

PRE-SPECIFIED NATIONALLY CO-ORDINATED PROJECT

IRELAND'S HIGHER EDUCATION TECHNICAL INFRASTRUCTURE
A REVIEW OF CURRENT CONTEXT, WITH IMPLICATIONS
FOR TEACHING AND LEARNING ENHANCEMENT



NATIONAL FORUM
FOR THE ENHANCEMENT OF TEACHING
AND LEARNING IN HIGHER EDUCATION

Ireland's Higher Education Technical Infrastructure

A review of current context, with implications for teaching
and learning enhancement

Report compiled by K.C. O'Rourke, in collaboration with the National Forum team



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Preface and Key Messages

This report provides a detailed snapshot of the current state-of-play of the technology infrastructure which supports teaching and learning in Irish higher education: the first time such a comprehensive review has been undertaken across the whole sector.

The approach taken by Dr O'Rourke and the Forum team has been highly consultative and brought together colleagues with very diverse roles and areas of expertise, in some cases for the first time, linking technologists and IT specialists, national providers, academic and support staff, and students. Collating expert opinion, data from surveys and interviews, and international comparisons, it provides an invaluable reference point upon which future strategy and academic practice can be built.

This is not a document which merely serves to occupy shelf-space (or fill your Dropbox quota!), but rather one which can contribute to real change and inspire future innovation. Indeed, there are a number of specific, practical ways in which this report can be used by Forum Associates, Heads of School/Unit, institutional managers, staff, and students. For example:

1. to nurture inter-institutional collaboration and cooperation in the areas of shared services, collective licensing/purchasing agreements, and to explore the possibilities for articulation of programmes, overcoming barriers to student transfer/mobility, and the development of joint programmes or supports;
2. to assist in generating higher levels of awareness amongst academic (and support) staff regarding the national and international context, perhaps via activities such as an informal seminar/webinar, a short presentation as part of a departmental/college meeting, etc.
3. to inform the development of higher level institutional strategy and to initiate informed discussion around strategy, planning, and resources across unit functions.

The consultation process has already forged links and connections and illustrated to all who engaged the importance of sharing information, data, and expert opinion across the sector. As the report demonstrates, a wide range of technologies and systems are now firmly embedded within the daily practice of teaching and learning across all of Irish higher education and there is considerable appetite for innovation and enhancement. Of course, resource constraints have been significant and budgetary planning needs to be reformed to ensure reliable continuity of provision, appropriate replacement and upgrade of equipment and systems, and the facilitation of innovation. The importance of providing timely, effective, and relevant training and professional development opportunities to all those who work, teach, or study in Irish HE has also been highlighted.

However, by responding to these challenges with reference to an informed, sector-wide evidence base, we in Irish higher education will be able to set the pace for technology-supported learning, further enhance the learning experience and ensure the quality of our graduates in terms of skills, confidence and creativity.

Dr Iain Mac Labhrainn

On behalf of the Board of Directors of the National Forum for the Enhancement of Teaching and Learning in Higher Education.



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Introduction

The National Forum seeks to assist Irish higher education institutions in their efforts to achieve a coherent digital future. This report aims to enhance and inform that process. The National Forum's 2014 Roadmap for Enhancement in a Digital World 2015-17 identified the need for a stronger evidence base in relation to Ireland's higher education technical infrastructure.¹ This report responds to that need by presenting cross-sectoral data that until now has not been readily available. The aim is to provide a clear picture of current technical capability in Irish higher education by presenting evidence and data, and to outline the implications of that capability with a view to enhancing teaching and learning practices across the entire sector.

The Review Process

A scoping group was convened to inform how this review might be undertaken. Terms of reference presented by the scoping group recommended the following:²

- Limit the review to state-funded higher education institutions;
- Provide a clear profile of technologies currently in use (including hardware, software and network connectivity) and digital content available;
- Examine relevant strategies and prevailing culture; staff and student use of digital tools, levels of awareness and digital literacy; inhibitors to digital development;
- Identify external factors impinging on institutions;
- Provide examples of best digital practices within institutions;
- Include in the review summary data without publishing specific information on any institution;
- Utilise and draw from surveys and reports prepared since 2013 as well as data already in the public domain; and
- Identify and utilise international benchmarks to get a better sense of how national issues and priorities compare and contrast with those in other countries.

