

The 3rd in the OECD CELE series

Higher Education Spaces and Places

: for Learning, Innovation and Knowledge Exchange



CONFERENCE REPORT

“Enhancing University Competitiveness through Educational Facilities”

18-20 June 2012, Seoul, Korea



Enhancing University Competitiveness through Educational Facilities

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DATE	PROGRAM		
6/18 (Mon.)	Opening Address	▪ Tae-Wan Kim(President, Korean Educational Development Institute, Korea)	
	Welcoming Address	▪ Eung-Gweon Kim(Vice Minister I, Ministry of Education, Science and Technology, Korea)	
	Congratulatory Address	▪ Richard Yelland(OECD CELE Head)	
	Keynote Speech	Enhancing University Competiveness through Educational Facilities ▪ Kyoungmo Koh(Assistant Minister for Planning & Coordination, MEST, Korea)	
	Session I	University vision and facility for the future ▪ Moderator : Bonggun Chung(Visiting Professor, Seoul National University, Korea)	
		Panel1. University Vision and Educational Facilities for the Future; A Case of Korea	▪ Yeon Han Chung(Dean of General Administration, Chung-buk National University, Korea)
		Panel2. The Status Quo of China National University Facilities	▪ Chunchun Wang(Assistant Researcher, Center for higher education research, China National Institute of Education Sciences, China)
		Panel3. Promotion of Systematic Development for Facilities of National Universities; The 3rd Five-Year Program for Facilities of National Universities(FY2011-FY2015)	▪ Osamu Yamashita(Director of National Facilities Division, Department of Facilities Planning and Administration, Japan)
		Panel4. Planning for university campuses in a Scandinavian context	▪ Ingrid Gustavsson(Advisor, Akademiska Hus AB, Sweden)
		University Facilities Design: Creating the sustainable campus ▪ Moderator : Alastair Blyth(OECD CELE Policy Analyst)	
		Panel1. Ulsan National Institute of Science and Technology(UNIST) Master Plan Planning	▪ Jong Ruhl Hahn(Senior Principal, SAMOO Architects & Engineers, Korea)
		Panel2. Campus Planning for a Sustainable Future	▪ Takeshi Ueno(Professor of Architecture, Director of Campus Planning office, Chiba University, Japan)
	6/19 (Tue.)	University Facilities Procurement: Using public private partnerships(PPP) ▪ Moderator : Jong-Ho Ock(Professor School of Architecture, Seoul National University of Science and Technology)	
		Panel1. The cases of PPP infrastructure projects that support competitiveness of university	▪ Youn-Saeng Lee (Director of Construction Division, Ministry of Education, Science and Technology, Korea)
Panel2. Current Situation and Future of PFI Projects on Facilities of National Universities		▪ Hirotaka Yamauchi (Professor Graduate School of Commerce and Management, Hitotsubashi University, Japan)	
Panel3. Using Public Private Partnership in the Implementation of the University Campus Development Project in Mongolia		▪ Enkhbold Tsendjav(Administrator of the University Campus Town Administration, Ministry of Education, Culture and Science, Mongolia)	
Panel4. University environments and PPPs		▪ Tony McCabe(Director, Planning and Delivery Department of Education & Communities, New South Wales, Australia)	
University Facilities Management: The integration of planning and operations, and the systems required to support this ▪ Moderator : Graham Roddick(Former Director of Estates, The University of Strathclyde, Scotland)			
Panel1. Supporting Policies of System to Meet a Demand and Support the University Space		▪ YeonWoong Jeong (CEO, ARCHISYSTEMS, Korea)	
Panel2. Performance Evaluation Systems for University Facilities in Japan		▪ Fukuei Saito (Director, Educational Facilities Research Center, National Institute for Educational Policy Research(NIER), Japan)	
Panel3. Managing the university campus ; frameworks, models and information to support campus decisions		▪ Alexandra den Heijer (Associate professor Real Estate Management, Delft University of Technology, Netherlands)	
Panel4. Case Study : The University of Strathclyde		▪ Graham Roddick(Former Director of Estates, The University of Strathclyde, Scotland)	
Conclusions Sum-up	▪ Facilitator : Jaepil Choi(Professor, Seoul National University, Korea)		
6/20 (Wed.)	University Tour	▪ Seoul National University Dormitory Tour ▪ Ewha Women's University Campus Complex(ECC) Tour	

