

Conference Paper

Investigation into the Model of Campus and Learning Spaces Therein to Serve the Purpose of Urban Higher Education Institutions – Phase 1

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Abstract

The emergence of the knowledge-driven economic structure reshapes the role of higher education institutions (HEIs) against the background of social development. HEIs have long served as the most important source of knowledge and intelligence to a city, and they are now demanded more than their traditional role solely in education and research. This gives rise to a new model of HEIs, namely “Urban Higher Education Institutions (UHEIs)”, which is to enable intense interactions between a HEI and its host city by means of campus location. This research is aimed to contribute to the body of knowledge on architectural typology by investigation into the design of campus and learning spaces therein for UHEIs which can serve the needs of a city driven by the knowledge economy. A recommended model considering a list of design parameters is expected to be developed which underpins the design paradigm for addressing the given condition of high-density urban environment in Hong Kong.

Keywords: Knowledge Economy, Higher Education, Campus, Learning Spaces

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Received: 15 March 2019
Accepted: 25 May 2019
Published: 20 November 2019

Publishing services provided by
Knowledge E

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Selection and Peer-review under the responsibility of the Architecture across Boundaries Conference Committee.

1. Introduction

This paper presents the findings of *Phase One* out of three of a research concerning the design of campus and learning spaces therein to enable higher education institutions (HEIs) in the high-density urban environment of Hong Kong to serve as an intellectual source in support of the knowledge economy. In revolution of information technology where the role of knowledge becomes vital important in economic success, HEIs is experiencing a shift of paradigm from purely teaching and research to academic entrepreneurship and evolving greatly in terms of pedagogic practice, knowledge transfer and global collaboration. Design of campus and learning spaces therein is considered as a key enabler to the above changes. A list of design parameters will be generated upon the completion of *Phase One* and enable further investigations

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in *Phases Two and Three* which will conclude with the most recommended model of campus and learning spaces therein for HEIs in a high-density urban environment.

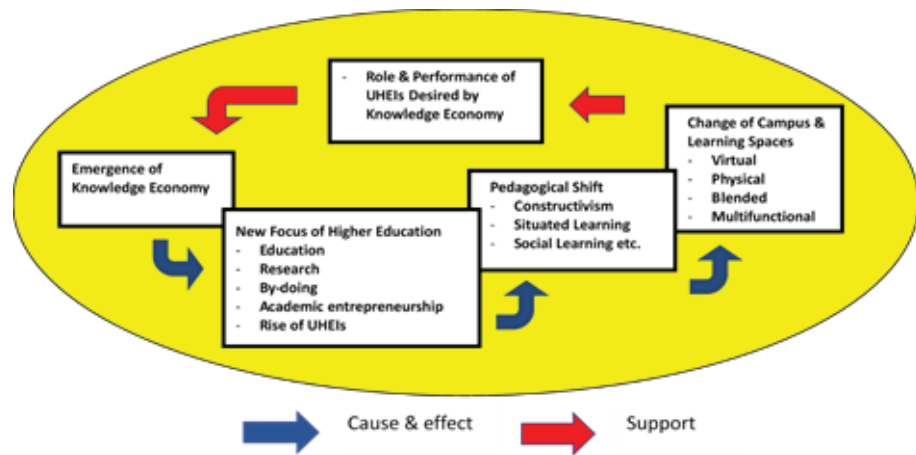


Figure 1: Rationale for the Research.

2. Research and Theoretical Background

2.1. Emergence of the Knowledge Economy as a Background to the Research

The economy nowadays is increasingly based upon the effective utilization of intangible assets including knowledge, skills and innovative potential as the key resource for competitive advantage (Brinkley, 2006). This observation is in line with the assertion by Stehr (1994) that knowledge challenges as well as transforms property and labor as the constitutive mechanisms of society. Within the foreseeable future, knowledge-based industries will take an unprecedented position to dominate the shares of GDP and total employment. It will be upheld by the most well-educated workforces in economic history since most of the population will have received higher education.

Olssen & Peters (2005) conclude from their observation that the most significant material change that underpins neoliberalism in the twenty-first century is the rise in the importance of knowledge as capital. Knowledge gaps and information deficiencies can retard growth prospects of a country. In his famous report for promoting the European Union as the most competitive knowledge economy, Kok (2004) stresses that the knowledge society is a larger concept than just an increased commitment to research and development (R&D). It covers every aspect of the contemporary economy where knowledge is at the heart of value added. In this sense, investment in knowledge may refer to inputs into both (1) area that generates software products such as

R&D and education and (2) hardware that supports innovation such as machinery and infrastructure (St George, 2006).

