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SPATIAL LEARNING LANDSCAPE (SLL) IN THE CAMPUS OF THE DIGITAL AGE

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Keywords: Campus, digital age, learning landscape, Cornell Tech

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Abstract

Values controlling campus articulation are mainly rooted in the 'Connectivity' value. Its interpretation exceeds just the physical connections inside the campus to the wider links between the academia and the society. The digital age has thoughtful impacts on the way that every aspect of the life is performing. The campus' shaping values have changed considerably and the connectivity came at the heart of these changes. The way the students are connected to each other's, to their tutors, and even to the place is replaced. In addition, this technological revolution has profoundly wedged the business domain, restructuring the linkage between academia and society as a whole. However, these transformations have influenced the required graduate specification to join the work market, and accordingly, the nature of learning in the digital age to face all of these challenges. This paper presents an analytical review to different circumstances that affect the learning typology at the digital age and the prospects of the future education at universities. It links between these attributes and the Spatial Learning Landscape (SLL) at the campus that reflects the values of the digital age. In addition, a matrix correlating the values of the education spaces in the digital age (active and inactive) to the Spatial Learning landscape configurations is originated. Finally, the paper presents a descriptive analytical study to the spatial learning landscape of the new Cornell Tech Campus, Roosevelt Island, New York, using the developed matrix as leading example for the digital age-based campus design.

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ABSTRACT

Values controlling campus articulation are mainly rooted in the 'Connectivity' value. Its interpretation exceeds just the physical connections inside the campus to the wider links between the academia and the society. The digital age has thoughtful impacts on the way that every aspect of the life is performing. The campus' shaping values have changed considerably and the connectivity came at the heart of these changes. The way the students are connected to each other's, to their tutors, and even to the place is replaced. In addition, this technological revolution has profoundly wedged the business domain, restructuring the linkage between academia and society as a whole. However, these transformations have influenced the required graduate specification to join the work market, and accordingly, the nature of learning in the digital age to face all of these challenges.

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KEYWORDS

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1. INTRODUCTION

The 1976 survey of the American Institute of Architects (AIA), named University of Virginia as the "proudest achievement in American architecture". The design of this university, initiated by Thomas Jefferson more than 150 years ago, is based on 'Academic Village' typology. The values dominated this design reflects the continuous tradition of the medieval European universities where the learners and teachers lived and worked together in a cloistered environment. These permanent values are all about 'Connectivity' as the core dispute. This is clear in Chapman words "For all of its intended intimacy as a place for human connection, Jefferson made sure that the campus on a hilltop that afforded a stunning visual grasp of the surrounding countryside. ... In this, he fulfilled an inspiration of the new nation to create a university shaped to America". As Jefferson himself asserts "... the campus that would negotiate a new relationship with nature in the New World" (Chapman, 2006:6). While 'Connectivity' is still a dictating force for campus shaping –either internally or externally- its definition has profoundly changed and redefined along many milestones.

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Digital revolution is one of these most influential landmarks along the campus development history. This revolution made a shift from industrial production to information and computerization, changing significantly how people connect with matters and with each other's (Chasse, 2017). This change has clear impacts on learning and work domains as well. Digital age learning shows the almost complete merge between learning and work, as Paine (2017) says: work is learning and learning is work. The reflections of this argument are clearly presented at a lecture given by Nick Van Dam, the chief learning officer at McKinsey. He raised a slogan of "Learn or Lose" as a reflection of the challenges of joining the graduates in the digitally developed working arena. He termed this a "call to action" to help organizations deal with the "sweeping, rapid changes" that they face. He suggests that this incorporates two separate but related processes: the first is to enhance the strategic role of learning and development; and the second is to implement 21st-century learning and development practices (Chasse, 2017).

Innovation stands as the core value in the 21st Learning and development practices. It is critically required to face the complexity and uncertainty typology of the rapidly accelerating changes in the digital age working requirements. This assumes the individuals to be lifelong learners. It also stresses the importance of creative problem solving and the ability to make connections across domains in order to drive innovation. As Chasse, (2017) asserts, in the digital age, individuals must not only be able to find and navigate information but they also must be able to critically interpret that information. In addition, a study performed for learning spaces, by Scottish Funding Council calls it "the period of expanded access to education". It argues that "now is the period of pedagogical changes from a teaching-based culture to a student-centered learning environment for student 'consumers' who take a more pro-active role in shaping their education than earlier generations" (SFC, 2006). However, these required changes have left their imprints on the learning environment and consequently on the campus of the digital age. The type of 'Connectivity' as the core value in campus shaping –whether within or across the campus- is redefined according to the new typology of interactions and the new intended outcomes of the learning process of the digital age. Actually, this is a perilous challenge for planners and architects when planning new campuses or re-planning the already built ones.

This paper reviews the changes at the pedagogical theories and techniques as related to the digital revolution. It investigates the new types of learning at the digital age and their impacts on the future education trends at universities. It presents an understanding to the 'Spatial Learning Landscape' of the digital campus correlating the new values for education at the digital age, to different spatial configurations. The paper uses the developed correlation matrix to investigate the spatial learning landscape of the new Cornell Tech Campus, Roosevelt Island, New York as a leading example in redefining the campus role at the digital age.

