaces; Maker Spaces and Design Spaces).
- It should be critically reflected and communicated among stakeholders how much frontal teaching is required, pedagogically meaningful or dispensable at all.
- The pedagogical requirements and technical options and needs of virtual (and hybrid) L&T should be critically reflected and implemented accordingly.
- The future of hybrid L&T should be clarified among stakeholders.

- Professional training of teachers and technical staff in L&T space issues should be improved.
- An overview over existing and used virtual L&T environments and platforms should be established.
- Students should be systematically involved in the processes of design and implementation of L&T spaces.
- Assessments of L&T spaces should be included in student evaluations/satisfaction surveys.
- Access to L&T spaces should be improved for disadvantaged groups (e.g., visually impaired or otherwise handicapped people).
- Catering options on the campus should be extended.
- Measures should be taken to improve on the integration of the campus and city life.
- Opportunities should probably be sought to further involve into political debates about higher education and its provision at HdM, including the design and implementation of L&T space.

6.2.3 Exploit opportunities

The opportunities listed in Table 12 can be immediately translated into the following recommendations for action:

- The interplay of contesting and competitive approaches to physical, digital and hybrid L&T should be clarified.
- Innovative hybrid L&T should be developed, if it is desired at all.
- An evidence-informed strategy that encompasses digital and presence approaches in L&T in an adequate balance should be developed.
- L&T spaces could be considered in student evaluations/satisfaction surveys.

6.2.4 Avoid threats

Finally, based on the identified threats, the following recommendations for action can be suggested:

- The imbalances and asymmetries in practice between face-to-face and online L&T, which are not completely avoidable, should be carefully observed and researched to reach an optimised blended L&T.
- Hybrid L&T should be organised transparently, if desired at all.
- Assumed problematic consequences of the transition from the physical to the digital space (e.g., decreasing cohesion among teachers and other colleagues; altered and diminished perception of teachers by students; insufficient use of buildings), which are

probably not completely avoidable, should be carefully observed and researched to reach an optimised blended L&T.

- The development of student numbers must be carefully observed in relation to the lack of L&T space in general and the design and implementation of new, innovative L&T space so that measures can be taken, if necessary (e.g. numerus clausus; development of new rooms; changed use of existing rooms).
- Initiatives should be undertaken, where possible,
    - To contribute to improvements on information and data about digital structures and physical L&T spaces on institutional, federal state and nationwide levels.
    - To tackle disadvantages of federalist higher education politics of 16 different federal states.
    - To constructively deal with underfinanced public higher education, particularly L&T, including the acquisition of third-party funds for financing research projects, infrastructure and equipment of innovative L&T spaces.

6.3 Summarising conclusions

Summarising, it should be noted that HdM tackles the following areas of interest related to innovative L&T spaces in their various projects over the years:

Debates and research projects on innovative L&T methodologies, including pedagogy and curriculum design are carried out.

Quality assurance of L&T and the relevance of L&T spaces is carried out within the framework of system accreditation[50].

The need and requirements of digital structures including virtual L&T environments are researched.

Innovative, physical and virtual L&T spaces are designed and implemented.

In HdM's L&T space activities, the focus is on the importance and relevance of the university campus, university buildings, and university classrooms while the relation of the university and the city (or host community) is not a focused theme because HdM is a pure campus university ituated in a sub-urb area outside the main city of Stuttgart.[51]

As far as it can be assessed from the outside at present, based on the available data and information[52], political debates about higher education and its provision at HdM, including the design and implementation of L&T spaces, tend to be less frequent.

[50] https://www.hdm-stuttgart.de/hochschule/profil/qm/systemakkreditierung
[51] At the same time, some interviewed stakeholders see the need to better integrate the campus and the city life.
[52] Including the reported interviews, see section 5.

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Appendix 1: Guidelines of stakeholder interviews and discussions

Introductory remarks

Below follow the question guides that were used in the semi-structured interviews and focus group discussions carried out at HdM with the stakeholder groups of rectory members, directors/deans of organisational units, teachers, students, QM, pedagogy and non-teaching staff, HEI estate staff, and architects. As already mentioned above, the English versions of the question guides were developed and agreed by all LTSHE partners while the German translation was carried out by the two interviewers of the LTSHE partner **evalag** (Evaluation Agency Baden-Wuerttemberg). The German translation was needed because, for practical reasons, the interviews and discussions at HdM were carried out in German.