2.2. Role of Higher Education in the Knowledge Economy

Higher education, serving as the most important source of knowledge and intelligence, has an undeniable role to play in the knowledge economy. As observed by Conceicao *et al* (1998), contemporary HEIs are demanded more than its conventional role focusing only on education and research. The factors having provoked the need for HEIs to change include democratization of knowledge, contestable student markets, global mobility, industry integration and emergence of digital technologies (Achterberg, 2014). A wide range of other activities grouped under the heading of 'provision of services' or 'links to society', are now part of HEIs' missions that promote a learning society. This observation is agreeable to the assertion of new growth theories that interface with society in terms of learning-by-doing, together with the conventional tasks of education and research, sets the driving force for the learning ability of a society that serves as the major key to the economic growth.

Florida (2006), Yigitcanlar *et al* (2008) and Mustapha & Abdullah (2004) advocate the important role of HEIs to promote competitive advantage of a region by enabling three key factors of economic growth, namely technology, talent and tolerance. While technology is important, the more critical way HEIs affect the regions in which they are situated is through talent and tolerance. A HEI adding to a region takes an important part not only to grow, but also to attract talented people as well as companies coming for large pools of talent. Tolerance takes on an open system. The regions that are most open to different lifestyles and to people who think differently have the kind of ecosystem that attracts talented and entrepreneurial people across the board. HEIs have an enormous effect on tolerance for creating environments that are open to different lifestyles and providing places where talented people of all strips interact.

2.3. Rise of Urban Higher Education Institutions

Given the evolving role of higher education in the knowledge economy, there emerges an alternate model of HEIs under which campuses are erected in an urban area and highly interactive with the host city for which they constitute a major intellectual resource through applied research and professional outreach. This is opposite to the conventional model under which HEIs are often considered as ivory towers located in remote areas.

The alternate model is known as urban higher education institutions (UHEIs) in this study referring particularly to those committed to responding to the knowledge needs in an urban context and dedicated to creating active links between campus, community and commerce (Lynton, 1995).

An UHEI can perform as an agent of change to transform a society and be transformed by that society (Hathaway et al, 1995; Perry & Wiewel, 2005; Abbott, 2010). Its mission of serving as an intellectual resource to the society outside the campus brings in the benefits of improving teaching and research inside the campus (Ziegler, 1995). It can carry a great deal of applied and problem-oriented research in a practice context by utilizing the metropolitan areas as a living laboratory (Hathaway et al, 1995). This also gives rise to pedagogic shift emphasizing on student-centered, active and collaborative approaches which are aimed to nurture human capital with competences demanded by the knowledge economy.

2.4. Design of Campus and Learning Spaces Therein for Urban Higher Education Institutions

Alongside serving better the purpose of UHEIs by accommodating pedagogic shift to nurture talents versed in critical thinking, creativity, problem solving and social skills, evolution of campus and learning spaces therein of UHEIs opens a new horizon for exploration in the realm of campus architecture. The impact of campus and learning spaces therein on functioning of an UHEI is multifold. Not only to play a vital role in materializing the vision of the UHEI, but also to enable different styles of teaching and learning driven by such factors as new social patterns, modern pedagogical philosophies, technological advancement and change over generations. Its dealing with the limited supply of space resources in the urban area through design innovation is also heavily counted for the UHEI to successfully operate.

HEIs have been evolving over time to address the needs of different generations of learners (see Table 1). Following the introduction of pedagogic shift to support the missions of UHEIs, design of campus and learning spaces therein is no longer a practice informed only by architectural guiding principles, but rather an effort jointly contributed by design stakeholders with different backgrounds including architectural profession and learning theory expertise. The practice of learning theories informing decisions made during the design process of campus and learning spaces therein is described as “architectural embodiment of learning theories” or “built pedagogy” (Rook et al, 2015; Monahan, 2002). This is to supplement the rationales for design decisions made in

a conventional way considering theories like proxemics and environmental-behavior design as well as ordinary design principles and collection of user feedback through evaluation survey. The traditional approach making little reference to learning theories provides fragmented ideas about how far a campus and learning spaces therein could go in term of innovation, yet it is rather weak in suggesting learning outcome of the campus and learning spaces therein. To UHEIs, conventional theories and principles used in design of campus and learning spaces therein may not suffice to bring into effect the benefits suggested by pedagogic shift in support of the institution missions.