CONFERENCE REPORT¹⁾

“Enhancing University Competitiveness through Educational Facilities”

Introduction

This report²⁾ summarises discussions at the international conference “Enhancing University Competitiveness through Educational Facilities”, organised by the OECD Centre for Effective Learning Environments (CELE) and the Korean Educational Development Institute’s Education Research Centre (EDUMAC), which took place in Seoul, Korea from 18-20 June 2012. It describes three broad trends in higher education – the impact of technology, changes in demography and internationalisation – and then draws together the issues discussed in the four conference themes: university vision and the facility of the future; and the design, procurement and management of university facilities

0. Trends in higher education

University facilities will need to be radically rethought if current trends in higher education continue. Changes in technology, demography and cross-border higher education will impact on the competitiveness of universities. There has been a significant increase in higher education participation and a further increase is expected in the future: one quarter of 20-29-year olds are enrolled in education across OECD countries and programme entry is up 20 percentage points over the last 10 years (OECD, 2009).

0.1 Technology: meeting the needs of students and researchers who have grown up using the internet

The rapid development and growth of communications technologies have opened up new possibilities for information retrieval and analysis, and communication, research and collaboration at a distance. This has a very real impact on buildings. For example, changes in technology, leading to, at one extreme solely online delivery, could leave universities with expensive and unusable real estate, either because students no longer

1) The principal authors of the report are Alastair Blyth and Hyo Jeong Yee, OECD, with contributions from moderators Bonggun Chung, Visiting Professor, Seoul National University; Jong-Ho Ock, Professor School of Architecture, Seoul National University of Science and Technology; and Graham Roddick, Former Director of Estates, University of Strathclyde. The report was edited by Hannah von Ahlefeld, OECD.

2) OECD would like to thank the conference facilitator, Jaepil Choi, Professor, Seoul National University, moderators and speakers in each session for contributing to the success of the conference.



need to be physically present at university or because the space needed for those on-campus will be quite different.

Technology – intranet, internet, student portals, digital libraries, as well as the availability of laptops, handhelds and other portable devices – has enhanced students' experience of higher education, both on- and off-campus (OECD, 2006). Rapid developments in computers and network performance has facilitated academic research and strengthened international communication and collaboration. Researchers can now access and manipulate massive data-sets, and simulate, model and visualise more complex systems (OECD, 2006).

Increasingly, e-learning is becoming a key means of delivering education. Its ultimate promise is to bring new methods of teaching, learning and interaction. However, it has not yet revolutionised teaching and learning due to low adoption of content management systems (OECD, 2009). As students' expectations continue to be an important driving factor – increasingly students entering higher education will not have known a time before the internet – e-learning will become an even greater focus for universities in the future (OECD, 2006).

However, the development of information and communication technologies and e-learning suggest that education can be delivered regardless of students' physical presence at the institution. While this approach may well increase the participation of students who were unable to attend university due to their location, health or other priorities, university facilities will still play a role. There will be less emphasis on formal lecture theatres and classroom spaces and greater need for a variety of different types of spaces that enable students to work in different ways.

0.2 Changes in demography: focus on lifelong learning

A decrease in the traditional student-aged population (i.e. 18 to 25-year-olds) across OECD countries will have an impact on student enrolments in higher education (OECD, 2006). Higher education institutions are responding by targeting other age groups and diversifying the supply of education programmes, for example, by providing mid-career programmes and higher education for older students returning to education (OECD, 2008).

So facilities, where they are needed, will have to address the needs of a broader range of age groups. In countries with ageing populations such as Korea and Japan, there is a shift in emphasis towards programmes for life-long learning. Lifelong learning is becoming increasingly important not only for employability but also for personal development. However, despite growing emphasis on lifelong learning, with few exceptions, higher education systems in general have not adjusted rapidly to the needs

