

Short Paper

# Trends and Outcomes of the Innovative Physical Learning Spaces: An International Comparative Approach

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**Abstract:** This paper focuses on the first observations on trends regarding the innovative physical Learning Spaces in Europe, North America, Oceania and Asia, and intend to compare the Japanese situation to the other territories. The Learning Spaces phenomenon represents a key transformation factor in Higher Education around the world, on the institution’s IT and on the teaching and learning practices. Nevertheless, beside obvious similarities, interesting differences – some of them culturally related – are observed in the Learning Spaces strategy, design and uses from countries to other ones.

**Keywords:** learning spaces design, active learning classrooms, learning commons, BYOD, international comparative study

## 1. Introduction

During the last decade, the innovative physical Learning Spaces (usually shortened to “Learning Spaces”) have become a continuous increasing hot topic in Higher Education, especially considering their presence in major conferences and reports [1], [2].

These spaces seek to support new teaching & learning practices (active learning, flipped classrooms, collaborative work, project based learning) by providing a mix of innovative spatial organization (and furnishing) and ICT features.

Two main categories of such spaces can be observed on the campus. The formal ones, that include the Active Learning Classrooms and the Collaborative Lecture Theaters, involve a direct interaction between the students and the teachers. The informal ones, mainly represented by the Learning Commons (**Fig. 1**) or the libraries that are evolving towards Learning Centers, are focused on autonomous and group working student activities.

Up to the end of the 2000s, the Learning Spaces phenomenon has suffered of a lack of formal research [3]. Since then, even though several studies have been conducted at a local or national level [4], [5], [6], it appeared that there was an opportunity to conduct a comparative study of the Learning Spaces phenomenon at the international level, that would compare different countries in order to highlight not only their common trends but also their key specificities. This study has been launched in October 2016 through an international collaboration between several universities. This project aims to study the Learning Spaces internal & external dynamics through different angles: policies, trends, design principles, outcomes on teaching and learning practices, and more globally the induced campuses transformation. We have



**Fig. 1** Kyoto University. Central Library Learning Commons.

already investigated more than 100 institutions on four continents, and involved international associations and workgroups such as EDUCAUSE/ELI [7], FLEXspace [8], and Association for Learning Environments [9].

This paper presents the study framework, the criteria used, and a set of global trends and findings identified for the Active Learning Classrooms, and the Learning Commons/Learning Centers. We propose then to focus on the specificities of the Japanese situation of Learning Spaces, in an international perspective.

## 2. Framework of the Study

### 2.1 Methodology

This study’s methodology was based on two steps.

First, a pre-study screening has been conducted from 2015, and allowed to feed the samples by identifying institutions already having or about to have a Learning Spaces strategy or masterplan on their campuses. We also selected institutions that were, on purpose or not, not engaged in such initiatives. This first se-

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lection was based on discussion and participation to workgroups activities, screening of literacy, first interviews with key actors already identified, and attendance to conferences.

Secondly, we collected factual data (masterplans, designs, governance scheme, usage statistics), as well as visual and empirical materials through visits, observations on site using time lapse video recordings and photo diaries and semi-structured interviews of actors. Those latter were categorized as:

1. Stakeholders, designers
2. Managers, practitioners
3. Users (staffs, faculties and students)

in order to prepare a specific interview form was prepared for each of these categories, yet all of them were structured around key topics and matters connected to the research questions:

1. Understanding of the Learning Spaces goals and potential benefits
2. Involvement in the local project/initiative and challenges
3. Expected outcomes

To analyze those collected qualitative data, we adopted content analysis to extract the characteristics of interviewees' motivations, and identify their practices related to the Learning Spaces. These were also articulated to the observations conducted on site, through the techniques mentioned above.

We intend to use these factual and qualitative data to identify similarities and differences among spaces designed for similar purposes, across the different territories and institutions. From the study of the spaces themselves and the uses/practices they effectively induce, we aim to conduct a reverse analysis first to highlight the design purposes, and the institution's strategy that was applied to this project. This is supposed to outline the conditions of the Learning Spaces success, and the potential of a large scale generalization.