The terms of reference for the review also included a strong focus on communicating and engaging with institutions across the sector, and generating information designed to be useful to them. This was done by:

- Informing heads of all institutions in advance of the review, communicating the value of participation and seeking engagement;
- Working closely with local National Forum Associates and other relevant institutional members to inform and update on the review's requirements, and to begin the process of capturing qualitative and quantitative data;
- Creating an individual profile for each of the participating institutions based explicitly on the review's terms of reference, seeking verification and completion where necessary from each participating institution;
- Maintaining confidentiality of institution-level data;

1 The roadmap is available here: <http://www.teachingandlearning.ie/wp-content/uploads/2015/03/Digital-Roadmap-web.pdf>

2 The terms of reference document is available at www.teachingandlearning.ie

- Responding to institutional invitations to engage in site visits to meet with relevant individuals and groups, as well as conducting phone interviews and electronic meetings/webinars;
- Hosting collaborative meetings with the chief information officer groups of the universities and the institutes of technology;
- Consulting other interested parties both within the public and private sectors; and
- Establishing contact with international equivalents.

As recommended by the scoping group, and in order to explore existing infrastructure with a focus on implications for teaching and learning enhancement, the work of this review includes an examination of perceptions, skills, culture and strategic approaches as well as an exploration of existing relevant hardware, software and technical capability.

This review has been necessarily broad, and has incorporated an examination of a diverse range of indicators of capacity. From it, a number of important process benefits have also been derived, not least those associated with bringing institutional experts together to generate a stronger sectoral picture of the challenges we face, and providing data that for the first time enables individual institutions to benchmark more meaningfully on issues to do with investment, capability, and the greater potential for shared service provision – all with a strong focus on enhancing teaching and learning throughout Irish higher education.

Data Sources

In all, 25 institutions participated in the review (see Appendix A).³ The reviewer conducted visits to 13 institutions and engaged in numerous phone and electronic meetings with these and the remaining 12. Based on such individual and group communications, as well as related data already in the public domain (e.g. recent surveys and reports, financial statements from national websites and other details drawn from the online presence of individual institutions), verified institutional profiles were compiled for each. These profiles form the main data source for this review.

In partnership with Chief Information Officers (CIOs) and IT managers across the higher education sector, the National Forum also licenced the US-based Campus Computing Project annual survey for use in Irish higher education to provide an international benchmark on key priorities. The survey consists of over 50 questions relating to IT usage within academic institutions. It was completed by CIOs/IT managers at 22 Irish institutions during the period August-September 2016 and maps to the US version of the survey conducted in September-October 2016 (see www.campuscomputing.net).⁴

This report was researched and written between January and October 2016. Profile reviews were largely completed by July 2016 and the survey was conducted in August 2016.⁵

A supplementary review of the technological infrastructure in private higher education institutions has been provided by HECA and is available as an addendum to this report.

³ In September 2016 while this review was in progress, St Patrick's College and Mater Dei Institute were incorporated into Dublin City University (DCU), reducing the number of institutions profiled from 27 to 25.

⁴ The number of respondents for the Campus Computing Survey in the US was 339. This compared to 22 respondents to the Irish survey. However, while the US sample represents 14% of institutions in the population, the Irish sample represents 88% of publicly-funded higher education institutions.

⁵ This report was a key part of the role of Kevin O'Rourke who was seconded to the National Forum for a period of nine months, and whose role within the Forum during that time included enhancing communication across boundaries, developing a more collaborative approach to collecting and sharing information on digital capacity and creating stronger links between institutions.

National Policy Context

A number of key national priorities provide a backdrop to this report. The National Skills Strategy to 2025 recognises technology as a key driver of change, and improved digital skills as vital for Ireland's future, both within the ICT sector and more widely as skills that are needed by everyone.⁶ The ICT Skills Action Plan 2014-18 supports an increase in supply of ICT graduates through a range of actions across the education and training system.⁷

In its Action Plan for Education 2016-19, the Government has committed to enhancing digital skills across the education sector by increasing the use of ICT in teaching, learning and assessment at all levels of education.⁸ At the level of higher education, the key framework for this enhancement is the Roadmap for Enhancement in a Digital World 2015-17, from which the current technological infrastructure review also stems. In tandem with the publication of the Digital Roadmap, the Government invested €6 million between 2014 and 2017, through the Teaching and Learning Enhancement Fund, focused on building digital capacity across the higher education sector.