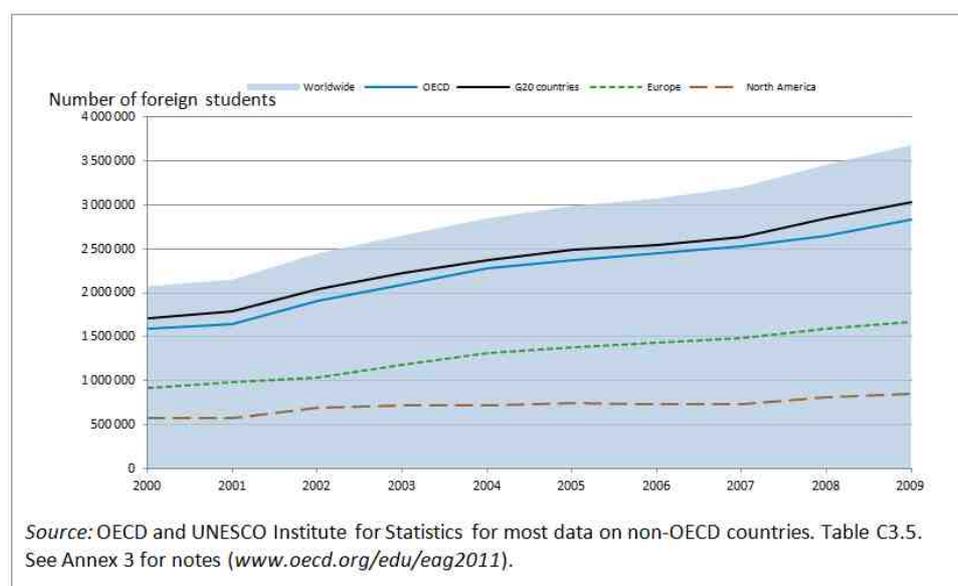
of lifelong learners by providing shorter courses, more flexible delivery, recognition of prior learning and tailor-made programmes (OECD, 2006).

0.3 Internationalisation

Internationalisation is becoming a key theme in higher education. “Internationalisation” of higher education, where students travel abroad to study, or study in their home country through courses franchised from abroad (OECD, 2006), is leading to greater competition to attract more overseas students. Facilities will therefore have to meet more diverse needs.

Cross-border higher education has grown significantly in recent years, and this is expected to continue. This growth has been stimulated by a growing interest and demand for students to gain international experience; by the internationalisation of labour markets for highly skilled workers; by the development of knowledge-based economies; and by students’ desire to learn foreign languages and explore foreign cultures. Internationalisation has also been assisted by reduced transport and communication costs (OECD, 2006; 2011). The number of students enrolled outside their country of citizenship has increased over the last 30 years, from 0.8 million worldwide in 1975 to 3.7 million in 2009 (OECD, 2011).

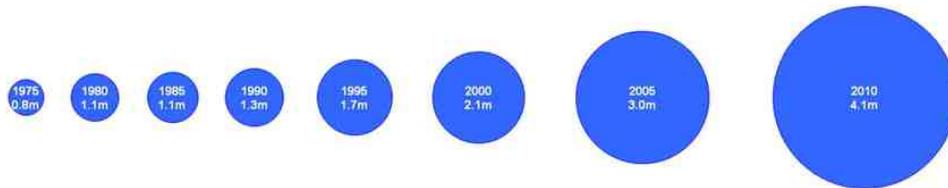
Figure 1. Evolution by region of destination in the number of students enrolled outside their country of citizenship (2000 to 2009)



The largest numbers of international students in absolute terms are from China, India

and Korea. Asian students represent 52% of foreign students enrolled worldwide, highlighting the growing number of Asian students studying in foreign countries (OECD, 2011).

Figure 2. Long-term growth in the number of students enrolled outside their country of citizenship³⁾(growth in internationalisation of tertiary education(1975-2009, in millions)



Source: OECD and UNESCO Institute for Statistics in *Education at a Glance 2011*.

Students studying abroad have tended to favour relatively few countries. The country of destination of most foreign students (in absolute terms) is the United States, with 28% of all foreign students, followed by the United Kingdom (12%), Germany (11%), France (10%) and Australia (9%). Together, these five major destinations account for 70% of all students pursuing higher education studies abroad (OECD, 2006).

Increased cross-border higher education has also meant increased competition among universities to attract both foreign and domestic students due to pressures of international comparison, quality labels, rankings and consumer choice. The increasing frequency of partnership and recognition agreements has also increased international pressure and competition (OECD, 2006).

As students are selecting a future place of study on the basis of the school, the programmes offered and its geographical location, improving the quality of programmes and teaching is naturally becoming a priority for universities to gain a competitive edge (OECD, 2011).