## 2.2 Study's Criteria

The pre-study screening process, including all the literacy, the workgroups outcomes, the conferences trends and the key actors interviews helped to fine and to confirm an pre-existing set of ten major criteria related to a Learning Spaces initiative, that the study itself is relying on. Those criteria have been chosen as they address the Learning Spaces not only on their physical point of view, but also on the induced (or not) practices. They also cover their genesis, their governance, their motivations and purposes, and their integration in the campus context.

### 2.2.1 Terminology

What types or spaces are precisely defined by the terms Active Learning Classrooms, Learning Commons and Learning Centers? What are their key features and purposes?

### 2.2.2 Layout and Furnishing

What type of spatial organization and what type of furnishing (fixed, mobile, mixed) are chosen for the spaces?

### 2.2.3 Integrated IT/ICT

What kind of IT/ICT equipment are installed in the Learning Spaces (large displays and video sharing systems, online reservation system or distance monitoring for instance)?

### 2.2.4 BYOD Compliancy

Are the Learning Spaces designed to be used in a BYOD con-

figuration, and if so, are they a part of the institution's BYOD strategy?

### 2.2.5 Location on the Campus

Are the Active Learning Classrooms gathered in a centralized location? Is the Learning Commons located inside or outside the library?

### 2.2.6 Governance of the Project

How the Learning Spaces project has been integrated in the context of the campus, and in the institution's strategy? Is it an institution-wide or a local (school/faculty) initiative?

### 2.2.7 Design and Evaluation Tools

Did the project team use design and evaluation tools during the design process, and in the Learning Spaces operations?

### 2.2.8 Community Interactions

Are the uses of the Learning Spaces affected by the life style of the students?

### 2.2.9 New Services

In the case of Learning Commons and Learning Centers, what kind of new services are provided compared, for instance, to the former University Library?

### 2.2.10 Teaching and Learning Practices

Do the Learning Spaces have an outcome on the faculties and students' practices?

## 2.3 Range and Samples

The study addresses samples of institutions in four main territories: Europe, North America (USA and Canada), Asia (Japan and Singapore) and Oceania (Australia and New Zealand).

We aim to make these samples as significant as possible, by including national and private universities, sciences focused and humanities focused ones, diverse in terms of their size, and located in various regions in each country.

Considering that in 2017 and 2018 the study especially focused in the situation in Japan, the Japanese sample includes 70 national, public, and private universities at the time of this paper's writing. This Japanese sample has been compared to the ones of North America (12 institutions), Europe (10 institutions), Oceania (8 institutions). Within the Asian territories, the Japanese sample has also been compared to the one of Singapore (3 institutions)

## 3. Findings regarding Active Learning Classrooms

### 3.1 Layout and Furnishing: Various Configurations

In the Active Learning Classrooms, flexibility and collaboration appear to be the most basic features. Many authors and papers mentioned this flexibility as a key to the switch to an Active Learning configuration [10], and/or to promote collaborative work. The choice of furniture type and the layout design reflect those features, through two main types.

The first type of layout and furnishing is based on highly moveable furniture, providing a real flexibility in the organization of space, offering a lot of possible configurations. Those furniture don't integrate any specific technology (power supply and video connection). Despite this flexibility, it appears in several examples from all territories that the users spontaneously don't change



**Fig. 2** Île-de-France Digital University. BYOD Faculty Development Active Learning Classroom in Paris 8 University library.

the configuration of the space. That’s the reason why some institution provide maps to the users to show some examples of layout they can compose in the space.

The second type of layout and furnishing is based on fixed tables, usually designed to promote collaboration by proposing a design that allows all the participants of a group to see each other, and by providing specific features such as wired networking for specific purposes, power supply, and shareable displays (**Fig. 2**).

Both of those configurations (flexible and fixed) are almost systematically compliant with the BYOD in all territories. In the case of a single stand-alone Active Learning Classroom design process, a choice had to be made between the flexible and the fixed configuration. Even if the flexible configuration is often representing the typical Active Learning Classroom, a significant number of the fixed configuration also exists, sometimes differently named. This second type of configuration keeps a significant popularity among students seeking for group work facilities in all territories. Overall, the mix between those two types of layout and furnishing is a reality in all territories.

