Learning Space
Forecast:
Spatial Impact of the 2015 Horizon Report

Jo Dane
The NMC Horizon Report is the product of an annual collaboration between the New Media Consortium and the EDUCAUSE Learning Initiative. Since its first edition in 2004, the Horizon Report has evolved to become one of the most keenly read publications predicting key higher education trends and technologies that are likely to impact upon teaching and learning in higher education institutions around the world.

Of particular interest to Woods Bagot are the space implications embedded within these trends as they become realised on campus. Many of the trends and technologies discussed in the 2015 Horizon Report have implications for the physical design of facilities and potentially the campus in general. In this sense we have indicated for each category whether the spatial implication is considered to be ‘significant’ or ‘insignificant’, with explanations as to how and why space may be affected.

The predictions are based upon a collaborative discourse that occurs among educators and technology experts around the world, resulting in an informed expectation of disruptions and changes anticipated to affect the sector. This year’s panel consisted of fifty six global contributors, including three Australian representatives.

In the past the Horizon Report has predicted many familiar educational trends, from ubiquitous mobile technologies, tablet computing, MOOCs and 3D printing (refer Figure 1). Over the years this report has demonstrated a reliable predictor of trends and challenges that can inform educational policy development, teaching and learning experiences and infrastructure planning.
<table>
<thead>
<tr>
<th>Year</th>
<th>Technologies</th>
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<tbody>
<tr>
<td>2010*</td>
<td><strong>TECHNOLOGIES</strong></td>
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| < 1 YEAR | 1. Mobile Computing  
2. Open Source Content |
| 2-3 YEARS | 1. Electronic Books  
2. Simple Augmented Reality |
| 4-5 YEARS | 1. Gesture Based Computing  
2. Visual Data Analysis |
| 2011* | 1. Electronic Books  
2. Mobile devices (ubiquitous) |
| 2-3 YEARS | 1. Augmented Reality  
2. Game-based learning |
| 4-5 YEARS | 1. Gesture-based computing  
2. Learning analytics |
| 2012* | 1. Mobile apps  
2. Tablet computing |
| 2-3 YEARS | 1. Game based learning  
2. Learning analytics |
| 4-5 YEARS | 1. Gesture based computing  
2. Internet of Things |
| 2013* | 1. Massive Open Online Courses (MOOCs)  
2. Tablet computing |
| 2-3 YEARS | 1. Games and gamification  
2. Learning analytics |
| 4-5 YEARS | 1. 3D printing  
2. Wearable technology |
| 2014* | 1. Flipped classroom  
2. Learning analytics |
| 2-3 YEARS | 1. 3D printing  
2. Games and gamification |
| 4-5 YEARS | 1. Quantified self  
2. Virtual assistants |

*All editions available from: http://www.nmc.org/nmc-horizon/
Trends Short-Term 1-2 Years

1. Increasing Use of Blended Learning
   Impact Upon Physical Infrastructure: SIGNIFICANT
   Blended learning is described as a combination of the best of online learning and the best of face-to-face (F2F) learning. However activities associated with online learning and F2F learning are becoming increasingly blurred. For example students are likely to engage in online learning activities while in class, especially if they have access to their own mobile devices or if the classroom incorporates access to internet-enabled screens.

   F2F learning doesn’t necessarily only occur in the classroom, with students making great use of informal learning spaces on campus or via online social platforms such as Skype. The design of classrooms and informal learning spaces must factor in the multiplicity of learning activities that occur in multiple domains and that students will benefit from being able to blur these activities to suit their own individual needs.

2. Redesigning Learning Spaces
   Impact Upon Physical Infrastructure: SIGNIFICANT
   Classrooms on university campuses have changed very little over the centuries. It is only since the introduction of the internet and mobile technologies that the design of learning spaces has begun to transform, with the focus on student-centred learning rather than teacher-centred instruction. Universities are moving away from the ‘sage on the stage’ default position and embracing innovations such as the ‘flipped classroom’.