TABLE 1: A Brief Evolution of HEIs over Time.

Generation of HEIs	Features	Examples
1) Medieval University Town (<i>originated from Europe in 11th century</i>)	<ul style="list-style-type: none"> • Interest in intellectual pursuit which may not be connected to the practical concerns of everyday life. • No formal accommodations in the first place. Classes were taught wherever space was available in churches, homes etc. Later campuses were built in a piecemeal fashion. • Use of structured spaces with teacher-centered approach for education. The pattern is same to what was used by churches for mass. • A bigger scale of campus and learning spaces was required during the industrial period to accommodate education shift from elitism to massification. 	University of Oxford (Oxford), University of Cambridge (Cambridge), University of Paris (Paris)
2) Academic Village (<i>originated from North America in 19th century and considered as prototype for modern university campuses</i>)	<ul style="list-style-type: none"> • Keen interest in studies with high theoretical research value. • Allocation of scholars and students into a single village to unite living and learning spaces in one undifferentiated area. • Campuses are built on remote and vast sites without the constraints of urban surroundings, and quite often considered as ivory towers. • An entire campus characterized by unity and totality is constructed at once rather than in a piecemeal fashion. • Purpose-built campus and learning spaces. 	University of Virginia (Charlottesville), University of East Anglia (Norwich), Ruhr University (Bochum)
3) UHEIs (<i>emerged in 20th century and becoming popular worldwide</i>)	<ul style="list-style-type: none"> • High level of responsiveness to the intellectual needs of the host society and its economy. • Focus on applied studies in practical context of the urban environment. • High-rise campuses with effective design of circulation are erected inside urban areas against the constraints of land supply. • Learning spaces with emphasis on multi-purpose, multi-function and flexibility to accommodate pedagogic shift. • Use of technologies to provide new learning experience inside and outside classrooms. 	Ryerson University (Toronto), Roosevelt University (Chicago), University Center The New School (New York)

2.5. Response of Higher Education to the Knowledge Economy in the Context of Hong Kong

Hong Kong, as one of the most advanced cities in the world, has inevitably taken up the challenges arising from transformation to a knowledge economy. As evidenced from the Policy Addresses of the Chief Executive over the years since 2000, the government has identified higher education as one of the strategic areas to promote the competitive advantages of Hong Kong against its counterparts in the international arena (Policy Addresses, 2000-18). Aside from fostering teaching and research capacity, higher education in Hong Kong has ridden on the academic revolution to extend its mission to closely collaborate with the industrial sector in the context of knowledge transfer or exchange. This is to realize application and commercialization of the research outputs on one hand, and to enable the pedagogies to better respond to the growing intellectual needs of the knowledge economy on the other hand.

In connection to the above, extraordinary opportunities arise for architects to explore a new horizon in design of campus and learning spaces therein which are not only to be aesthetically inspiring and highly functional, but also able to address the demands of expended higher education mission and overcome the limitation in space resources resulting from the high-density urban environment in Hong Kong. As claimed by Hong Kong Institute of Architects (2008) that the spaces and facilities delivered by a campus development project may convey a message to the users and public about the human values that it supports and its understanding of the way a pattern of spaces can create an inspiring ambience for learning and social exchange. The task would even be more challenging in dealing with one of the world's most congested cityscapes found in Hong Kong.

3. Research Methodology

The expected outcomes of the research will be generated from three phases of research works which include *Phase One*: in-depth review on literatures in such areas as (i) "higher education in the knowledge economy", (ii) "campus for higher education" and (iii) "design of learning spaces" so as to develop a set of 12 parameters to facilitate design of campus and learning spaces therein for UHEIs. Sources of references include journal articles, conference proceedings, reports, textbooks, theses and online information published mostly over the past 20 years; *Phase Two*: critical analysis of the data collected from case studies on respective UHEI campuses from humble, small, medium

to large sizes in terms of student enrolments to validate and contextualize the 12 parameters in the context of Hong Kong; and *Phase Three*: consolidation of the findings from the previous two phases to suggest on the most recommended model of campus and learning spaces therein for UHEIs located in a high-density urban environment.

4. Preliminary Findings in Phase One

Based on the results of in-depth review on literatures in three focus areas conducted in *Phase One*, a list of 12 design parameters are developed to take a comprehensive perspective towards the criteria for UHEIs to perform the role and functions desired by the knowledge economy through design of campus and learning spaces therein. Elaboration on each parameter is set out through subsidiary critical factors to provide a detailed explanation on how the use of parameter is supposed to serve the purpose of UHEIs (see Table 2).