### 3.2 IT/ICT: Analog/Digital Mix

Active Learning Classrooms design principles are usually involving a larger part of embedded technology than the classical classrooms. However, examples observed all around the world tend to show a great variety of configurations, and validate an Analog/Digital mix as the best way to promote uses and practices. Analog writable surfaces, for instance, are an especially popular feature, and often more than Digital SmartBoards. Not only motivated by a cost cutting logic, this trend seeks to support a fully human collaboration, not especially enabled by a specific hardware and software technology. The term “humanware” has been introduced to illustrate this trend, regarding which, it’s necessary to mention that it doesn’t present any correlation with the outcomes on the uses and on the practices. Some very interesting ones has been observed in facilities in which the technological equipment wasn’t the highest priority.

### 3.3 Faculty Development: The Key to Support the Practices

The main challenge of the Learning Spaces remains of course the evolution for the students’ experiences, and especially of the

Teaching & Learning Practices. Especially in the Active Learning Classrooms, that present a strong pedagogic focus, which also requests the teachers to modify their practice to have a real translation from material features to a pedagogic reality. Meaning that in the most successful experiences that have been observed, if the equipment is a key factor, a genuine Faculty Development initiative exists in synergy with the Learning Space itself. This type of proceedings finds especially its relevancy in centralized institution-wide Learning Spaces strategy. US Universities, in particular, present interesting initiatives in this matter [11].

### 3.4 Number of Facilities and Capacity: The Main Challenge

The Active Learning Classrooms’ number on a campus clearly appears to be a key factor to move from an experimental situation to a generalization. Regardless of the territories, multiple examples of well designed Active Learning Classrooms can be observed, that can’t reach the step of a generalization as they can’t host regular weekly classes. This generalization challenge is not only connected to the practices, but clearly also to their capacity to face a huge number of classes and students. As Active Learning basic principles tend to avoid to large number of students in a same classroom, the Active Learning Classrooms need to be multiplied on the campus to increase their global capacity in seats.

## 4. Findings Regarding Learning Commons & Learning Centers

### 4.1 Global Trend: A Rise of the Informal Spaces

The analysis of the literacy, the interviews and the conferences trends clearly shown that the Active Learning Classrooms have been the primary focus of the institutions’ stakeholders and the most promising type of Learning Spaces during the first years of the phenomenon. However, in all territories and especially due to the challenge of the capacity mentioned in Section 3.4, the study has shown a significant shifting of the focus towards the informal Learning Spaces: Learning Commons and Learning Centers. Illustrating their growing popularity, an Australian study shown that on a yearly base, a cohort of students spent three times more time in informal physical Learning Spaces than in the formal physical Learning Spaces and in virtual Learning Spaces [12].

### 4.2 Layout and Furnishing: Fitting Basic Needs

The design of those informal spaces, due to their specific typology of use, is based on specific furnishing, reflecting the less formal interactions and the socialization they are supposed to promote. For example low height sofas or bar style counters, that provides slightly different kinds of interactions. The Learning Commons and Learning Centers are especially compliant with the BYOD. That’s the reason why the type of furniture chosen for such areas are not only comfortable, but also integrate power plugs for many of them (**Fig. 3**). Considering the trends of the students equipment in mobile/portable devices, power appears as a primary request in the surveys usually conducted prior to project launch.

### 4.3 Set of Services

Learning Commons and Learning Centers are basically defined



Fig. 3 University of Washington. Odegaard Library.