2. THE NATURE OF LEARNING IN THE DIGITAL AGE

According to Paine (2017), the digital age learning is affected by two wider constraints the first is the technological changes and opportunities and the second is the changes in the working organizations and the society as well. The rapid changes at these two determinants calls for accompanied changes in the way the educational game is played. This, as the Deloitte report so fittingly says, is a "new game, new rules".

This change is widely discussed as an indispensable new educational metaphor that works as a new milestone along the epistemology development. That's why the Global Human Capital Trends report, which Deloitte has produced for the last five years, focused exclusively on "rewriting the rules for the digital age". In this regards, an important distinction has to be made between translating learning into a digital format and transforming learning using technologies to re-assess the purpose, function and outcomes of learning. Actually, this is such an important fundamental shift that every learning organization should be undertaking (Paine, 2017).

Brown & Duguid, (2017) highlight number of dimensional shifts that shape the new face of the digital educational era. The main dimensional move concerns the developing idea of pedagogy, which today includes message as well as picture and screen education. Beyond imagery, data manipulation is maybe the key segment of the new pedagogy. Another important dimensional move is the shift towards more examination and disclosure that describe surfing the World Wide Web, which, surely, wires learning and excitement. This shift comes to diminish the traditional authority-based lecture model. The third move, relating to thinking, connects with exploring-based learning in a forceful way.

Traditionally, thinking is connected with the deductive and conceptual. However youthful students working with computerized media appear to concentrate more on the solid, proposing a type of bricolage, an idea doing with one's capacities to discover something—maybe a device, a question, or an archive—that can be utilized or changed for building something new. New generation of learners, sharpen their judgment abilities through experience and triangulation as they practice a range of assets the Web introduces.

The last dimensional move needs to do with an inclination to activity, to attempt new things without perusing the manual or taking a course. This inclination moves the concentration to taking in situ with and from each other. Learning ends up noticeably as situated in action; it progresses

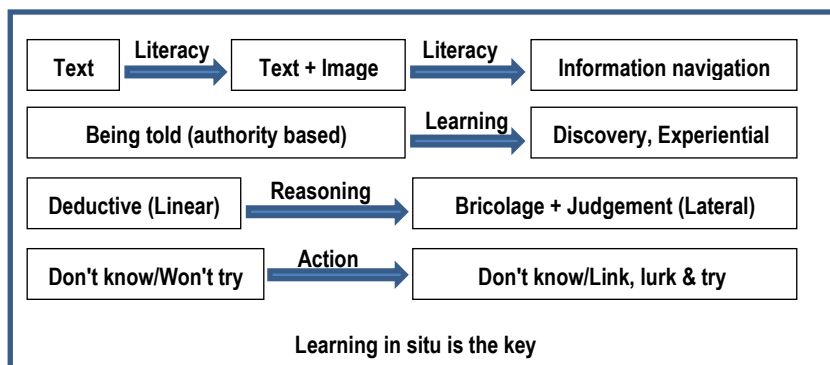


Fig. 1 Some Cyberage shifts

Reference (Brown & Duguid, 2017)

social as intellectual, it is concrete as opposed to digest, and it entwines with judgment and investigation (Brown & Duguid, 2017). These critical moves in learning are represented in figure 1. As supporting these moves, Chasse (2017) identifies six characteristics of learning in the digital age. They are as follows:

- Engaging through an exceptional and relevant learning experience

An attractive student learning experience will generate intrinsic gratification, motivation and the active engagement necessary for more effective learning. To sustain that engagement, the act of learning must be relevant and meaningful, both for the learner and for the organization. This is empowered through student driven plan and instructive adjusted goals.

- Empowering, customized and self-coordinated

The improvements in computerized innovation have empowered students to pick what, how and when they learn. They look for learning that is customized, that fits their individual inclinations and requirements. A culture of self-coordinated learning is definitely rising with learners guiding themselves towards which learning to tackle.

- Universal, without a moment to spare, on-request and in setting

Computerized learners need to learn at the desperate hour when they experience a particular ability or information hole that keeps them from finishing an assignment or from accomplishing a coveted unmistakable outcome. Learning must directly support the activities that the employees perform in reality and on-the-job rather than focusing on teaching knowledge and theories. Individuals ought to have the capacity to get to this particular learning inside their own specific situation, when they require it.

- The right blends of experiential, social, formal and informal

Learning happens continuously, in an assortment of settings and modes, upheld by innovations and technologies that enable any learner to easily and effectively get to inner and outside data and interact with networks of experts and peers. Mixing formats makes learning more effective and choosing the accurate configuration for the right purpose is critical.

- Hyper-connected with analytics universally

Digital age learners are connected with learning resources, information, peers and experts to effectively learn. Providing simple tools that enable these connections is important for learning organizations. Additionally, analytics can provide insights on the learners, their own development needs, what assets can meet their needs, how those assets are consumed, how learning could be improved and how effective learning activities are.

- Continuous, based on inquiry, exploring and doing.

It is critical for individuals to own their development and continuously learn. A university must be a place where constant learning opportunities enable students to stay relevant in their career. Learning design is expected to promote inquiry, exploring and doing so that learners are able to research solutions to specific situations and build their own answer based on collective experience and existing knowledge.