1.0 University vision and facilities for the future

The past can teach us a lot about the future. Since the late medieval era when universities were born, there have been tremendous social, economic, political, science

3) Data on foreign enrolment worldwide comes from both the OECD and the UNESCO Institute for Statistics (UIS). UIS provided the data on all countries for 1975-95 and most of the non-OECD countries for 2000, 2005 and 2010. The OECD provided the data on OECD countries and the other non-OECD economies in 2000 and 2010. Both sources use similar definitions, thus making their combination possible. Missing data were imputed with the closest data reports to ensure that breaks in data coverage do not result in breaks in time series.

and technological developments in the Western world and in the East. Asian countries like Korea, China, India, Japan and others have seen radical changes as higher education institutions have developed following Western models.

The physical environment will continue to play an important role in the context of universities, enabling students, researchers and the broader community to come together to share ideas and exchange knowledge. But the spaces that are needed are changing.

The issues concerning the vision for the future direction of universities that emerged during the conference covered the more strategic issues relating to the role of the university within cities; the importance of connectivity between university campuses and the city; and the need for universities to define themselves and differentiate from each other. The discussion also included a reflection on the types of environments that will be needed and the difficulty that some institutions may face to rapidly adapt to future needs because of the quality of their existing facilities.

▪ **The physical environment will continue to play a role in higher education.**

The physical environment impacts on learning for three reasons. First, theories of human motivation suggest that a student's motivation to learn can be influenced by their environment. Second, research in environmental psychology suggests that humans' perception of their environments can provoke reactions conducive to learning and well-being. Third, human capacity to learn is affected by physical conditions such as temperature, noise and lighting. Therefore the learning environment of the future must be stimulating and inspirational at the same time as meeting the basic physical needs of its users.

▪ **Universities must continue to express differentiation, which will be reflected in the design of their spaces.**

In the highly competitive world of higher education, universities are trying to find ways to differentiate themselves and to express an individualised core mission. Some institutions want to express security and tradition, others research, and some want to display their commitment to environmental sustainability. Students tend to choose attributes and environments that match their identity. This means that universities can also "dare to be special" and create certain profiles. Such values affect the design of the physical environment in a variety of ways, either through the outward expression of the buildings or in the way that spaces are arranged.

▪ **Finding the right balance between the physical and virtual environments is important.**

Technology is a critically important factor in the design and creation of the modern learning environment as universities seek to provide an intelligent technology-enabled



environment for students and academics. A significant question is how to support the needs of the virtual learning environment through the physical learning environment. There needs to be an understanding of both the limits and possibilities of ICT. The question that university managers must ask is: “What can technology realistically offer us as creators of universities, and what do we allow for?” Technology is enabling different forms of access to information and ways of interacting between people. However, there is a limit to the extent that technology can replace physical interaction.

- **There has to be a greater focus on the relationship between the city and the university campus.**

The demands of students for good physical connectivity between the university and amenities in the city, the role of the university in the life of the community and access to it by transport suggest that universities must forge a tighter connection with the town or city in which or near where they are located. Increasingly students are rating highly the importance of greater access to amenities that are generally outside the campus, such as retail and leisure facilities. Consequently there is greater focus on developing universities in cities that have a mixture of amenities including retail, restaurants and cafés, and leisure facilities such as health clubs and cinemas. This provides opportunities for universities to engage with the other communities within cities.

The university can no longer sit behind a “castle” wall within a city. There should be increased co-operation between the city authorities and university authorities, with the university providing a range of environments, including education and social amenities, that will enable a tighter integration of the campus and city.

For those campuses constructed outside towns, it is important to think of them like a town rather than a collection of individual buildings. They will have amenities just like a town—workplaces, leisure and living places. This involves taking a city-planning approach to create a harmonious campus landscape, enhancing the campus environment from the perspective of all of its users.

- **Many older universities need to manage a legacy of under-funded maintenance.**

The reality for many university facilities managers is that buildings are deteriorating, technologies are out of date and there is a legacy of under-funded maintenance. These places are not fit for purpose either because they do not function well with different pedagogies; their technological systems are out of date; they do not meet modern standards of construction and environmental comfort; or facilities may be difficult to adapt. In some cases, facilities may be spread across a city with little to connect them other than the name of the institution. Practicality and cost may make it difficult to

easily update some older facilities, and this alone raises the question as to whether for some institutions at least the answer is to rebuild.