All interviewees and discussion partners were sent a two-page information sheet by email several days before the event, see Appendix 2. Also enclosed in this email were the respective guiding questions which are documented below.

All interviews and focus group discussions were initiated with the following same introductory orientating remarks:

"This interview/focus group takes place in the context of the Erasmus+ project Learning and Teaching Spaces in Higher Education that aims to develop a comprehensive set of design and implementation principles that institutions can draw on to inform the development of new learning and teaching spaces.

The purpose of this discussion is to collect your perceptions on the design, implementation and use of L&T spaces at HdM.

The interview is composed of two parts:

1) Existing learning and teaching spaces at the university

2) Future/intended learning and teaching spaces at the university

I will ask the questions, and you may answer freely, engaging in the discussion with no predefined order. The expected duration of the interview/focus group is about 60 minutes."

Ordered according to the various stakeholder groups that were addressed, the subsequent questions of the interviews and focus group discussions were as follows:

Guiding questions institutional top managers

Part I – Existing learning and teaching spaces at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; ii) the importance and status of didactics, pedagogy, and curriculum design in higher education; and iii) the importance and status of physical, virtual, hybrid learning and teaching spaces.

1. Könnten Sie kurz die Handlungsprinzipien [*policy*] und Strategie Ihrer Hochschule in Bezug auf Studium und Lehre beschreiben?

[English version: Could you briefly describe the policy and strategy of your institution for learning and teaching?]

[discussion]

2. Könnten Sie kurz die Handlungsprinzipien [*policy*] und Strategie Ihrer Hochschule in Bezug auf Design und Umsetzung von Lern- und Lehrräumen (physische, virtuelle, hybride) beschreiben? Wer schlägt was vor und wer entscheidet auf welcher Grundlage?

   [English version: Could you briefly describe the policy and strategy of your institution for the design and implementation of learning and teaching spaces (physical, virtual, hybrid)? Who suggests/decides what and on what basis?]

[discussion]

3. Wie beurteilen Sie die Rolle von Lern- und Lehrräumen (physische, virtuelle, hybride) bei der Unterstützung und/oder Förderung neuer Lern- und Lehransätze an Ihrer Hochschule?

   [English version: What is your opinion on the role of learning and teaching spaces (physical, virtual, hybrid) in supporting and/or promoting new approaches to learning and teaching at your institution?]

[discussion]

4. Wie würden Sie die bestehenden Lern- und Lehrräume (physische, virtuelle, hybride) und deren Relevanz und Nützlichkeit für die Entwicklung eines adäquaten und qualitativ hochwertigen Lern- und Lehrprozesses an Ihrer Institution beschreiben?

   [English version: How would you describe the existent learning and teaching spaces (physical, virtual, hybrid) and their relevance and usefulness for the development of an adequate and quality learning and teaching process at your institution?]

[discussion]

5. Verfügt Ihre Hochschule über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

   [English version: Does your institution have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, [If yes,] …

a. (strategisch) Welche Gründe haben zur Schaffung neuer Lern- und Lehrräume an Ihrer Hochschule geführt? Für welche Zwecke?

   [(strategic) What reasons led to the creation of new learning and teaching spaces at your institution? For what purposes?]

b. (operative Ebene) Um welche Arten von Räumen handelt es sich? Welche Art von Möbeln/Design wurde für sie ausgewählt und warum? Welche Ressourcen und/oder Technologien stehen in den Räumen zur Verfügung und dienen welchen pädagogischen Modellen? (gegebenenfalls)

   [(operational level) What kinds of spaces are they? What type of furniture/design was selected for them and why? What resources and/or technologies are available in the spaces, and to serve what pedagogical models? (if appropriate)]

c. (Mikroebene) Wie werden die Räume genutzt? Wer nutzt sie? Auf welche Weise wird die Wirkung der Nutzung der neuen Räume zur Verbesserung des Lernens und Lehrens in der Hochschule bewertet?