This dictates universities to play a different role at the digital age. They have rethink their part as social learning organizations, fostering students' progression from the explicit to the tacit by using virtual, Web-based learning opportunities to augment, but not replace, the physical. The Web introduces a medium that distinctions numerous types of knowledge—dynamic, literary, visual, melodic, social, and sensation. This brings the educators with new confronts and prospects about how to create new learning environments that use the unique capabilities of the Web to leverage the regular ways that people learn.

However, the role the university has to play at the digital age has to go through two parallel domains; on-campus and off-campus. On one hand, an on-campus social learning environment ideally offers both extensive and intensive learning experiences. The extensive entails exposure to multiple communities of scholars and practice, giving students' broad access to people from different fields, distinctive foundations, and diverse desires, all of which join to frame an inventive pressure that produces new thoughts and points of view. The extensive experience often results in learning that students would not have independently chosen to make emphasize on but from which they nevertheless gain considerably. Furthermore, it also helps to develop the capacity to judge what is worthwhile and what is worthless— an increasingly important skill in an age of ubiquitous and often unreliable information (Brown & Duguid, 2017).

On the other hand, off campus, the 21st-century university can extend its reach dramatically through space by using technology to help develop a regional learning environment that is dynamic, diverse, and interdependent. A regional learning environment builds on the strengths of the institutions within it such as universities, and libraries, as well as the equally important contributions of the region's citizens, students, firms, and government. Effectively connected, these assets assemble a learning environment that brings progressively rich scholarly and instructive chances to their region. Universities can utilize the Web to keep up fundamental alumni networks as well. Such systems can offer much esteemed long lasting learning openings and, moreover, give a chance to the university to learn from the alumni and their encounters (Brown & Duguid, 2017).

3. PROSPECTS OF THE FUTURE EDUCATIONAL TRENDS AT UNIVERSITIES

The most influential shift in pedagogy in the digital age is the move from tutor-based to learner-based learning process. This draws a larger role for the learner and a new type of connection with tutors, peers, and the place. As realized by faculty members, the more appropriate type of learning in the digital age is a merge of, the hybrid courses (a mix of online and in-class lectures), and flipped classrooms (online lectures with face-to-face classroom project work). This diminishes the role stereotypically played by the traditional lecture-style classroom instruction model, dictating a new type of spatial requirements. Online lectures provided by faculty, give them a chance to examine different types of collaboration that the students could engage in the campus. These merging techniques approved to have a higher level of learning outcomes and skill development (Zeller & Luskin, 2015).

The remote learning and the role of online courses and degree offering in higher education is expected to increase noticeably. The innovators and developers of the Massive Open Online Courses (MOOCs), have put the focus on residential campus education and its importance. They communicated that they are not attempting to supplant face-to-face education, but rather apply lessons from distance learning that can likewise help enhance on-campus learning. The "blended learning" as EdX President Anant Agarwal expects – is anticipated to be the most predominant type of the classes instructed on campus. Actually the call for a new examination of on-campus learning was reported in the 2013 by the New Medium Consortium Horizon Project (Zeller & Luskin, 2015). The understanding of the blending education is expanding as Coursera is recently starting to get accreditation for their (MOOCs), and throughout the following quite a while, learners on traditional campus will have the capacity to get transferrable academic credit by registering in online courses offered from universities around the world (Zeller and Luskin, 2015).

Another sort of blending is between physical and virtual learning environments. Now this mix is a testing matter. This relationship is continuously reevaluated to distinguish the interesting qualities and shortcomings of each for various types of instructing and learning activities. A number of investigates is now performed to find the correct harmony between the utilization of virtual situations and face-to-face human interaction. Keeping in mind the end goal to augment the advantages of these associations, many new instructional models are developing which will purposefully mix web based

learning with individual cooperation. This depends on many investigations that feature the estimation of individual communications between learners, faculty, and peers as still an important and vital part of the 21st century campus involvement.

Private learning groups have been grasped by many universities in the course of recent years as a viable way to enhance student learning and aptitude advancement by crossing over students' curricular and co-curricular knowledges. Basically, this has been accomplished by organizing constructive faculty-learner and learner - learner interactions around a typical scholastic or instructive topic. The good example offers academic courses inside the private group, with organized planned cooperation inside and outside of the classroom. As the National Study of Living-Learning Programs (NSLLP) shows, just 48% of these projects conduct formal coursework, and 23% had no faculty contribution by any means, (Inkelas, 2010). As indicated by Zeller and Luskin, (2015), the mix of new advancements into the private learning group condition may rise as the perfect on-campus instructing and learning condition for the 21st century. By purposefully coordinating individual communications, experiential learning and astounding courses, the capability of these groups can be completely figured it out. Furthermore, in like manner, campus configurations will in this way progressively factor larger amounts of students learning and expertise improvement results by amplifying the advantages of mixing instructional advances with face-to-face educating and observing. The private learning group could be at the focal point of these campus planning.