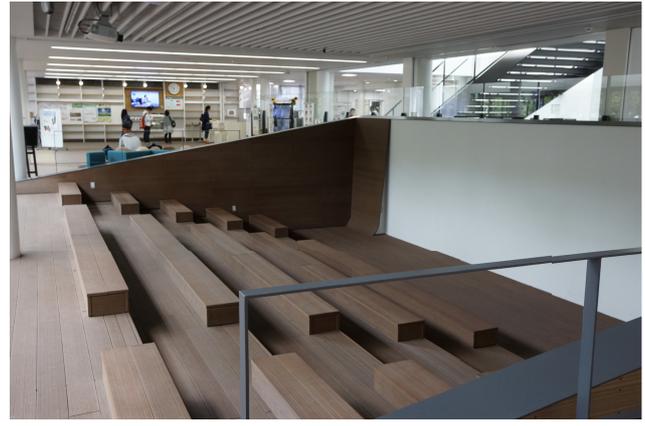


Fig. 5 Chiba University. Presentation area in Academic Link Center.



Fig. 4 University of Melbourne. Group working areas in School of Design.



Fig. 6 Osaka International University. Zoning in Learning Commons.

by the following fundamentals: facilities, contents, practices. Their design philosophy is systematically translated to a set of new services compared to the eventual prior situation, especially a pre-existing library (in Japan, 80% of the Learning Commons are located in libraries [13]. They contribute to the attractiveness of the location, beyond its physical features.

Several of those services are almost systematically observable. Group working areas (Fig. 4) are very popular among students.

Physically, they can be closed (usually by glass walls) or separated by specific furniture and may be bookable (though a classical human counter or through an online tool) or not. In a huge majority of the visited informal spaces, a pedagogical support / teaching assistance counter is also proposed on a daily or weekly basis [14]. Such service allows for example undergraduate students to get topical mentoring from graduate students, on site and face-to-face.

Some other services, yet not systematical, show an important presence in the Learning Commons and the Learning Centers. IT lending counters allow the users to borrow and/or use technological devices and accessories for the time they spend in the space. Specialized workstations, especially providing software that the students don't usually have on their own devices (typically image processing or A/V focused [15]), may be observable on some locations. Some video recording studios, often initially settled for MOOCs production purposes, are also present. The conjunction between the BYOD and the Learning Spaces also introduces

new modalities in terms of technical support and user assistance. Within the new types of services provided, 1st level technical assistance desks or counters (previously provided at the IT department) appear to be one of the most popular and useful ones [16]. Printing labs and Fab labs also tend to be more and more included in the offer. Same for formal presentation areas (Fig. 5), that may contribute to an event dynamic on the campus, or visualization rooms [17] that are usually only hosted in Learning Commons and Learning Centers, for event or pedagogic purposes.

#### 4.4 Zoning

In large integrated spaces such as a Learning Commons and Learning Centers, the different types of services described above can and usually do co-exist. This co-existence introduces the notion of zoning, that consists to a physical and functional subdivision pattern of the space, and that aim to support different kinds of practices in a same location. The zoning clearly appears to be a key factor of the efficiency of a Learning Commons design, regardless of its size. It contributes significantly to the understanding of the Learning Commons or the Learning Center's purposes, and clarify the visibility of the set of services. Different techniques may be used to apply this zoning pattern, most of them using different kinds of furnishing to distinguish the different zones (Fig. 6).

## 5. Discussion about the Japanese Situation

### 5.1 Overall Dynamic and Design Trends of the Learning Spaces in Japan

The observation of the Learning Spaces phenomenon in Japan shows an especially dynamic trend on the informal spaces side, particularly on the Learning Commons, confirming the shifting mentioned in Section 4.1. The contextual reasons of this dynamic, more important than the other territories' ones, are exposed on Section 5.2. The Active Learning Classrooms, on their side, present a trend similar to the ones observed abroad: Japan show very interesting examples not only due to their design but also to their integration in a Faculty Development initiative [18], [19]. However, and as observed globally, the biggest challenge of most of the Japanese Active Learning Classrooms remains the step towards the generalization, as their number on a campus is too low to induce and support a mainstream transformation of the teaching and learning practices.

Looking back to the design principles, it appears that the physical aspects (embedded technology, layout and furnishing) don't really tend to homogenize, still reflecting some of their respective territories' cultural aspects. For instance, Japanese Learning Spaces, in their core design, apply the same space optimization process than usually applied in any other construction, and are therefore more versatile.