   With the student experience being placed front and centre, these innovations in teaching and learning are enabling transformative interpretations of classrooms designed for engaging, collaborative and interactive learning experiences. This is a truly exciting development that will potentially change the future face of higher education.
Growing Focus on Measuring Learning

Data analytics are beginning to show their potential in demonstrating student support for learning, retention and progress. With educational policy likely to demand evidence of institutional success through data analytics, the greatest impact will be in terms of staff time and the development of digital infrastructure.

Complimentary to measuring learning is the considerable interest in evaluating learning spaces. A robust discourse has existed for over ten years on the measurable benefits of ‘new generation learning spaces’ in order to support infrastructure planning and change management. Research is advancing in this area with promising outcomes being produced, for example, by the Learning Environment applied Research Network at the University of Melbourne and Steelcase Education Solutions.

As research develops it will be difficult to ignore evidence-based recommendations that will impact upon the design of formal learning spaces in higher education, leading to potentially transformational change in university infrastructure.

Proliferation of Open Educational Resources

MIT started this trend some ten years ago when they made their lecture content freely available in the public domain. In recent years MOOCs have fostered a wealth of freely available open source content. Add to this an immense quantity of YouTube videos, iTunes content and numerous other engaging and educational sources of online content. The dilemma is not one of availability of content but discovery and curation.

It also begs the question as to why lecturers at university will need to continue creating new lecture content when open source content may be just as relevant and appropriate. While this may not have an immediate or obvious impact on physical infrastructure, there may be consequences if demand for timetabled lectures in lecture theatres is reduced over time, as a result of open source educational resources becoming more prevalent online.

Trends Mid-Term
3-5 Years

1. Growing Focus on Measuring Learning
   Impact Upon Physical Infrastructure: SIGNIFICANT

2. Proliferation of Open Educational Resources
   Impact Upon Physical Infrastructure: (LONG TERM: SIGNIFICANT)
We are already beginning to see an increased interest in fostering entrepreneurial thinking, creative thinking and innovation, especially involving industry and research partners. Multi-disciplinary and cross-disciplinary interactions will be forged, for undergraduate, postgraduate and research engagement. Therefore, there will be demand for developing facilities and space typologies to promote entrepreneurialism, innovation and creative thinking. Some universities are beginning to develop facilities specifically for this new way of thinking, for example, UNSW has been discussing an innovation centre for cross-disciplinary innovations.

Students and researchers are anticipated to be able to access specialised programs in partner organisations outside of their institution, which may include other institutions. Therefore the significant spatial implication is that universities in the future may share specialist facilities between universities rather than every university build their own version. This is a high order aspiration, but with mounting funding pressures and limited land development opportunities, universities may need to take this course of action in order to prioritise funding or prioritise land use on campus.

Bio hubs such as SAHMRI are emerging where there are multiple stakeholders, including universities, government agencies and industry partners.

Figure 2: UNSW Innovation Lab concept, Woods Bagot
Universities have been preparing for BYOD in recent years and more students are opting to bring their own laptops and devices to campus. Computer labs with fixed computers are still in demand providing access to specialist software and for students who do not have their own device.

However, as the BYOD trend continues to grow it is expected that university-owned computers will eventually become obsolete, especially when coupled with the ability for licensed software to be cloud-based, enabling students to access software from literally anywhere.

Therefore in the foreseeable future we may see the end of demand for dedicated computer laboratories, replaced instead with more informal learning spaces designed for a wide range of group and independent activities where students can use their own equipment. Learning commons, often associated within or adjacent to the university library, may also become obsolete. Instead, libraries will be designed with significant space dedicated to desktop activities, similar to informal learning spaces.

This issue was carefully considered by Woods Bagot in designing the new Student Hub currently under construction at Flinders University. Whilst university-owned computers are expected to be somewhat in demand in the short-term future, there are no computer labs in the design. Informal learning spaces have been planned with fixed desktop computers in some areas, but with the expectation they will be removed in the next few years, leaving ample benches for laptops and other equipment.