The Infrastructure and Capital Investment Plan 2016-2021 identifies high quality infrastructure as an important element of modern society.⁹ The National Strategy for Higher Education to 2030 states that, with a growing emphasis on flexible learning, and the enthusiasm among higher education teachers to excel and innovate in teaching and learning, there is a need to ensure the technical infrastructure is in place to underpin such innovation and excellence.¹⁰

Excellence and innovation must also be efficient. The Strategy emphasises the need for greater collaboration between higher education institutions in order to pool efforts and share services. To this end, shared services, external service delivery, and procurement have been identified as enablers for the overall objectives for the higher education sector in the Education and Training Sector Shared Services Plan 2014-16.¹¹ Building on the strong tradition of collaboration across Irish higher education, the Plan suggests that shared services may help higher education institutions to redirect resources to their core functions while providing quality services to students and staff.

With this policy context in mind, this review provides evidence to inform the decisions and practice of those in the sector as they endeavour to respond to the priorities set out by Government in ways which are efficient, collaborative and forward-looking.

6 Department of Education and Skills. (2016). Ireland's national skills strategy to 2025. Retrieved from https://www.education.ie/en/Publications/Policy-Reports/pub_national_skills_strategy_2025.pdf

7 Department of Education and Skills (DES). (2014). ICT skills action plan 2014-2018. Retrieved from http://www.heai.ie/sites/default/files/action_plan_ict_2014_4final_spr.pdf

8 Department of Education and Skills. (2016). Action plan for education 2016-2019. Retrieved from <https://www.education.ie/en/Publications/Corporate-Reports/Strategy-Statement/Department-of-Education-and-Skills-Strategy-Statement-2016-2019.pdf>

9 Department of Public Expenditure and Reform. (2015). Infrastructure and capital investment plan 2016-2021. Retrieved from <http://www.per.gov.ie/en/capital-investment-plan-2016-2021/>

10 Department of Education and Skills. (2011). National Strategy for higher education to 2030. Retrieved from http://www.heai.ie/sites/default/files/national_strategy_for_higher_education_2030.pdf

11 Department of Education and Skills. (2014). Education and training sector shared services plan 2014-16. Retrieved from <https://www.education.ie/en/The-Department/Public-Service-Reform/Education-and-Training-Sector-Shared-Services-Plan-2014-2016.pdf>

Section 1: IT Profile of the Higher Education Sector, Including Network, Hardware and Software

Section 1A: Ireland's Digital Performance within an EU Context

Digital innovation continues to accelerate at an unprecedented pace in Ireland and around the world. In Ireland, the 2016 Census figures indicate that 87% of households are connected to the internet, and 92% of those aged 16–29 are online every day. Moreover, the Central Statistics Office reports that 99% of students are online and in the main are doing so using mobile phones and laptops rather than desktop computers.¹²

Comparing digital performance within an EU context using the DESI index,¹³ Ireland is similar to the EU average for connectivity, human capital and use of internet, while exceeding the EU average for digital public services and integration of digital technology (see Figure 1).¹⁴