### 5.2 Institutional Context and Motivations

The study shown that the motivations leading an institution to launch Learning Spaces projects, whatever could be their perimeter and their ambitions, present significant differences between the territories. Those differences are mainly connected to the national Higher Education context and system. Being a centralized or decentralized Higher Education system, having a mix between national / private universities, and showing or not a high level of competition between the institutions appear to be some key factors influencing the way to lead a national or a local strategy towards Learning Spaces.

In that sense, Japan shows significant specificities, not only due to its national Higher Education system, but also to external factors. The MEXT decided to promote Active Learning, and so the related Learning Spaces, since 2009 through the funding of a first wave of experimentations in national universities [20]. However, the main step occurred consecutively to the 2011 Tohoku earthquake, when the MEXT decided to launch a university buildings structure anti-seismic strengthening operation [21], through a new and wider funding. This latter was also an opportunity to work not only on the structure of the facilities, but also on their interior layout. That was especially true for the libraries, and lead to an important sequence of Learning Commons settlement in national universities. The private ones took the same kind of initiatives, in order to follow the trend, but also for competitive purposes.

Indeed, the competitiveness of a national Higher Education system appears to be correlated to the Learning Spaces trend. The Japanese private university system is very representative of this, and the interviews lead clearly showed that the very high number

of Learning Commons settled especially in private universities is a direct consequence of the competition existing between all of them, and with the national/public ones. The stakeholders acknowledged that such kind of facilities were not only a tool to support new practices, but also way to attract the students at the moment of their enrollment choices, considering that they reflect the institution's innovativeness.

These Japanese specificities can be compared to foreign examples. France's centralized Higher Education system, therefore not competitive among universities, didn't induce a real nationwide Learning Spaces policy, beyond recommendations and some institutional support (even though some universities decided to invest in Learning Centers on their own [22]). The US system, less centralized, more competitive, shows a dynamic trend of Learning Spaces pretty close to the Japanese one, tending to confirm the influence of the decentralization and the competitiveness of the system.

### 5.3 IT/ICT: Pressure of the Smartphone, and Low Tech on Purpose

Regarding the IT/ICT component of the formal and informal Learning Spaces, the study immediately shown a quite unique situation regarding the BYOD in Japan. This is indeed the only territory observed that makes a difference between a PC based BYOD, introducing the BYOPC concept, and a generic BYOD. Indeed, the smartphone – and not the laptop or the tablet – is clearly identified by the stakeholders, the practitioners, and the students themselves as their primary device. And even if the laptop or tablet equipment rate is equal to the European and North American ones, the Japanese students habits consist to bring only the smartphone on the campus. That's why some Japanese universities, which initiated western BYOD-like policies, introduced the BYOPC concept [23] as their challenge is to create a physical and digital learning environment that would motivate the students to finally bring not only their smartphone, but also their laptop or tablet on the campus instead of using the institution's fixed PCs.

In Europe, Oceania and North America, the use of the acronym BYOD is clearly connected to laptops and tablets, and not to smartphones. Meaning that a BYOD compliant Learning Space design is focused on the use of user's laptops and tablets in the space, through the features previously described.

Also related to the technological matters, some Japanese Learning Commons [24] were the first ones to apply a "low-tech on purpose" design philosophy. This choice has been made in order to support human collaboration in the space, rather than technology-enabled one.

If Japan provided the first and most significant examples in that matter, the questioning of the right amount of technology to include in a Learning Space design also rose progressively in other territories, getting beyond the dogma of an obvious high-tech design that doesn't always get a translation in practices.

### 5.4 The Question of the Assessment

Becoming a strategic, financial and operational matter, the Learning Spaces and their trend highlighted the necessity of design and evaluation tools, able not only to provide good practices

and guidelines for the upcoming projects, but also to assess the efficiency and the quality of the existing ones. Measuring the efficiency and/or the quality of an object as a Learning Space brings the natural question of what defines this efficiency and/or this quality: the furnishing? the embedded ICT? the integration in a campus strategy? the transformations induced on the teaching & learning practices?