As indicated by these new patterns, the planning of campus workplaces will be an imperative institutional issue as these key discourses happen and in like manner new results for learning and ability advancement will develop, and it will be fundamental that the campus amenities without bounds be intended to help the accomplishment of these results. These new results will in all likelihood include:

- The utilization of knowledge as opposed to the procurement of knowledge
- The improvement of human communication skills and capabilities
- The improvement of worldwide skills and the capacity to work successfully in multinational work groups
- Entrepreneurialism and the need to adjust individual skills to quickly changing workplaces

In addition, for future planning of the campus of the digital age it will be essential to have specific features to accommodate these new patterns. The spaces that will be affected will incorporate students' rest areas, eating zones, private academic spaces, academic support spaces, open social event spaces ... etc.

The thoughtful mixing of present day innovation assets with the conventional advantages of face-to-face connections between students, staff and mentors – including responsively arranged informal learning condition – will at last save campus experience and give flusher learning chances. Nonetheless, these new campus facilities will necessitate spaces for: (Zeller and Luskin, 2015).

- Flipped classroom community oriented ventures and gathering work
- Groups to see online lectures
- Study gatherings
- Educational provision utilities (exhorting, mentoring, library help, and so forth.)
- Group collaboration and task work
- Informal cooperation between students, faculty, tutors and associates
- Socializing and amusement
- Individual studying, reflection and confidentiality

4. SPATIAL LEARNING LANDSCAPE (SLL) OF THE DIGITAL AGE

The repercussions of shifting the learning paradigm from instruction to learning have clear impacts on the role those spaces in the digital age play. Customary categories of space are winding up less important as space turns out to be less specific, limits obscure and working hours reach out toward all day, every day. In many cases, space sorts are progressively being planned basically around examples of human collaboration instead of specific requirements of departments, administrative systems or technologies (Harrison and Hutton, 2014).

The 'learning landscape' concept has been utilized to create spatial models for universities that perceive that learning isn't quite recently bound to formal showing spaces and that the type of the learners encounter is affected by all parts of their physical condition. Learning spaces within this

model can be categorized as ‘specialist’, ‘general’ or ‘informal’ (Figure 2). However, the new trends of spatial organization are to maximize the informal learning spaces compared with the formal ones. Many universities are developing very flexible learning spaces that can be shared crosswise over resources and branches of knowledge. Diana Oblinger (2006) asserts the dynamism of the learning process and its changing typology as an interaction between the learner and the space. She notes that today’s students have attitudes, expectations, and constraints that differ from those of students even short time ago. She suggests that learning spaces reflect the people and learning approach of the times. She advocates for the creating a comprehensive blending learning landscape, *"learning is the central activity of colleges and universities. Sometimes that learning occurs in classrooms (forma learning); other times it results from serendipitous interactions among individuals (informal learning). Space – whether physical or virtual – can have an impact on learning. It can bring people together; it can encourage exploration, collaboration, and discussion. Or, space can carry an unspoken message of silence and disconnectedness. More and more we see the power of built pedagogy (the ability of space to define how one teaches)"* (Oblinger, 2006).