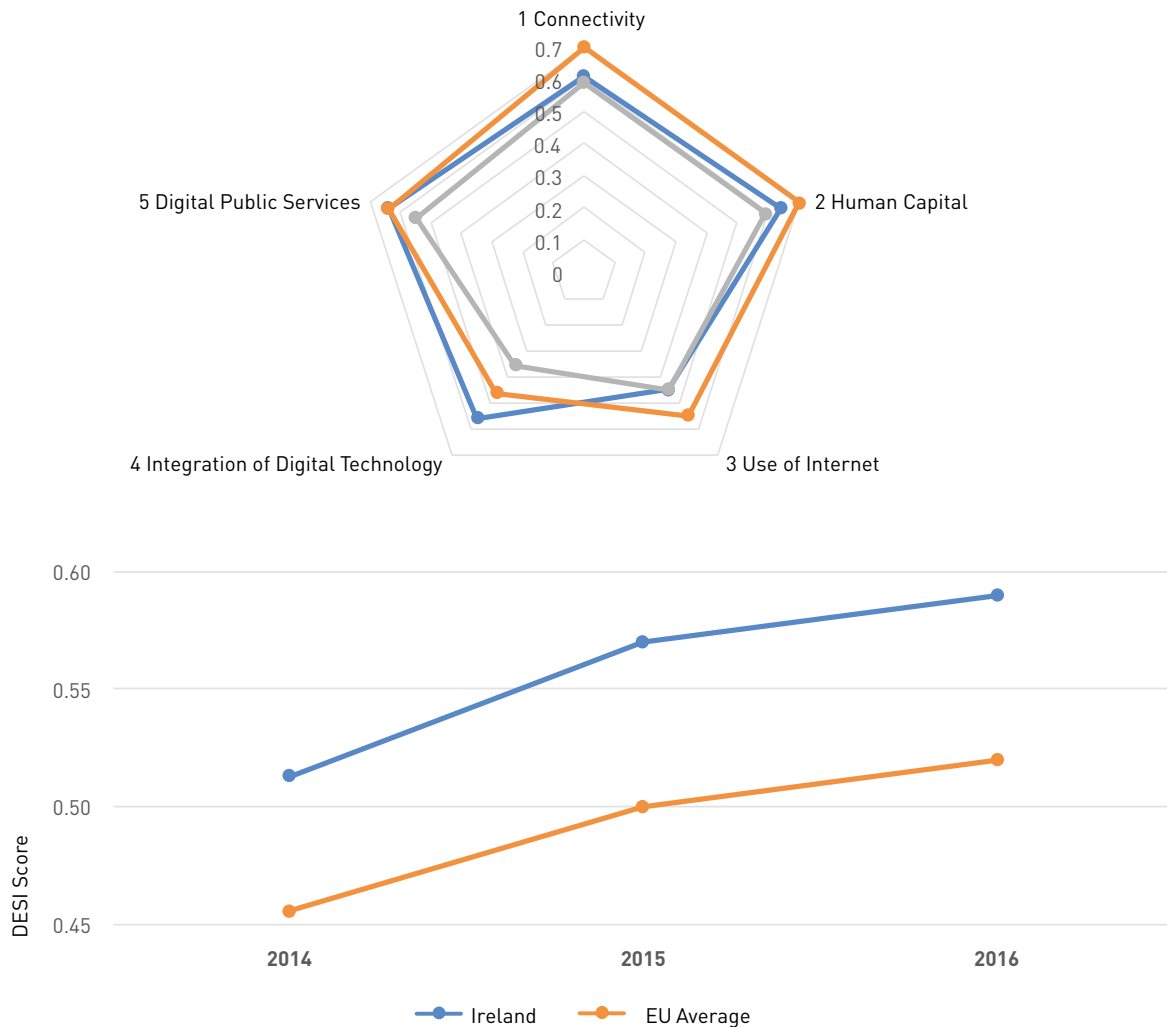


Figure 1 Ireland (2016) Digital Single Market (Source: <http://europa.eu/!ft36vV>)

HEAnet

HEAnet, the national education and research network, provides digital connectivity for all of Ireland's higher education and research organisations.¹⁵ It connects Ireland to European and international research and education organisations via the GÉANT network which operates at speeds of up to 500 Gigabits per second (Gbps), offering "the highest levels of capacity and security that research and education users need, where and when they need it."¹⁶ Currently, all seven universities, along with three institutes of technology and the Royal College of Surgeons in Ireland (RCSI) connect into HEAnet using a link of 10 Gbps.¹⁷ The remainder of higher education institutions are connected at 1Gbps, but can be readily upgraded in response to future increases in demand.¹⁸ Such speeds are much faster than the highest domestic broadband connections on offer in Ireland.¹⁹

Ireland is placed nineteenth busiest in educational traffic volume among 32 European countries, ahead of countries such as Portugal and Luxembourg but behind countries including Romania, Poland, Spain and the Czech Republic. GÉANT data suggests that actual volumes of traffic per user within the Irish system are low by comparison with some other European countries. In 2013, the total Irish HEAnet traffic was reported at just over 22,000 Terabytes (Tb), an average in the region of 100GB for each higher education student user. (The busiest Irish institution – a university – reported slightly more than 3,500Tb and the least busy had less than 100Tb.) By contrast, the UK reported the highest volume in Europe overall, with traffic in excess of 500,000Tb, suggesting an average in the region of 250GB for each of its two-million-plus students.²⁰

HEAnet also acts as a broker for hardware, software, support and professional services on behalf of the sector with the stated aim of, "streamlining procurement processes, adding value and saving money by providing aggregate deals."²¹ It seeks to provide the same deal for all clients across the sector regardless of size, and assists members in complying with the Office of Government Procurement (OGP) tender processes. Among its many other services, HEAnet also offers data centre hosting for clients, multimedia and video streaming, identity and access management, and robust, large-scale hosting for the Moodle virtual learning environment (VLE).