TABLE 2: 12 Parameters for Design of Campus and Learning Spaces Therein for UHEIs.

1. Identity	
1.1 Vision and Mission	<ul style="list-style-type: none"> • To uphold and communicate the vision and mission of an institution. • To facilitate the realization of values and goals of an institution. • To express the link between teaching & research, students and society.
1.2 Culture, History and Environment	<ul style="list-style-type: none"> • To be charged with symbolism of cultural, social and historical significance. • To stimulate creativity with acknowledgement of the campus history, tradition and surrounding environs.
1.3 Community	<ul style="list-style-type: none"> • To define the tangible identity etc. that an institution portrays to its stakeholders. • To provide physical experience enabling students to interact and exchange.
1.4 Place	<ul style="list-style-type: none"> • To involve physical attributes which create a sense of place with visual uniqueness. • To furnish with allegorical significance and perceptual connotation and meaning.
2. Aesthetics	
2.1 Attraction	<ul style="list-style-type: none"> • To create an aesthetically pleasing and emotionally compelling campus to recruit and retain the best caliber students and faculty.
2.2 Landmark	<ul style="list-style-type: none"> • To provide iconic landmarks which can generate headlines and incite awe and reverence to impress stakeholders in the competitive higher education sector.
3. Sustainability	
3.1 Social Responsibility	<ul style="list-style-type: none"> • To assist in portraying the level of sustainability mission and commitment to society. • To educate the members of an institution and even society at large as a role model in sustainable development.

3.2 Environment	<ul style="list-style-type: none"> • To have influence over the choice of spaces with environmental features. • To reduce energy consumption and carbon emission by intelligent and green facilities.
4. Flexibility	
4.1 Reconfiguration	<ul style="list-style-type: none"> • To accommodate formal and informal activities representing collegiate life and spirit. • To enable reconfiguration of spaces for social learning and use of new technologies.
4.2 Future Change	<ul style="list-style-type: none"> • To address the future change arising from the long range academic and strategic goals of an institution in terms of enrolment, programs, pedagogies and facilities.
4.3 Learner-centered	<ul style="list-style-type: none"> • To consider total context for learner experience from formal to informal, individual to collaborative, specialized to multipurpose, and physical to virtual.
5. Innovation	
5.1 Creativity	<ul style="list-style-type: none"> • To stimulate creativity in providing iconic landmarks with acknowledgement of the campus history, tradition and surrounding environs.
5.2 New Technologies	<ul style="list-style-type: none"> • To offer a rich potential in providing intellectual and social encounter with flexibility in time and place through real and virtual spaces. • To make innovative use of technology that enables a higher level of stewardship for the campus and provides students with real time access to learning materials.
5.3 New Approaches	<ul style="list-style-type: none"> • To generate an interacting community balancing inward-focused learning through open spaces where process of learning and teaching is taken as a social activity. • To turn campus into a network of places where choices and synergies are generated to enrich learners' experiences through adjacencies and clustering of spaces.
6. Locality & Accessibility	
6.1 Connection	<ul style="list-style-type: none"> • To make locality and accessibility an essential feature to a campus site. It is particularly true to an institution highly interacting with its host city.
6.2 Interplay with Community	<ul style="list-style-type: none"> • To have a campus intermixed with the urban fabric of its host community for the integration of academic, cultural, business and community functions. • To give rise to an occasion where an institution and its host city can serve each other by blending their intellectual resources for competitive advantages in global market.
6.3 Expansion of Serving Area	<ul style="list-style-type: none"> • To expand access to higher education with enlarging the footprint of existing institutions by establishment of new standalone, satellite, or partnership campuses.
7. Comfortability	
7.1 Comfortability	<ul style="list-style-type: none"> • To make use of principles and good practices in ergonomics, lighting and ventilation in design to satisfy the human needs in teaching and learning process.
8. Management and Maintenance	
8.1 Long Range Plan	<ul style="list-style-type: none"> • To address the future change and needs for development and management in enrolments, institutional programs as well as facilities and spaces needed.