Those questions become especially delicate not only to answer, but even to formulate, as soon as we focus on composite objects as Learning Commons and Learning Spaces, whose informal nature makes very difficult to identify practices to evaluate. Japan shows a lack of formal assessment, despite the dynamic it shows especially regarding the Learning Commons. This lack is also existing in all other territories, despite the availability of two major tools.

Regarding a Learning Spaces assessment framework, the first, and still major initiative up today is the Learning Spaces Rating System (LSRS) [25], initiated and developed by the EDUCAUSE Learning Spaces Constituent Group. The LSRS has been published in 2014 in its original English version (French & Japanese translation in 2017). This framework focused on Active Learning Classrooms provides a set of criteria for pre-occupation evaluation, organized in 6 sections and covering all the matters involved in a Learning Spaces project. Meaning not only the material aspects (layout and furnishing, ICT) but also the strategic (integration in the campus strategy) and operational (support, training) ones. Overall, the LSRS definitely shows an increasing popularity, that has however to be confirmed beyond the North American borders. Nevertheless, it clearly represents today the reference for evaluation and assessment of the Learning Spaces.

Beside the LSRS described above, Flexible Learning Environments eXchange (FLEXspace) is a second and complementary tool, more focused on the post-occupation assessment. Initiated in 2012, FLEXspace is an online open access repository of various types of various and existing Learning Spaces, gathering almost 1,000 records. FLEXspace provides technical, spatial, technological, organizational, financial data, high definition photos, and examples of practices that can occur in the described space. A research activity related to the repository's contents [26] has been initiated in 2018. Even though its popularity is continuously growing, FLEXspace – as the LSRS described above – needs to gain visibility beyond Canadian and USA borders.

## 6. Concluding Remarks

At the intersection of strategic plans and unexpected events, of centralized measures and local initiatives, of pedagogic expectations and rational competitive reasons, the Japanese Learning Spaces show a quite unique conjunction, that lead a very important dynamic, especially on the side of the Learning Commons.

The interviews organized for this study definitely highlighted how much the Japanese Universities stakeholders were embracing the Learning Spaces as a key matter for their campuses. Beyond real design qualities, several examples of visited spaces shown one of the highest level of integration in the campus strategy observed in all territories of this research. Some of them very successfully re-invented some core missions of the universities,

respecting their legacy yet adding an undeniable creativity in the facilities themselves, but also in the services they support [27].

However, Japan also share with the other territories some common challenges, that will really shape the future of those Learning Spaces: a genuine generalization for the Active Learning Classrooms, and a real assessment of the practices occurring in the informal spaces.

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### Editor's Recommendation

Learning spaces are a key driver of change in higher education, IT, and teaching and learning practices around the world. This paper focuses on observations of innovative physical learning spaces in the EU, North America, Oceania and Asia, and intends to compare the situation in Japan with those in other regions. This study is an international comparison of learning spaces and is considered to be a very ambitious and valuable paper. Also, this paper provides useful information of the case examples of various learning space to readers.

(National Institute of Informatics, Masako Furukawa)



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He is running since 2016 an international comparative study of innovative physical Learning Spaces that seeks to highlight the dynamics and the outcomes of this phenomenon in a cross cultural approach. John used to serve as expert at the Educational Technology division of the French Ministry of Higher Education and Research, and is active in several Educational Technology and Learning Spaces international workgroups.



**Shoji Kajita** is a researcher and practitioner on Infield Information Informatics defined as study of the ways in which community dynamics and information and communication technologies mutually shape each other as a stakeholder of community. He is currently a Professor of IT Planning Office, Institute for Information and Management Communication, Kyoto University.

He was an Associate Professor of Strategic Planning Office in Information Communication Technologies and Services, and also Department of Systems and Social Informatics, Graduate School of Information Science, Nagoya University. His current main interests include e-Learning and e-Science to actualize scalable information environment for higher educational institutions.

## 正誤表

下記の箇所に誤りがございました。お詫びして訂正いたします。

訂正箇所	誤	正
44 ページ	Revised : August 26, 2018	Revised : August 26, 2018/May 1, 2019