12 <http://www.cso.ie/en/releasesandpublications/er/isshh/informationssocietystatistics-households2016/>

13 The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around five dimensions. DESI scores range from 0 to 1, the higher the score the better the country performance.

14 <https://ec.europa.eu/digital-single-market/en/scoreboard/ireland>

15 Founded in 1983 as a collaborative endeavour between the Irish universities, HEAnet's mission is "To realise Ireland's education and research goals in partnership with our clients by providing advanced infrastructure and services". It is publicly funded and reported an annual income of over €22.6m in 2014 (see http://www.heanet.ie/sites/default/files/hea_ar_14.pdf p. 46, Note 16).

16 GÉANT Compendium of National Research and Education Networks in Europe 2015 Edition, p. 7, <https://compendium.geant.org/compendium-2015-updated.pdf>

17 In the course of this review at least two of these reported not having the internal network capacity to operate at such speeds. See <http://www.heanet.ie/the-network>

18 Traffic analysis for each of Ireland's higher education institutions is publicly available at <http://www.heanet.net/> At the November 2016 HEAnet conference, plans to upgrade the network to 100Gbps capacity were announced.

19 eFibre services of up to 100Mbps are available to circa 1.2 million addresses, but cable is delivering speeds of up to 240Mbps to over 700,000 addresses. The updated government intervention strategy (December 2015) seeks to establish a minimum of 30Mbps download, 6Mbps upload and service availability at least 99.95% of the time across the country. See <http://www.dccae.gov.ie/communications/SiteCollectionDocuments/Broadband/Updated%20Strategy%20December%202015.pdf>
<http://www.dccae.gov.ie/communications/en-ie/Broadband/Pages/Connecting-Communities.aspx>

20 GÉANT Compendium, pp. 7, 20-22, 38-9, 41.

21 <http://www.heanet.ie/brokerage>

In May 2015 HEAnet became the parent organisation of EduCampus, established to provide shared services delivery to Irish higher education as a whole. (Under former company An Chéim, this service was primarily for the institutes of technology.) In addition to providing new ways for the sector to avail of shared IT services, it seeks “to implement, maintain and support business critical systems for the current client community including student records management, payroll, HR management, finance and library management.”²²

Section 1B: The Institutional Picture

Budgets and expenditure

The precise IT expenditure within the higher education sector is difficult to calculate, as the reported central IT budget often does not necessarily include or reflect expenditure on hardware and software purchased by individual academic departments and centres. Access to a precise picture is further complicated by the fact that the annual budget cycle for each institution follows the calendar year and therefore does not map directly to the Consolidated Financial Statements, which reflect the academic year (September-August). With these caveats in mind, expenditure on software, hardware and related IT items averages at just over 4% of non-pay budget across the sector (see Table 1). The current year-by-year budget allocation system does not encourage or facilitate long-term planning and frequently results in allocations within institutions being based on the previous year’s spend (plus or minus 10%) rather than being focused on future development and delivery. Theory and best practice suggest that change management needs a longer view than a one-year horizon.

The seven universities report a higher average annual spend on IT and associated items compared to the institutes of technology. This is reflected in higher levels of investment and generally newer equipment evident within universities and larger institutes of technology.

Table 1 Expenditure on IT and library across the higher education sector

	Students ²³ 2014-15	Staff 2014-15	Software & IT spend 2014-15	Average of non-pay budget (2014)	Library non-pay spend (2014)	Average of non-pay budget (2014)
Universities	113,703	14,119	17,203,764	3.6%	16,470,160	3.4%
IoTs	88,187	8226	11,194,000	6.0%	6,205,000	3.4%
Colleges	12,804	751	418,426	1.9%	923,900	4.1%
Totals	214,694	23,096	28,816,190	4.2%	23,599,060	3.6%
Universities			Institutes of Technology			
Average IT spend per student €151			Average IT spend per student €127			

²² <http://www.heanet.ie/about/educampus>

²³ Student and staff figures are from 2014-15 (<http://www.heanet.ie/sites/default/files/hea-key-factsfigures-2014-15.pdf>), as this was the year for which spending figures were also available.