Figure 3:
UTS Building 5
Woods Bagot
It is really exciting to see the Flipped Classroom escalate quickly within the Horizon Report forecast. If you haven’t heard of this phenomenon before, it is an educational approach that was developed originally in a secondary school in the USA by Jonathan Bergmann and Aaron Sams. In its most simplistic terms it refers to swapping classroom activities (instruction-focused) with homework activities (worksheet-focused). Instructional content is reviewed by students via video or audio platforms for homework whereas worksheets are completed in class, enabling students to seek help if they need it.

Its application in higher education is gaining momentum as educators recognise the student-centred experience this brings to the classroom. However, it is an approach that cannot be applied into just any classroom environment. For example it would be difficult to implement in a lecture theatre as the experience provokes interaction and collaboration among students.

The Australian School of Business (ASB) at UNSW commissioned Woods Bagot to design a Flipped Classroom precinct on the ground floor of their Kensington campus building. Designing the series of four classrooms and informal learning spaces involved a stimulating discourse involving Woods Bagot, Professor Peter Jamieson and several academics from the ASB. The resultant classroom design is a completely unique space typology that offers incredible flexibility and agility, from screen-based group work or simulated boardroom discussion, to individual research or industry events.

The ASB is consulting with students to capture their experiences of learning in the new classrooms. Educators involved with this post occupancy investigation are already declaring that students get to know each other better and generate ideas easier in the Flipped Classroom. Further research into the benefits of the Flipped Classroom is currently underway at UNSW.
The Maker Culture has become synonymous with technology-enabled, self-directed learning where participants push the boundaries to experiment, create and make artefacts, products and new innovations. And now it is coming to universities all over the world. As stated earlier, many universities are focusing on fostering the entrepreneurial pursuits of students, activities that are often interdisciplinary, involve industry support and require access to equipment such as 3D printers or gaming technology. Sometimes called Hacker Labs, Makerspaces are a new space typology where all kinds of innovations can be explored. While space is a premium on university campuses, the benefit of providing Makerspaces on campus will be in the innovations, industry partnerships and university branding opportunities that emerge.

University of Western Sydney are conceptualising a series of workshops in their forthcoming new Parramatta CBD campus. Whilst not specifically labelled ‘Makerspaces’, the idea is that some workshops will enable 3D printing, interdisciplinary connections and innovation development. Watch this space as this concept will start to take shape on university campuses in the next few years. The question remains: How prepared is your university for a wave of ‘creative thinking’ and ‘entrepreneurialism’?

The scope of wearable technologies being able to shape our learning experiences has yet to be truly understood, let alone the impact on the physical environment. In the short term this technology field is unlikely to have a major bearing upon space, but in the long term future there is likely to be greater connectivity between wearable technologies, mobile devices and surface screens. An incredible video [available here] from Microsoft demonstrates the technological seamlessness the world is heading towards.

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**Impact Upon Physical Infrastructure:**

**SIGNIFICANT**

**Technology Mid-Term Adoption:**

2-3 Years
Adaptive Learning Technologies refer to software and digital infrastructure that will be capable of adapting to students’ needs as they learn. It will enable students to work at their own pace and on content that is relevant to them. In the classroom this may mean that students are undertaking different learning activities resulting in demand for agile learning spaces that can also adapt to students’ needs. However, classrooms, informal learning spaces and libraries are already anticipated to become more agile and this trend alone will not drive significant change to physical infrastructure.

The long term impact of the Internet of Things (IoT) on our everyday lives will be transformative and world-changing. World leaders of this phenomenon are currently promoting ways in which the IoT will change our lives, such as in this Cisco commercial, but these speculations are years from becoming realised. In the future cars, homes, buildings, schools and ‘systems’ will be designed very differently to accommodate the IoT.