	<ul style="list-style-type: none"> • To understand users' and organizational needs as a main prerequisite for built facilities and services to deliver value for money in the long run of campus planning.
8.2 Facility Management	<ul style="list-style-type: none"> • To enable flexibility and reconfiguration in planning and management of spaces.
	<ul style="list-style-type: none"> • To offer choices and generate synergies in support of core activities on campus through planning of efficient access to adjacencies and clustering of facilities.
8.3 Performance Management	<ul style="list-style-type: none"> • To facilitate interplays between people, place and process in support of organizational goals through ongoing and holistic evaluation of performance of facilities.
	<ul style="list-style-type: none"> • To consider the performance of facilities having an important role in the trend emphasizing on learning in social, informal and virtual context.
9. Safety and Security	
9.1 Safety and Security	<ul style="list-style-type: none"> • To furnish a campus with freedom from danger and health hazards, and freedom from noise, vibrations and other distractions.
	<ul style="list-style-type: none"> • To make traditional barriers between space types and campus activities more permeable and transparent while maintain separations for safety and security needs.
10. Connectivity	
10.1 Organization	<ul style="list-style-type: none"> • To connect campus spaces as a community in microcosm to grow like an organism uniting buildings and landscapes in a total vision visually as well as functionally.
	<ul style="list-style-type: none"> • To enable a campus to resemble a network of standardized component spaces that are randomly connected to each other where structuralism is evident.
10.2 Operational Efficiency	<ul style="list-style-type: none"> • To facilitate campus users in their activities through structural features of the campus such as designs of circulation, accessibility, adjacency and layout.
	<ul style="list-style-type: none"> • To offer choices and generate synergies by turning campus into a network of places through design and planning of fabrics and elements of a campus.
11. Functionality	
11.1 Realization of Objectives	<ul style="list-style-type: none"> • To support development of students to realize as fully as possible their mental, physical, social and spiritual potentialities.
	<ul style="list-style-type: none"> • To realize the mission and values of an institution on which the edifice of educational programs, student life, faculty interaction, and community relations is built.
11.2 Facilitation of Core Business	<ul style="list-style-type: none"> • To foster a sense of collegiality and supports the open exchange of ideas, free inquiry, exposure to many disciplines, engagement and collaboration.
	<ul style="list-style-type: none"> • To enable a broad spectrum of education instructions and the corresponding delivery of teaching and learning styles such as interactive, team-based, and problem-based.
11.3 Satisfaction of Operational Needs	<ul style="list-style-type: none"> • To offer access to multiple curriculum and multimedia equipment in order to facilitate collaborations and sharing of resources among institutions.
	<ul style="list-style-type: none"> • To give rise to corporate campus (corporate-sponsored programs and departments) for facilitating greater cooperation between institutions and the private sector.
12. Spatiality	

12.1 Sense of Place	<ul style="list-style-type: none"> • To structure the layout design, broader skeleton, articulated pattern of a campus plan that carries the essence of collegiate life and spirit.
	<ul style="list-style-type: none"> • To enable development of a community where physical space and intellectual space can be connected through the operation of social networks.
12.2 Accommodation	<ul style="list-style-type: none"> • To accommodate learning styles arising from societal development (i.e. learning by reflection, by doing, and through conversation) with new types of learning spaces.
	<ul style="list-style-type: none"> • To accommodate clusters of learning activities through interplays between physical and virtual spaces of a largely self-organizing and interactive learning community.
12.3 Exploration of Spatial Resources	<ul style="list-style-type: none"> • To enable architectural spatial exploration in support of flexible campus, campus community, and needs of specialist spaces driven by instructional methods.
	<ul style="list-style-type: none"> • To create flexible learning spaces that can adapt to both individual and collaborative works with a strong emphasis on social learning and advanced technology.

The list of 12 design parameters is also examined with the theory of human motivation formulated by Maslow (1943, 1962 & 1970) in which 5 basic needs driving human motivation are identified as (1) physiological needs, (2) safety needs, (3) social needs, (4) esteem needs and (5) need for self-actualization. The rationale is based on the premise that human needs are organized in a hierarchy of prepotency where lower needs should be met prior to higher needs. The major implication brought up by Maslow is that gratification becomes a concept equally important to deprivation in motivation theory, for its releasing the organism from domination of a relatively more physiological need to allow emergence of other higher goals (e.g. social and growth goals as a desire to interact and grow as a personal fulfillment).