   (micro-level) How are the spaces used? Who uses them? What assessment is made on the impact of using the new spaces for the improvement of learning and teaching in the institution?

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

6. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) Ihre Hochschule benötigt? Und für wen und zu welchen Zwecken? Was sollten sie enthalten, umfassen, bieten?

   [What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your institution needs? And for whom and for what purposes? What should they contain, encompass, offer?]

[discussion]

7. Welche Unterstützung ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen und ihr pädagogisches Potenzial ausschöpfen zu können?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces, taking advantage of their potential in pedagogical terms?]

[discussion]

8. Welche Arten digitaler Strukturen sind erforderlich für hybrides und „blended“ Lernen und Lehren?

   [What type of digital structures are needed both for blended and hybrid learning and teaching?]

[discussion]

Thank you very much for your participation in this interview!

Guiding questions directors/deans of organisational units

Part I – Existing learning and teaching spaces at the organisational unit/university level at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; ii) the importance and status of didactics, pedagogy, and curriculum design in higher education; and iii) the importance and status of physical, virtual, hybrid learning and teaching spaces.

1. Was ist Ihre Meinung zu Handlungsprinzipien [policy] und Strategie Ihrer Hochschule für Studium und Lehre?

   [What is your opinion on the policy and strategy of your institution for learning and teaching?]

[discussion]

2. Was ist Ihre Meinung zu Handlungsprinzipien [policy] und Strategie Ihrer Hochschule in Bezug auf Design und Umsetzung von Lern- und Lehrräumen (physische, virtuelle, hybride)?

   [What is your opinion on the policy and strategy of your institution for the design and implementation of learning and teaching spaces (physical, virtual, hybrid)?]

[discussion]

3. Wie beurteilen Sie die Rolle von Lern- und Lehrräumen (physische, virtuelle, hybride) bei der Unterstützung und/oder Förderung neuer Lern- und Lehransätze an Ihrer Hochschule?

   [What is your opinion on the role of learning and teaching spaces (physical, virtual, hybrid) in supporting and/or promoting new approaches to learning and teaching at your institution?]

[discussion]

4. Wie würden Sie die bestehenden Lern- und Lehrräume (physische, virtuelle, hybride) und deren Relevanz und Nützlichkeit für die Entwicklung eines adäquaten und qualitativ hochwertigen Lern- und Lehrprozesses an Ihrer Institution beschreiben?

   [How would you describe the existent learning and teaching spaces (physical, virtual, hybrid) and their relevance and usefulness for the development of an adequate and quality learning and teaching process at your institution?]

[discussion]

5. Verfügt Ihre Organisationseinheit über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

   [Does your organisational unit have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, If yes, …

a. (strategisch) Welche Gründe haben zur Schaffung neuer Lern- und Lehrräume in Ihrer Organisationeinheit geführt? Für welche Zwecke?

   [(strategic) What reasons led to the creation of new learning and teaching spaces at your organisational unit? For what purposes?]

b. (operative Ebene) Um welche Arten von Räumen handelt es sich? Welche Art von Möbeln/Design wurde für sie ausgewählt und warum? Welche Ressourcen und/oder Technologien stehen in den Räumen zur Verfügung und dienen welchen pädagogischen Modellen? (gegebenenfalls)

   [(operational level) What kinds of spaces are they? What type of furniture/design was selected for them and why? What resources and/or technologies are available in the spaces, and to serve what pedagogical models? (if appropriate)]

c. (Mikroebene) Wie werden die Räume genutzt? Wer nutzt sie? Auf welche Weise wird die Wirkung der Nutzung der neuen Räume zur Verbesserung des Lernens und Lehrens in der Organisationseinheit bewertet?

[(micro-level) How are the spaces used? Who uses them? What assessment is made on the impact of using the new spaces for the improvement of learning and teaching in the organisational unit?]

[discussion]

Part II – Future/intended learning and teaching spaces at the organisational unit/university level at HdM

6. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) benötigt Ihre Organisationseinheit/Hochschule? Und für wen und zu welchen Zwecken? Was sollten sie enthalten, umfassen, bieten?