2.0 Design of university facilities: Creating the sustainable campus

Students today have very different expectations of life at university. Patterns of learning are different with less reliance on formal lectures and more on collaboration. These emerging patterns are being reflected in new teaching styles and more interactive or collaborative approaches to learning.

However, today, creating the spaces to support learning and research is as important as creating places that enable interactions between people, and stimulate discourse and the exchange of ideas.

An important focus is sustainable development. Although concepts of sustainable development are complex and differently defined, a “sustainable campus” is one that balances the ecological aspect of the campus space, the economic aspect of the university management, and the social aspect of the university mission.

Within this context, discussion during the conference considered the role of the physical environment within universities, how to potentially reconfigure existing buildings, and the viability of keeping large estates.

- **The physical environment within campuses is changing to reflect the evolving needs of education.**

The role of the physical environment is to support the needs of education. There is more emphasis on creating different types of space – spaces that are large and small and capable of being used in different ways, with less reliance on formal lecture rooms and more on spaces for interaction and collaboration. To accommodate this, spaces for teaching and research must be flexible and agile, in other words quickly adaptable to the needs of different users.

The extent to which the physical campus can effectively respond to changes in technology and education delivery such as e-learning remain open. While some universities may predominantly deliver education on line, most likely physical places will still be needed to bring students together.

As universities seek closer interactions with local communities, the campus is being used to provide community-based courses, museums or interactive centres that people can visit. These places not only provide entertainment, but are a way of educating the public and informing them about the activities of the institution.



Continuous reviews are needed to ascertain how the facilities are meeting the needs of academics, students, staff and the university as a whole.

■ **Creating spaces for interaction and engagement is important.**

Universities are places of knowledge exchange, and the physical environment can enable interaction between people from different departments, for example meeting points such as cafes and other social spaces. Research on how ideas and innovations spread suggests that innovation in research often happens when researchers are able to exchange ideas in relatively informal settings such as over coffee or when meeting colleagues outside their own research environment. It also suggests that creating environments that enable casual encounters is important to assimilate ideas. It is therefore important to create and design areas and routes that enable people to meet when walking around a campus.

■ **Institutions should look at how to reconfigure existing spaces rather than build new facilities.**

Not only are the types of spaces needed changing but so too is the notion that all spaces are designated for one set use. More attention is being paid to spaces that can accommodate a variety of activities, such as circulation areas. There are often opportunities within university buildings for finding new ways of using existing spaces, for example old classrooms are redesigned as areas for students to work together or individually. Therefore, there is often significant unrealised potential in existing institutions. Other sectors - corporate, entertainment and cultural - can also provide clues as to how education buildings can be designed to meet the demands of modern higher education environments.

■ **A university can be a model for a sustainable community of the future.**

Universities have a unique role to play in the realisation of a sustainable society. A sustainable campus is one that balances economic, social and ecological dimensions. The economic dimension is achieved through the efficient management of the university, the campus and its facilities. The social dimension incorporates the university's mission to both be a place of learning but also interaction with the community. The ecological dimension includes the campus physical environment and its design. The campus can be a living laboratory, and work with surrounding communities to develop social models for sustainability, with the campus providing venues for community activities. A campus is not created in isolation of the community, and so there should be close links with the local master plan for the city or community.

■ **Universities need to consider reducing the number and size of facilities.**

The need to address sustainability and broader environmental issues raises questions about the desirability of maintaining large stocks of buildings that may be left empty or underutilised. There is a strong financial argument for demolishing buildings because they are incapable of meeting the current needs of education. Perhaps lessons can be drawn from the past. Some university buildings have remained remarkably adaptable over hundreds of years. Given the radical changes in education and research to which older universities have responded over centuries, longitudinal studies of these institutions might reveal qualities about both the institutions and their facilities that have made them adaptable.

3.0 University facilities procurement: public private partnerships (PPP)

Public-private partnerships (PPP) involve private companies in the design, financing, construction, ownership and/or operation of public university facilities. The PPP approach allows the public sector client and the private sector to blend their special skills and to achieve an outcome which neither party could achieve alone.

The use of PPP, however, is not straightforward. There are complex issues that should be addressed by either the public or private sector in order to enhance success of a PPP project.