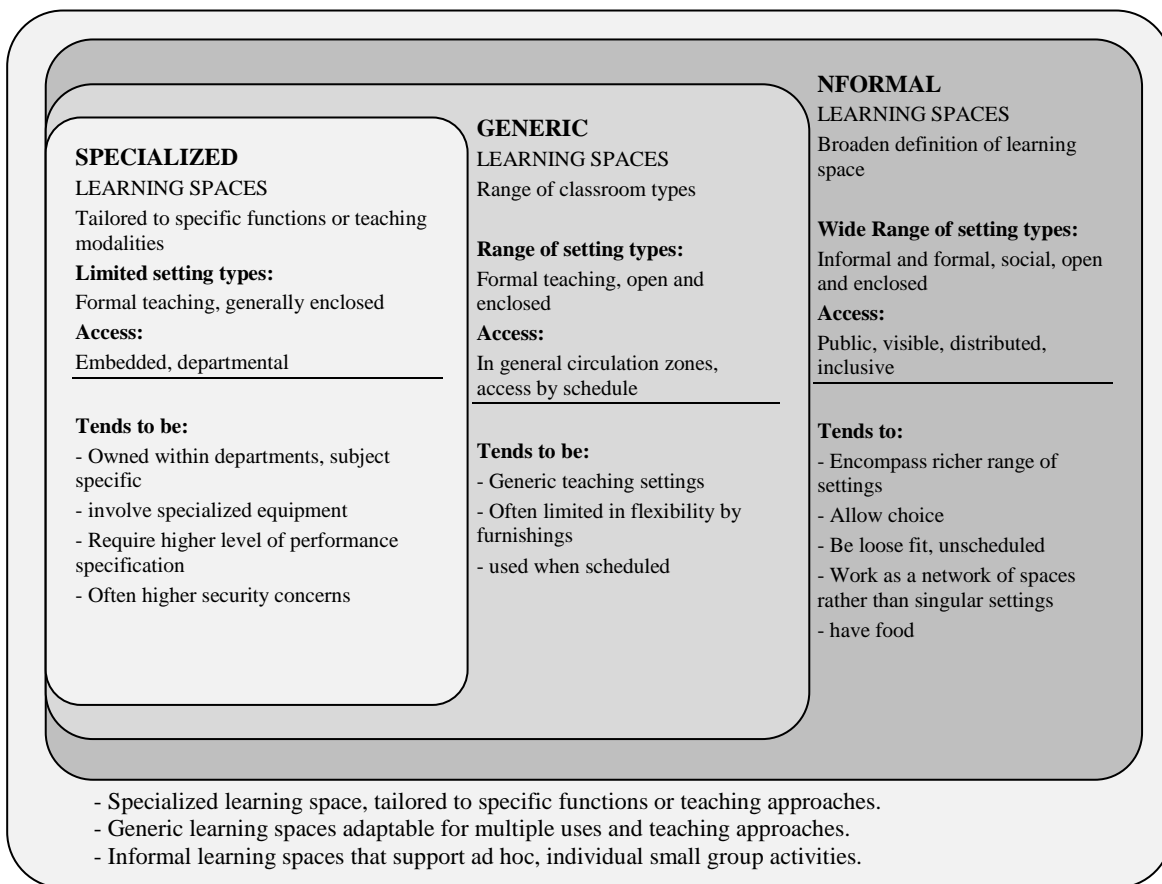


Fig. 2 Types of learning spaces in the campus of the digital age.
Reference: (SMG, 2006).

A considerable lot of the present learners support dynamic, partaking, empirical learning – the learning character they show in their own lives. However, this is in contrast with the single focal point at the front of the study room. Acknowledging the desires and typology of learners of the digital age, how individuals learn, and innovation, the ideas of compelling learning spaces have changed. Progressively, those spaces are adaptable and organized; uniting formal and informal activities in a consistent domain that recognizes that learning can happen wherever, whenever, in either physical or virtual spaces.

A report delivered by the Institute of Education in the UK to investigating the effect on space of future changes in higher education come to conclude certain key observations – a blend of existing conditions, remedies and expectations (SMG, 2006). It is observable, says the report, that learning space is merging with aspects of general amenity space, including common room areas and cafeterias. Lectures are still seen as a good way of inaugurating learners into a discipline and will continue to occur for the foreseeable future – but more creative lecture theatre designs will allow these spaces to

be to be utilized as a part of more various ways. IT developments are empowering more serious utilization of space for teaching and learning yet won't allow considerable diminishments in general space use. The plan of generic teaching space in new buildings is likewise assessing the requirement for more adaptable arrangement, to think about distinctive estimated bunches working in various routes over extended working hours. Most present day advanced education structures now give significantly more of their space in units which can be reconfigured and in little rooms intended for group learning (SMG, 2006).

Forecasts incorporated the recommendation that there is probably going to be an unobtrusive increment in space use throughout the next decade, mirroring the extension in authoritative capacities in many institutions and the arrangement of more adaptable teaching spaces, with the quality of an organization's physical facilities progressively observed as a vital advertising resource and accordingly attracting more resources and management attention. In Higher Education Institutions HEIs, the current space will progressively be renovated to meet new learning and teaching prerequisites or to meet new norms. Future changes in educational methodologies will influence the size of student groups, the recurrence with which they meet and the type of space they require, with more arrangement required for student-led and 'blended' learning, which will request all the more generally little and versatile spaces. HEIs will give more space to unstructured/specially appointed self-coordinated learning and peer-teaching among students and there will be expanded obscuring of the limit between academic and social areas.

More noteworthy adaptability and flexibility may reduce refinements between space type and permit more escalated utilize however any decreases in space needs are probably going to be little. New buildings give chances to collocate administrative services to enhance effectiveness and offer an improved administration work flow. It is predicted that for the large lecture theatres and large seminar-style rooms (more than 50m²) will continue to be used. These spaces will progressively be multifunctional, with a scope of digital technologies enabling instructors and students to produce and manipulate images and data of all kinds. Research facility and workshop space will have diminished significantly in zone, with more prominent dependence on computer modelling and digital representation and more multidisciplinary utilization of the spaces (SMG 2006).

In a parallel line, the Joint Information Systems Committee (JISC) determined a number of key values that have to be taken into consideration when dealing with educational institutions as they are expensive long-term resources. These values are as follows:

- Flexible – to house both contemporary and developing educational techniques
- Future-proofed – to empower space to be re- assigned and reorganized
- Bold – to comprehend all the experienced advancements and learning techniques
- Creative – to motivate and inspire learners and instructors
- Supportive – to build up the capability of all students
- Enterprising – to make each space fit for maintaining diverse purposes.

The UK Higher Education Space Management Group (SMG) was set up in 2002 to help higher education foundations employ best practice in the organization of space. It advocates for compelling space administration techniques as an important management tool in the progressively self-motivated and diverse higher education environment. One of its main aims is to provide information and a path for universities to convey effective space management of their estate, in aggregation with business benefits, without negotiating the academic offerings or student experience. In its annually (SMG 2006) highlights that: "A learning space should be able to motivate learners and promote learning as an activity, support collaborative as well as formal practice, provide a personalized and inclusive environment, and be flexible in the face of changing needs". In its most updated version (August 2016), the (SMG) has developed a benchmarking tool accompanied by a guide (a spreadsheet-based utility) which allows HEI's to compare the size of their actual educational estates with predictions about estate size which are based on assumptions set within the tool (SMG, 2016).