   [What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your organisational unit/university needs? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

7. Welche Unterstützung ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen und ihr pädagogisches Potenzial ausschöpfen zu können?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces, to take advantage of their potential in pedagogical terms?]

[discussion]

8. Welche Arten digitaler Strukturen sind erforderlich für hybrides und „blended“ Lernen und Lehren?

   [What type of digital structures are needed both for blended and hybrid learning and teaching?]

[discussion]

Guiding questions teachers

Part I – Existing learning and teaching spaces at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; ii) the importance and status of didactics, pedagogy, and curriculum design in higher education; and iii) the importance and status of physical, virtual, hybrid learning and teaching spaces.

1. Wie beurteilen Sie die Rolle von Lern- und Lehrräumen (physische, virtuelle, hybride) bei der Unterstützung und/oder Förderung neuer Lern- und Lehransätze an Ihrer Hochschule?

   [What is your opinion on the role of learning and teaching spaces (physical, virtual, hybrid) in supporting and/or promoting new approaches to learning and teaching at your institution?]

[discussion]

2. Wie würden Sie die bestehenden Lern- und Lehrräume (physische, virtuelle, hybride) und deren Relevanz und Nützlichkeit für die Entwicklung eines adäquaten und qualitativ hochwertigen Lern- und Lehrprozesses an Ihrer Institution beschreiben?

   [How would you describe the existent learning and teaching spaces (physical, virtual, hybrid) and their relevance and usefulness for the development of an adequate and quality learning and teaching process at your institution?]

[discussion]

3. Verfügt Ihre Hochschule über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

   [Does your institution have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, If yes, …

   a. Was sind die Gründe für ihre Konzeption und Umsetzung?

      [What are the reasons behind their design and implementation?]

   b. Haben Sie jemals einen dieser Räume genutzt und zu welchen Zwecken?

      [Have you ever used any of those spaces, and for what purposes?]

   c. Worin besteht die Vorteile der Nutzung dieser Räume? Wie würden Sie die Auswirkungen der Nutzung der neuen Räume auf das Lernen und Lehren beschreiben? Und wie stellen Sie die Wirkungen fest?

      [What is the benefit of using those spaces? How would you describe the impact of using the new spaces with respect to learning and teaching? And how do you assess it?]

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

4. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) benötigt Ihre Organisationseinheit/Hochschule? Und für wen und zu welchen Zwecken? Was sollten sie enthalten, umfassen, bieten?

   [What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your organisational unit/university needs? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

5. Welche Unterstützung ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen und ihr pädagogisches Potenzial ausschöpfen zu können?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces, to take advantage of their potential in pedagogical terms?]

[discussion]

6. Welche Arten digitaler Strukturen sind erforderlich für hybrides und „blended“ Lernen und Lehren?

   [What type of digital structures are needed both for blended and hybrid learning and teaching?]

[discussion]

Guiding questions QM staff, pedagogy staff and non-teaching staff

Part I – Existing learning and teaching spaces at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; ii) the importance and status of didactics, pedagogy, and curriculum design in higher education; and iii) the importance and status of physical, virtual, hybrid learning and teaching spaces.

1. Wie beurteilen Sie die Rolle von Lern- und Lehrräumen (physische, virtuelle, hybride) bei der Unterstützung und/oder Förderung neuer Lern- und Lehransätze an Ihrer Hochschule?

[What is your opinion on the role of learning and teaching spaces (physical, virtual, hybrid) in supporting and/or promoting new approaches to learning and teaching at your institution?]

[discussion]

2. Wie würden Sie die bestehenden Lern- und Lehrräume (physische, virtuelle, hybride) und deren Relevanz und Nützlichkeit für die Entwicklung eines adäquaten und qualitativ hochwertigen Lern- und Lehrprozesses an Ihrer Institution beschreiben?

   [How would you describe the existent learning and teaching spaces (physical, virtual, hybrid) and their relevance and usefulness for the development of an adequate and quality learning and teaching process at your institution?]