- **PPPs provide an opportunity to leverage private investment over the long term.**

With the constrained budgets of the public sector, PPPs offer the opportunity to use sources of private finance to provide facilities and services to the higher education sector. Managing a PPP effectively over the course of the whole contract demands that both the public and private sectors maintain a significant level of expertise. However, this expertise may come at a cost, particularly for the public sector. It should therefore employ management practices that reduce the level of expertise needed but maintain the quality of the PPP.

- **PPPs are costly to set up and should be undertaken as part of an overall government procurement plan.**

PPPs can be used for some or all elements of procurement including facility planning and delivery, maintenance and operation and provision of service. However, PPPs should be undertaken as part of a coherent plan within an overall procurement strategy, which is appropriate for that particular project. PPP projects demand particular management expertise, which need to be adequately resourced and planned.

- **University PPPs are attractive for private partners.**

Universities are attractive for private partners because they can offer a sufficient



volume of activities and services such as catering and residential accommodation through economies of scale.

■ **Good management of the operation phase of a PPP is essential.**

The operation phase of a PPP is often given less attention by the public sector partners compared to the start-up and construction activities. However, if the operation phase is not well managed it can devalue the outputs that provided the initial impetus for adopting the procurement method. There is a danger in assuming that the PPP will “manage itself” and that the public sector partner does not need to invest many resources in ongoing management. However, although the contract may set out the requirements of the private partner, these targets may be missed or forgotten. There may be changes in the context of the public sector partner, for example the university may need to change its activities, which may require adjusting the PPP deliverables.

■ **Long-term PPPs can constrain ability to respond to future change.**

To meet the demands of an unpredictable future, flexible PPP contracts can assist the university to develop facilities that can respond to change. Competitiveness of the tender can be ensured by defining life-cycle costing; by specifying the elements of the building or the service that require flexibility; and by using performance-based specifications with benchmarking to measure performance.

■ **Facilities should be maintained to a level that allows desired service delivery only.**

Prescribing minimum standards – and the types of facilities to which these standards apply – ensures that the contractor maintains facilities to a level that supports the desired service delivery. Maintaining facilities to a higher level than needed would not necessarily benefit the client and would certainly result in higher costs.

■ **Systems for effective management and simple auditing should be provided.**

To avoid misunderstandings relating to contracts for those managing the PPP and end-users, contracts should be written in straightforward, simple language. Creating a “deliverables” calendar is a useful and straightforward mechanism that enables all sides to track every contractual deliverable. It can be reviewed and updated regularly, enables new staff to confidently manage the PPP and permits a lower level of staff knowledge. Experts can review the project at set points or when required, with a full record of the project.

4.0 University facilities management

For most universities the cost of building and maintaining the campus is the second

highest area of expenditure after staff salaries. University competitiveness can be enhanced by:

- 1) Adopting an integrated approach to the planning and operation of the campus;
- 2) Using management information to support decision-making and performance monitoring;
- 3) Investing in integrated facilities management systems and policies; and
- 4) Embedding a culture of continuous improvement in all facilities management activities.

Planning

Campus planning involves the assessment of current provision and future needs, the development and analysis of options, and the identification of a clear vision and implementation plan. The quality of decision making is critical. All key stakeholders should be involved, including policy makers, senior executives, space users and facilities managers. The return on investment should be identified for each project, taking account life cycle costs, future flexibility, sustainability and risk.

Operations

All facilities management operations should deliver best value (cost and quality). A culture of continuous improvement and innovation will improve the performance of in-house staff and external suppliers.

Effectiveness

The effectiveness of planning and operations will depend on the use of:

- ▶ **Management information**(covering the strategic, financial, functional and physical performance of the campus)
- ▶ **Facilities management systems and policies**(fully integrated, including space utilisation and space design)
- ▶ **Key performance indicators**(incorporating benchmarking data).

There are many good examples of sharing best practice at a regional level, although more could be done to share, and possibly align, best practice at an international level.

- **University facilities should be used more efficiently.**

Several trends are impacting on the provision of facilities in universities: decreasing public funding, ageing infrastructure including the buildings and IT, low occupancy rates and increasing cost of managing the campus. Policy makers and managers need to find



ways of maximising the use and hence efficiency of university facilities while at the same time supporting the competitiveness and performance of institutions.