The higher goals in practice are strongly associated with cognitive capacities in perceptual, intellectual and learning activities which can be considered as techniques for enabling basic safety in the world as well as expressions of self-actualization for intellectual people. This may help to explain the motivational role of desires to be curious, to search for knowledge, and to explore the truth. Application of Maslow's theory to the purpose of education enables a holistic approach to look into impacts on learning considering physical, emotional, social and intellectual qualities of students. Design of campus and learning spaces therein can be relied on in this connection to satisfy the student's needs from physiological to cognitive. A supportive learning environment is important to the pedagogic shift taking place in UHEIs where students are physically and emotionally prepared to explore their full potential. Table 3 presents classification of the 12 design parameters into the Maslow's 5 basic needs according to their inherent natures. This is to serve as a bridge crossing over the design and psychological considerations for future reference of campus architecture.

TABLE 3: Classification of 12 Design Parameters into 5 Basic Needs Driving Human Motivation According to Maslow (1943).

Five Needs to Drive Human Motivation	Parameters	Critical Factors
	Identity	<ul style="list-style-type: none"> • Vision & mission • Culture, history & environment • Community • Place
	Aesthetics	<ul style="list-style-type: none"> • Attraction • Landmark
	Sustainability	<ul style="list-style-type: none"> • Social responsibility • Environment
	Flexibility	<ul style="list-style-type: none"> • Reconfiguration • Future change • Learner-centered
	Innovation	<ul style="list-style-type: none"> • Creativity • New technologies • New approaches
	Locality & Accessibility	<ul style="list-style-type: none"> • Connection • Interplay with community • Expansion of serving area
	Comfortability	-
	Maintenance & Management	<ul style="list-style-type: none"> • Long range plan • Facility management • Performance management
	Safety & Security	-
	Connectivity	<ul style="list-style-type: none"> • Organization • Operational efficiency
	Functionality	<ul style="list-style-type: none"> • Realization of objectives • Facilitation of core business • Satisfaction of operational needs
	Spatiality	<ul style="list-style-type: none"> • Sense of place • Accommodation • Exploration of spatial resources

5. Conclusion and The Way Forward

The list of 12 design parameters generated in *Phase One* lays out a full set of criteria for design of campus and learning spaces therein of an UHEI to be evaluated against its very purpose. Integration with the theory of human motivation provides a comprehensive perspective to consider the future campus design for UHEIs. However, the list is subject to validation and contextualization through case studies on sample UHEI campus projects of different capacities in *Phases Two and Three* of the research. Research methods of in-depth interview and focus group discussion with design stakeholders will be conducted together with the research activities of onsite observation and documentation study. Analytic Network Process will also be adopted to enable a recommended model of campus and learning spaces therein for UHEIs to be further developed with a quantifiable indicator.

References

- [1] Abbott S L (2010), *The Good, Bad, and Ugly of Campus Expansion: Two Case Studies of Urban University Expansion Initiatives in Boston and New York*. Unpublished EdD thesis, Columbia University
- [2] Achterberg A (2014), Moving from Campus to Community. In Fraser K (ed.), *The Future of Learning and Teaching in Next Generation Learning Spaces (International Perspectives on Higher Education Research, Volume 12)* (pp. 289-298), Emerald Group, published online: 10 Oct 2014
- [3] Conceicao P et al (1998), "Expectations for the university in the knowledge-based economy" *Technological Forecasting and Social Change*, 58, pp. 203-214
- [4] Hathaway C E et al (1995), "Metropolitan universities: models for the twenty-first century" in Johnson D M & Bell D A (eds.), *Metropolitan Universities: An Emerging Model in American Higher Education*, University of North Texas Press, Denton
- [5] Hong Kong Institute of Architects (2008), "Architecture for Tertiary Education" *HKIA Journal*, 53(3), pp. 20-65
- [6] Monahan T (2002), "Flexible space and built pedagogy: emerging IT embodiments", *Inventio*, 4(1), pp. 1-19
- [7] Olssen M & Peters M (2005), "Neoliberalism, higher education and the knowledge economy: from the free market to knowledge capitalism" *Journal of Education Policy*, 20(3), pp. 313-345
- [8] Perry D C & Wiewel W (eds.) (2005), *The University as Urban Developer: Case Studies and Analysis*, M.E. Sharpe, New York
- [9] Rook M M et al (2015), "Learning theory expertise in the design of learning spaces: who needs a seat at the table", *Journal of Learning Spaces*, 4(1), pp. 17-29
- [10] St George E (2006), "Positioning higher education for the knowledge-based economy" *Higher Education*, 52, pp. 589-610
- [11] Yigitcanlar T et al (2008), "The making of knowledge cities: Melbourne's knowledge-based urban development experience", *Cities*, 25(2), pp. 63-72