Table 1: Matrix correlating the Values of the education buildings in the digital age to the Spatial landscape configurations. √ Direct relationship / □ Indirect relationship

Reference: The Author

Spatial landscape configurations	Values controlling the campus at the digital age		
	Active	S	U
	√	□	□

	Flexible	Future-proofed	Bold & Dynamic	Creative	Supportive & Highly Equipped	Enterprising & Incorporating	Micro climate design	
- <i>Group teaching and learning.</i>	√	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>
	- Incorporate multiple learning modes - Flexible furniture arrangements - Varying sizes, using varying layouts, preferably in square							
- <i>Simulated environments.</i>	<input type="checkbox"/>	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	- Space for observation as well as for performing the task in hand							
- <i>Immersive environments.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	- Highly interactive virtual environments							
- <i>Peer-to-peer environments and social learning spaces.</i>	<input type="checkbox"/>	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	- Positive effects of being in a learning group - Informal learning							
- <i>Learning clusters.</i>	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√	√	<input type="checkbox"/>	<input type="checkbox"/>
	- Incorporate interactive and group learning spaces and social learning spaces as well as more traditional lecture halls and classrooms - Groups of learning spaces designed for a range of learning modes							
- <i>Individual learning spaces.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√
	- Solo study & writing or creation mode. - Library – computer rooms – study bedrooms							
- <i>External spaces.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√	<input type="checkbox"/>
	- Plays an important role in aiding learning.							

In its report, the Education Space Management Group (SMG) recognizes seven sorts of learning space that have advanced, been reshaped or outlined particularly to react to this across the board change: in (Harrison and Hutton, 2014).

- *Group teaching and learning.* Lecture rooms and classrooms frame a vast part of the HE and FE bequest and will keep on dominating – yet the customary organization of these spaces is being changed to join various learning modes. Adaptable furniture arrangements will be expected to oblige gatherings of differing sizes, utilizing fluctuating designs, ideally in a square instead of rectangular rooms (the previous being more adaptable).
- *Simulated environments.* Dynamic modes – learning by doing. Viable learning can happen in innovative subjects requiring space for perception and also to perform the errand close by.
- *Immersive environments.* Virtual portrayals assume a vital part in drawing students into contact with complex data – progressively from another area or from arranged sources. These can be HIVEs (highly interactive virtual environments), with advanced ICT – conceivable in many subjects, however, more inclined to be discovered adjusted inside scientific or technological studies.
- *Peer-to-peer environments and social learning spaces.* Spaces to encourage the beneficial outcomes of being in a learning group that is part of a learning community. Settings where casual learning can happen (in cyber cafes, for example).
- *Learning clusters.* Groups of learning spaces intended for a scope of learning modes, expanding on recognized advantages of utilizing various learning modes to reinforce understanding. Traditional clusters incorporate extensive gathering learning spaces and small seminar rooms. More current clusters consolidate collaborating and gather learning spaces and social learning spaces as well as more conventional lecture halls and classrooms (though with enhanced technology).
- *Individual learning spaces.* Effective learning usually involves time in active, solo study and writing or creation mode – ordinarily in library areas, computer rooms and study rooms.
- *External spaces.* Outside space, and especially space between structures, assumes an imperative part in helping to learn. Wireless broadband provision and microclimate configuration can broaden the utilization of these areas.

5. SPATIAL LEARNING LANDSCAPE OF THE NEW CORNELL TECH CAMPUS

Cornell Tech is a dynamic model for graduate training that circuits the insightful group and industry to make initiating pioneers and advances for the computerized age. The imaginative Cornell Tech campus has already opened its new campus on New York City's Roosevelt Island. Master plan is developed by SOM and highlighting buildings and landscapes by Morphosis, Weiss/Manfredi, Handel Architects, and James Corner Field Operations. The planning of the campus represents a new vision of spatial learning landscape for the digital age. It's planning comes as a reflection of the academic

vision of its advisory board as it would be engaged with both the city and its industries. The focus of this campus is on how knowledge could have a quick effect, concentrating on transforming ideas into businesses in a very short time. So, the university would be built around research hubs, not departments. These center points would have an entrepreneurial approach to investigate: those that yielded advances would flourish, while those that demonstrated less commendable would inevitably be replaced by new hubs. This academic vision impacts all aspects of campus planning and buildings design. It is reflected in 'Five Principles for Innovation' determined by the academic board: The campus must be integrated with its community, pedestrian-oriented, dynamic, a microcosm of the city, and sustainable (Koop, 2017).