[discussion]

3. Verfügt Ihre Hochschule über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

   [Does your institution have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, If yes, …

   a. Was sind die Gründe für ihre Konzeption und Umsetzung?

      [What are the reasons behind their design and implementation?]

   b. Haben Sie jemals einen dieser Räume genutzt und zu welchen Zwecken?

      [Have you ever used any of those spaces, and for what purposes?]

   c. Worin bestehen die Vorteile der Nutzung dieser Räume? Wie würden Sie die Auswirkungen der Nutzung der neuen Räume auf das Lernen und Lehren beschreiben? Und wie stellen Sie die Wirkungen fest?

      [What is the benefit of using those spaces? How would you describe the impact of using the new spaces with respect to learning and teaching? And how do you assess it?]

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

4. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) benötigt Ihre Hochschule? Und für wen und zu welchen Zwecken? Was sollten sie enthalten, umfassen, bieten?

   [What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your organisational unit/university needs? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

5. Welche Unterstützung ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen und ihr pädagogisches Potenzial ausschöpfen zu können?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces, to take advantage of their potential in pedagogical terms?]

[discussion]

6. Was würden Sie für die Gestaltung, Umsetzung und Nutzung dieser neuen Lern- und Lehrräume im Hinblick auf die Anforderungen der Qualitätssicherung und des Managements und der Weiterentwicklung empfehlen?

   [What would you recommend for the design, implementation and use of these new learning and teaching spaces with respect to requirements of quality assurance and management and enhancement?]

[discussion]

7. Welche Arten digitaler Strukturen sind erforderlich für hybrides und „blended“ Lernen und Lehren?

   [What type of digital structures are needed both for blended and hybrid learning and teaching?]

[discussion]

Guiding questions students

Part I – Existing learning and teaching spaces at HdM

1. Werden die Lernräume an Ihrer Hochschule den Bedürfnissen von Studierenden gerecht? Denken Sie beispielsweise an die Organisation von Lehrveranstaltungen,

kollaboratives Arbeiten, autonomes Arbeiten, studierendenzentriertes Lernen, selbstorganisiertes Lernen und kommentieren Sie dies bitte.

[Do you consider that the learning spaces at your university correspond to the needs of a student in higher education? Consider classes, collaborative work, autonomous work and please comment on this.]

[discussion]

2. Beeinflussen Ihrer Ansicht nach diese Lernräume Ihre Lernprozesse und Lernerfahrungen, auf welche Weise? In welcher Weise sind die Lernräume relevant und nützlich in Bezug auf Lehren/Unterrichten an Ihrer Hochschule?

   [In your opinion, do these spaces influence your learning? How do you consider them to be relevant and useful in regard to teaching at your institution?]

[discussion]

3. Verfügt Ihre Hochschule über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

   [Does your institution have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, If yes, …

   a. Haben Sie jemals einen dieser Räume genutzt und zu welchen Zwecken?

      [Have you ever used any of those spaces, and for what purposes?]

   b. Worin bestehen die Vorteile der Nutzung dieser Räume? Wie würden Sie die Auswirkungen der Nutzung der neuen Räume auf das Lernen beschreiben? Werden diese Wirkungen systematisch erhoben?

      [What is the benefit of using those spaces? How would you describe the impact of using the new spaces with respect to learning? Are these effects systematically assessed?]

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

4. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) benötigt Ihre Hochschule? Und für wen und zu welchen Zwecken? Was sollten

sie enthalten, umfassen, bieten?

[What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your organisational unit/university needs? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

5. Welche Arten digitaler Strukturen oder Techniken würden Ihre Lernprozesse unterstützen?

   [What type of digital structures or technologies would support you in your learning?]

[discussion]

6. Welche Unterstützung (z.B. technisches Personal, Ressourcen, Lehrkompetenzen, …) ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen und ihr Potenzial in Bezug auf das Lernen ausschöpfen zu können?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces, to take advantage of their potential in terms of learning? (In terms of technical staff, resources, teaching competencies, …)]

[discussion]

Guiding questions HEI estate staff

Part I – Existing learning and teaching spaces at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; and ii) the importance and status of physical (and virtual and hybrid) learning and teaching spaces.