In the meantime new physical environments will be designed with agility and the knowledge that building systems will be able to adapt to incorporate increased networking capacity and smart technologies. Some universities are providing gaming and media hubs which begin to address new issues such as interdisciplinary problem-solving and collaborative networking.

The impact on university spaces is yet to be seriously considered, however future envisioning and potential changes should become part of the University Master Planning discourse over the next few years, to ensure relevant planning for the future. Expect major changes in this area as all equipment becomes IP connected and ‘smart’.
### TIME TO ADOPT  |  TRENDS | IMPACT UPON PHYSICAL INFRASTRUCTURE
--- | --- | ---
1 - 2 YEARS | 1. Increased Blended Learning | SIGNIFICANT  
  e.g. new technology-enhanced classroom typologies  
2. Redesigning Learning Spaces | SIGNIFICANT  
  e.g. new space typology on campus

3 - 5 YEARS | 1. Growing Focus on Measuring Learning | SIGNIFICANT  
  e.g. applied improvements in learning spaces following evaluation  
2. Proliferation of Open Educational Resources | (LONG TERM) SIGNIFICANT  
  e.g. eventually may result reduced demand on lecture theatres

> 5 YEARS | 1. Advancing Cultures of Change & Innovation | SIGNIFICANT  
  e.g. develop creative thinking, entrepreneurial spaces  
2. Increasing Cross-Institution Collaboration | (LONG TERM) SIGNIFICANT  
  e.g. shared facilities across institutions

### TIME TO ADOPT  |  TECHNOLOGIES | IMPACT UPON PHYSICAL INFRASTRUCTURE
--- | --- | ---
< 1 YEAR | 1. Bring Your Own Device (BYOD) | SIGNIFICANT  
  e.g. reduce computer labs; increase informal learning spaces; cloud-based software; learning happens anywhere on campus; more power points and great quality WI-FI  
2. Flipped Classroom | SIGNIFICANT  
  e.g. new space typology on campus

2-3 YEARS | 1. Makerspaces | SIGNIFICANT  
  e.g. new space typology on campus  
2. Wearable Technology | INSIGNIFICANT

4-5 YEARS | 1. Adaptive Learning Technologies | INSIGNIFICANT  
2. The Internet of Things | (LONG TERM) SIGNIFICANT  
  e.g. buildings and spaces integrated with smart building systems including facial recognition, seamless connectivity and sharability; may need to design buildings and spaces differently to accommodate?


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Figure 7: The Horizon Report Summary - Education Technology Forecast 2015*
Summary

The 2015 NMC Horizon Report continues to paint a picture of immense change in higher education over the next five years, with significant spatial implications related to many of the forecast trends and technologies.

There is a strong conviction within the Horizon Report pointing to the redesign of learning spaces as well as providing Flipped Classrooms, makerspaces and entrepreneurial spaces.

Changing educational processes such as increased access to Open Educational Resources, Cross-Institutional Collaboration and even the Internet of Things, may not have an obvious immediate impact on physical infrastructure. However in the long term these concepts have the potential to demand agile spaces that can adapt to emerging technologies that enhance the learning experience.

Campus planning should include these topics as part of the brief for every new building and major refurbishment, to ensure that universities are prepared for changes in the foreseeable future.

The next generation of students do not want Industrial Age learning experiences anymore. Preparing students for the future necessitates that they engage in 21st Century learning experiences conducted within 21st Century physical and online learning spaces.

How prepared is your university for the #campusofthefuture?
About the author

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Jo works within the Education, Science and Health Sector with a specific focus on Education Consulting. Her passion lies is finding ways to improve the student experience, through the combined pillars of pedagogy, design and technology.

Jo is an active researcher having consistently published papers and presented at conferences for over a decade. Her PhD research (in progress) has culminated in the development of the ‘Effective Teaching and Learning Spatial Framework’ which uniquely unites educational and environmental psychology theory. She has been researching new generation learning environments for twelve years, bringing the dual perspective of educator and designer to every project. [more]

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#campusofthefuture

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