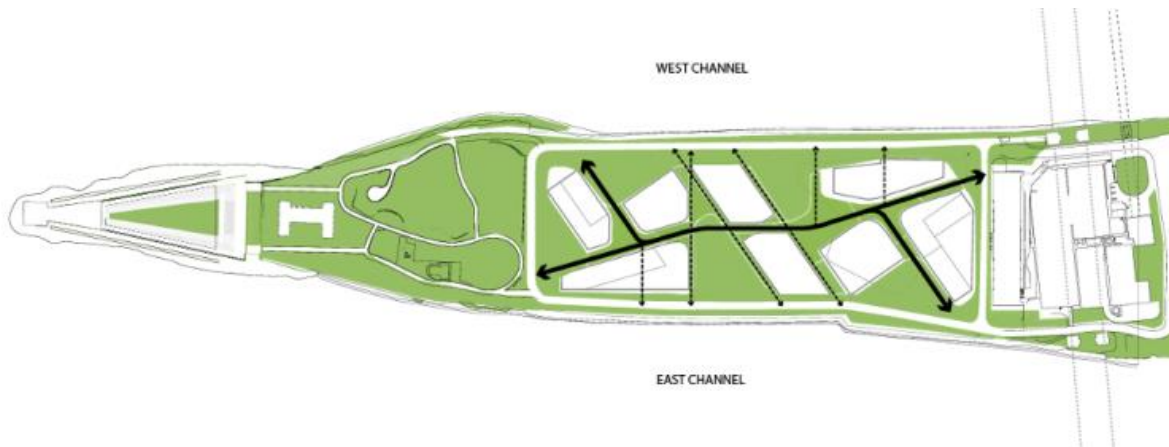
Fig. 3 Areal view of the new Cornell Tech Campus, Roosevelt Island, New York.

Reference: Koop, 2017

After two years of its inauguration -in 2015-, the first stage of campus development is finished. The Bloomberg Center is the appearance of this mission, uniting students, faculty, and companies in a synergist situation to goad innovation. In addition, The Bridge, designed by Morphosis; One of the key buildings in the campus stands as one of the most environmentally-friendly and energy-efficient buildings in the world (Lynch, 2017).

5.1. Master Plan

Fig. 4 Master plan of the new Cornell Tech Campus, Roosevelt Island, New York.
Reference: McKnight, 2017



Skidmore, Owings & Merrill, (SOM), comprehended the masterplan for the five-hectare campus, built on the Roosevelt Island – a land owned by the city of New York. The first phase of construction, (2015 – 2017), consists of three buildings, each designed by a different architect. And the landscaping was envisioned James Corner. The campus as the university president asserts "Cornell Tech is the first campus ever built for the digital age, bringing together academia and industry to create pioneering leaders and transformational new research, products, companies and social ventures," (McKnight, 2017). The master plan developed by SOM is arranged as create a place that is both separate from and integrated into the city, providing students with a calming atmosphere that is closely linked to New York's entire city of resources (Lynch, 2017). The layout is driven by principles of flexibility, collaboration and innovation as noticed at the words of Colin Koop, Senior Designer on the project and a Director at SOM. "We felt strongly that the framework should stimulate invention - both architectural and scientific. We designed a campus framework that would encourage the creative process now and into the future, flexibly accommodating a growing and evolving institution," (Koop, 2017). In addition, the SOM's scheme emphasizes the open nature of the pedagogy with a boundary-free, 12.4-acre campus knit into the promenades and green spaces of Roosevelt Island. Another key feature of the master plan is Techwalk, a car-free pathway lined with outdoor "rooms," each uniquely programmed. Buildings are organized along this central spine. This arrangement calls for learning scenes with open insides and luxuries, for example, cafes and presentation spaces Sustainability is also a driving force behind the design, with Phase I including the construction of New York City's largest net-zero energy building (Koop, 2017).

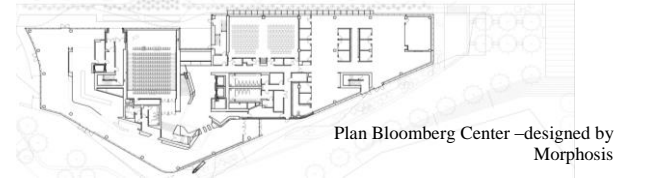
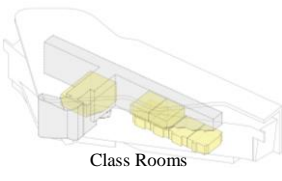

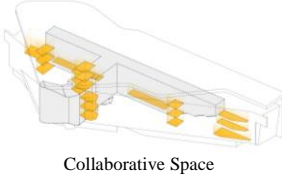

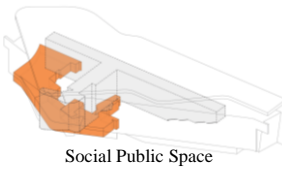

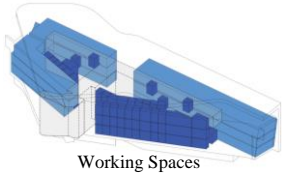

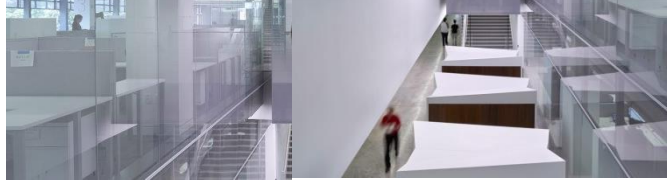

5.2. Buildings

The Bloomberg Center –designed by Morphosis-, is the first academic building on campus. This building in one hand is highlighting an assortment of reevaluated learning spaces including both flexible collaborative areas and private work spaces. On the other hand it the building is striving to become one of the largest net-zero energy buildings in the United States regarding its qualities both in concept and in design, The Morphosis founder and design director Thom Mayne asserts these qualities in his words: "The aim of Cornell Tech to create an urban center for interdisciplinary research and innovation is very much in line with our vision at Morphosis, where we are constantly developing new ways to achieve ever more sustainable buildings and to spark greater connections among the people who use our buildings. With the Bloomberg Center, we've pushed the boundaries of current energy efficiency practices and set a new standard for building development in New York City," (Lynch, 2017).