1. Wie würden Sie die existierenden Lern- und Lehrräume (physikalische, virtuelle, hybride) an Ihrer Hochschule beschreiben, insbesondere hinsichtlich ihrer Relevanz und Nützlichkeit für Studium und Lehre?

   [How would you describe the existent learning and teaching spaces (physical, virtual, hybrid) and their relevance and usefulness for learning and teaching at your institution?]

[discussion]

2. Verfügt Ihre Hochschule über neue (innovative) Lern- und Lehrräume (physische, virtuelle, hybride)?

[Does your institution have new (innovative) learning and teaching spaces (physical, virtual, hybrid)?]

Falls ja, If yes, …

a. Was sind die Gründe für ihre Konzeption und Umsetzung?

   [What are the reasons behind their design and implementation?]

b. Sind Sie in Design, Implementierung und Support eines dieser Räume involviert? Welches sind Ihre Hauptaufgaben? Und weshalb sind diese relevant?

   [Are you involved in the design, implementation and support of any of those spaces? What are your main tasks? And why are they relevant?]

c. Welches sind die Hauptschwierigkeiten, denen Sie bei Ihrer Aufgabenerfüllung in Bezug auf diese Räume begegnen?

   [What are the main difficulties you face in relation to your tasks related to those spaces?]

d. Wer nutzt diese Räume und zu welchen Zwecken? Werden Sie regelmäßig genutzt?

   [Who uses these spaces and for what purposes? Are they used regularly?]

e. Was würden Sie zur Verbesserung dieser Räume empfehlen?

   [What would you recommend to improve the spaces?]

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

3. Was denken Sie, welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) benötigt Ihre Hochschule? Und für wen und zu welchen Zwecken? Was sollten sie enthalten, umfassen, bieten?

   [What new (innovative) learning and teaching spaces (physical, virtual, hybrid) do you consider your organisational unit/university needs? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

4. Welche Unterstützung ist Ihrer Meinung nach erforderlich, um diese neuen Lern- und Lehrräume nutzen? Welches ist ihre Rolle in Bezug auf diese neuen Lern- und Lehrräume?

   [What kind of support do you think is needed for the use of these new learning and teaching spaces? What do you see as your role in these new spaces?]

[discussion]

Guiding questions architects

Part I – Existing learning and teaching spaces at HdM

Please discuss the following questions, considering: i) the digitalisation in higher education; ii) the importance and status of didactics, pedagogy, and curriculum design in higher education; and iii) the importance and status of physical, virtual, hybrid learning and teaching spaces.

1. Wie gehen Sie gewöhnlich beim Implementierungsprozess von Lernräumen vor? Beziehen Sie beispielsweise Treffen mit Lehrenden und technischen Mitarbeiter:innen mit ein?

   [Usually, how do you implement the design process of new learning spaces? Do you include, for example meetings with teaching staff, technical staff?]

[discussion]

2. Wie würden Sie aus den Perspektiven von Theorie und Praxis der Architektur den Entwicklungsstand des Designs und der Implementierung von Lern- und Lehrräumen (physische, virtuelle, hybride) an Hochschulen beschreiben?

   [How would you describe the state-of-the-art of design and implementation of learning and teaching spaces (physical, virtual, hybrid) at higher education institutions from the perspectives of architectural theory and practice?]

[discussion]

Part II – Future/intended learning and teaching spaces at HdM

3. Welche neuen (innovativen) Lern- und Lehrräume (physische, virtuelle, hybride) würden Sie aus den Perspektiven von Theorie und Praxis der Architektur für Hochschulen

empfehlen? Und für wen und für welche Zwecke? Was sollten sie enthalten, umfassen, bieten?

[From the perspectives of architectural theory and practice, what new (innovative) learning and teaching spaces (physical, virtual, hybrid) would you suggest or recommend to design and implement at higher education institutions? And for whom or for what purposes? What should they contain, encompass, offer?]