■ **Universities need to find more opportunities to share space.**

The model of space provision adopted by universities has been focused on the exclusive use of space, for example, each faculty has its own building. To reduce facilities-related costs, universities could share more space with other institutions and promote more sharing of space within their own organisations. For example, all institutions could benefit from sharing facilities where there are several universities within a small geographical area or perhaps a town. Staff often resist this approach but the trade off is to give up physical space in one department in order to improve the general quality and efficiency of education services. The increasing use of space charging systems can assist staff to recognise the value of their space and to find efficiencies in its use.

■ **Analysing how the facilities hinder the operation of the university can improve efficiency.**

One way to explore the effect of facilities on a university is to look at how they hinder the operation and activities of the institution, affecting the university's performance in terms of sustainable development, competitive advantage, profitability and productivity.

■ **Both the facilities and the academic plans should be considered by campus managers.**

Managing the university campus demands focusing on both the university and the facilities at the strategic and operational levels. There are four steps to managing the campus: assessing the current campus to define the problem; exploring the changing demand and future trends; generating future models and the vision for the future; and defining the projects and creating project plans. The perspectives of each stakeholder group such as students, academics, managers and the community should be integrated into each step. Within this management process, the link between facilities management staff and academics is important to ensure that the needs of academics are understood and taken into account by the facility manager.

A campus master plan should include not only the academic plan, but also the management strategy and current status of the campus, including current problems. Often the facilities management teams will tend to recognise facilities problems, rather than academic problems. There thus needs to be a process of developing a shared understanding of the issues.

■ **Sound information on existing facilities is key to effective facilities management.**

An understanding of the current state of existing facilities is necessary to effectively manage facilities. This requires good information on the condition of facilities and an effective performance evaluation system. It is also important to establish a basic policy on the quality expected, the amount and treatment of space, and parameters for cost management and how these criteria will be measured.

■ **There are barriers to improve facility management processes and decisions.**

One of the key barriers to improving facilities management is accounting for the diverse needs of policy makers, stakeholders and future users, without knowing the contexts in which they will be working or their specific needs. Therefore the systems and buildings must be responsive to changes in both the “hardware” (the physical environment, ICT) and “software” (the management, pedagogical processes).

However, strong leadership is needed to challenge the culture of the university with regard to sharing resources. Faculty members often resist sharing resources or the university system discourages sharing, for example where departments are allotted specific space such as offices, classrooms and seminar rooms and they are told to pay for that space out of their own departmental budget, then they are less likely to share it with other departments even if the space is not being used. This is often because they would not want to in effect subsidise another department particularly when funding is very scarce.

Conclusion

The physical environment will continue to play a role in the operation of universities, although the environment as traditionally conceived is evolving into one that encourages physical and virtual interaction between users – academics, students and the community. Although the development of e-learning may not replace the physical university campus – physical interaction between people remains important – it will impact on the design of spaces as universities play a greater role in local and regional development.

Universities are in an increasingly competitive environment, facing the challenges of increased use of technology in course delivery, changing student demographics and internationalisation. To be successful, universities must continue to express differentiation, and this should be reflected in the design of the campus environment.

A university can be an important role model for a sustainable community of the future by demonstrating how facets of sustainability can be used in the economic, social and environmental senses.



As the physical environment within university campuses changes to reflect the evolving needs of education, campus managers should look at how to reconfigure existing spaces rather than build new facilities. The sustainability of the campuses rests not merely on using environmentally friendly techniques for construction and management, but also on creating places that are adaptable and flexible for different uses.

To create university campuses that meet the emerging needs of higher education at a time of financial constraints means that institutions should look for procurement approaches that provide them with opportunities to use private sources of funding. Public private partnerships are costly to set up and should be undertaken as part of an overall government procurement plan. This funding model provides an opportunity to take advantage of the skills in the private sector over the long term. However, good management of the operation phase of a PPP is essential, and university clients must focus on this to avoid repeating the failings of PPPs in other sectors. Therefore, systems for effective management and simple auditing should be provided.

University facilities are expensive to operate, and tend to have low rates of utilisation. In the face of increasing costs and tight budgets, efficiency could be maximised by finding opportunities to share space with other universities, if they are located nearby, and with other organisations.

Ideally, the universities' physical environment must support the mission and academic programmes of the university, the needs of its users, and the goals of local and regional development. A campus master plan that includes both facilities and academic plans can address these objectives.

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Printed by "Bum Shin", Seoul, Korea

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