The biggest expanding on grounds is The Bridge, which aggregates 21,832 square meters. Designed by Weiss/Manfredi, the seven-storey building aims to generate a high level of dialogue and collaboration. As its designers say 'it is a new type of building' as it offers spaces for students to work alongside start-ups and leading companies on diverse technological and business projects. The building is very open, with social affair territories on each level, including a multilevel "Tech Gallery" and a sun powered trellis-shaded rooftop terrace. "The building is a crystalline social condenser, one that reveals expansive skyline views and creates spaces for academics and entrepreneurs to slow down, talk to one another, and generate ideas in

unprecedented ways,” said Marion Weiss and Michael A. Manfredi, the building architects (Koop, 2017).

Table 2: Analytical analysis to the Spatial Learning landscape of the new Cornell Tech Campus, Roosevelt Island, New York using developed matrix (Source: The Author)

Spatial landscape configurations	Values of the education buildings in the digital age							Inactive
	Active							
	Flexible	Future-proofed	Bold & Dynamic	Creative	Supportive & Highly Equipped	Enterprising & Incorporating	Micro climate design	
- <i>Group teaching and learning.</i>	 <p>Plan Bloomberg Center –designed by Morphosis</p>						<ul style="list-style-type: none"> - Flexible - Bold & Dynamic - Enterprising & Incorporating 	
- <i>Simulated environments.</i>	 <p>Class Rooms</p>						<ul style="list-style-type: none"> - Bold & Dynamic 	
- <i>Immersive environments.</i>	 <p>Collaborative Space</p>						<ul style="list-style-type: none"> - Supportive & Highly Equipped 	
- <i>Peer-to-peer environments and social learning spaces.</i>	 <p>Social Public Space</p>						<ul style="list-style-type: none"> - Bold & Dynamic 	
- <i>Learning clusters.</i>	 <p>Working Spaces</p>						<ul style="list-style-type: none"> - Flexible - Supportive & Highly Equipped - Enterprising & Incorporating 	
- <i>Individual learning spaces.</i>							<ul style="list-style-type: none"> - In Active 	
- <i>External spaces.</i>							<ul style="list-style-type: none"> - Micro Climate Design 	

- Landscaping

The design of open spaces - by James Corner Field Operations, - comes to ensure the values upon which the campus is planned. It is proposed to cultivate joint effort and foster collaboration and encourage visits from the general public. Essential components incorporate the Campus Plaza, a get-together space that can suit huge occasions, and the Tech Walk, a "focal spine" that connects to person on foot pathways. In addition to incorporating a number of sustainable features, including rain harvesting for irrigation, subterranean gravel trenches that hold and slow down stormwater, and bio-filtration gardens that treat stormwater runoff non-mechanically before it enters the river, the words of Karen Tamir, a principal at the landscape architecture firm shows the principal values of landscape design, "each of the open spaces work together to provide settings for students, faculty, staff and visitors to sit, talk and collaborate, creating a lively, welcoming and social environment," McKnight, J. (2017).



Fig. 5 Landscaping layout of the new Cornell Tech Campus, Roosevelt Island, New York.

Reference: McKnight, 2017

6. CONCLUSIONS

This paper presents an analytical review to planning and design constraints of the campus in the digital age. This age has brought a wide understanding to "Connectivity" as a key value in shaping the campus articulation. It redraws the connections among the students, between students and the faculty, and between university and the society as well. The Spatial Learning Landscape (SLL) is used to point out the flow of interconnected set of redefined spaces used to comply with the new educational requirements. The paper defines the relations between these (SLL) and the values controlling the campus at the digital age using a matrix correlation form. Reading this matrix shows that: the most influential value is 'to be bold and dynamic' as it impacts all of, group teaching and learning, simulated environments, and peer-to-peer environments and social learning spaces. The 'flexibility' is another crucial value. It directly impacts two spatial types: group teaching and learning, and learning clusters. The latter spatial type and the immersive environments also have to be supportive and highly equipped. Another influential value for space is to be 'enterprising and incorporating'. These values affect all of group teaching and learning, and learning clusters. In addition, the micro climate design has to be taken into consideration when designing external spaces. As indicated in the matrix, the inactive spaces are more appropriate for individual learning spaces.

The paper examines the applicability of the developed matrix by showing the relationship between the spatial learning landscape (SLL) and its associate values of the new Cornell Tech Campus, Roosevelt Island, New York. The analysis of these interconnected relationships shows that: group teaching and learning and learning clusters are flexible, and enterprising and incorporating. In addition to these two values the former space is bold and dynamic; meanwhile the latter is supportive and highly equipped. The success of the spatial learning landscape depends on balancing and the type of interwoven active and inactive qualities of spaces. Meanwhile the active landscape has a clear impact on different types of learning and teaching spaces specially peer-to-peer environments, social learning spaces, and simulated and immersive environments, the inactive typology plays an important role to support the individual learning space. In addition the micro climate design for external spaces plays an important role as an integrative and compatible part of the overall spatial learning landscape in the campus.

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