[discussion]

Appendix 2: LTSHE information sheet for interviewees

Evaluation Agency Baden-Wuerttemberg Mannheim, 4 June 2021

INFORMATION SHEET

ERASMUS+ Project

LEARNING AND TEACHING SPACE IN HIGHER EDUCATION (LTSHE)

evalag (Evaluation Agency Baden-Wuerttemberg, Mannheim, Germany) as a partner together with seven European higher education institutional partners, including the lead partner Birmingham City University, has been granted the project LEARNING AND TEACHING SPACE IN HIGHER EDUCATION (LTSHE). The project is conceived as a Strategic Partnership for Higher Education within the Erasmus+ Program under the key action Cooperation for Innovation and the Exchange of Good Practices.

The LTSHE project has a duration of 36 months (01-12-2019 – 30-11-2022) and is carried out by its eight partners from eight European countries:

- BIRMINGHAM CITY UNIVERSITY (Birmingham, United Kingdom)
- UNIVERSIDADE DE AVEIRO (Aveiro, Portugal)
- UNIWERSYTET JAGIELLONSKI (Krakow, Poland)
- EVALUATIONSAGENTUR BADEN-WUERTTEMBERG (evalag, Mannheim, Germany)
- UNIVERSITÀ DEGLI STUDI DI MILANO (Milano, Italy)
- UNIVERSIDAD PÚBLICA DE NAVARRA (Pamplona, Spain)
- UNIVERSITETI AAB (Pristina, Kosovo)
- WIRTSCHAFTSUNIVERSITAET WIEN (Vienna, Austria)

Objectives

The aim of the project is to develop a set of comprehensive design principles that institutions can draw on to design, construct and develop new learning spaces. Among other things, the project aim will be achieved by addressing the following objectives:

- To identify the meaning of ‘innovative L&T’ in different contexts across Europe;
- To identify existing policy and practice towards L&T space, physical, hybrid and virtual as well, and related issues across EU and national HE sectors;

- To explore the extent to which quality enhancement and organisational development includes the built environment;
- To identify existing practice and principles of L&T space across the partnership institutions;
- To share practice and examples across the partnership;
- To highlight examples of good practice in design and development of L&T space.

Description of activities

The principal output of the project will be a set of core principles that institutions can use to help them to design new L&T spaces, whether developing existing buildings or constructing new spaces. This output would need to be built upon two core sets of data: wider, national explorations of policy and practice followed by a series of case studies that explore the issues facing universities in building new L&T spaces, determining what works and what does not work and highlighting good practice.

Methodology to be used

The project will take a pragmatic approach, where each stage of the project is informed by the previous stage. The first stage of the project would be to undertake a set of studies to identify policy and practice across national higher education sectors (finalised). The second stage of the project would be to focus on the partner institutions and explore what activity is currently in process, what approaches are taken to building new L&T spaces and stakeholder perceptions of the space available to them (current activity). These two stages of work would inform the core output of this project, the basic principles of constructing L&T spaces. The resulting output will be piloted and evaluated.

Results

The key tangible result of this project will be a manual to inform university design to facilitate innovative L&T spaces. Other results will be data relating to the extent and development of innovative L&T space within the EHEA.

Impact

The main impact of the project would be to encourage wider consideration of how the design of learning spaces contributes to the implementation of innovative and effective L&T practice across the EHEA.

Potential longer term benefits

The project will share good practice in facilitating innovative L&T, taking account of the rapid acceleration of technological innovation and how this is driving L&T and student engagement. This could also include relatively new developments such as how learning analytics is contributing to a greater understanding of how learners use resources. In other words, design of learning spaces has to take into account technological development and changes in L&T delivery as well as responding to student engagement evidenced through data collection.

Benefit for Stuttgart Media University (HdM)

Stuttgart Media University will participate in some surveys (semi-structured interviews and focus group discussions) about the institutional policy and practice for, and stakeholders' perceptions of the design, implementation and use of L&T spaces at HdM.

The specific benefit for HdM is that the composed LTSHE Report "Case Study of Experience: designing, developing and using learning and teaching spaces in German higher education. The case of Stuttgart Media University (HdM)" will serve as a stocktaking and evaluation report of HdM's achievements, desiderata and future plans about L&T spaces. If possible, a joint publication is also planned.

For further information on the LTSHE project see https://www.evalag.de/ltshe/