Between 2009 and 2015, there was a 57% reduction in exchequer capital expenditure on higher education from €202m to €87m.²⁴ Consequently, in the current financial climate many institutions necessarily focus on maintenance of existing infrastructure rather than developing new IT systems.

Moreover, in that period the international monetary exchange rate has also given less purchasing power to the euro against the US dollar, in which most hardware and software is priced. The need for investment and upgrading of server infrastructure is widely acknowledged and it is a problem that appears to be particularly pronounced across the institutes of technology, although universities also report difficulty in acquiring budgets for basic underlying infrastructure such as network replacement.

Institutional representatives indicated that the recent establishment of EduCampus should assist the renewal, implementation, maintenance and support of systems for the institute of technology sector, including student records management, payroll, HR management, finance and library management through their MIS Refresh Project.²⁵ There is also a view that the accompanying shared service culture may well provide a future for the technical underpinnings for digital teaching and learning. In the US and elsewhere, the reported benefits of such services for the institutions begin as up-front cost savings and operational efficiencies, but it is suggested that they can lead to pedagogical benefits for staff and students.²⁶ While Ireland is at the beginning of its shared services journey, and it is acknowledged as a long-term endeavour, evidence suggests that significant progress has been made in building such a shared services culture, with 59% of employees in the education sector receiving shared services of some form.²⁷

24 <https://www.education.ie/en/Publications/Policy-Reports/Investing-in-National-Ambition-A-Strategy-for-Funding-Higher-Education.pdf>

25 <http://www.educampus.ie/>

26 See, for example, "A Retrospective on Implementing Common Course Management Systems: Motivations, Benefits, Drawbacks and Recommendations" (May 2016), available at <http://mfeldstein.com/retrospective-implementing-common-course-management-systems/>

27 A full review of shared services in the Irish public service and internationally is available here: <http://www.per.gov.ie/en/research-into-shared-services-in-irish-public-service/>

Networks and IT security

Upgrading/enhancing network and data security was considered by responding Irish CIOs/IT managers to be the top institutional priority over the next three years. As can be seen in Figure 2, just 16% rated their institutional IT security as excellent (6 or 7 on a 7-point scale), 37% rated their wireless networks as excellent and 47% rated their computer networks and data communications as excellent. In all cases the figures were lower than their US counterparts.

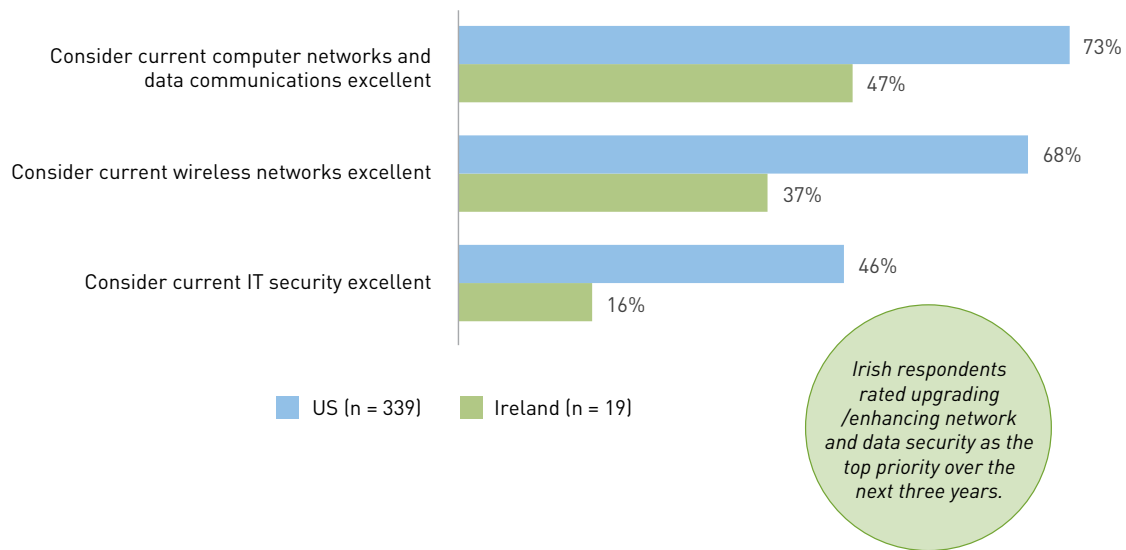


Figure 2 Perceptions of senior IT managers regarding networks and IT security in the US and Ireland (Campus Computing Survey, 2016)

The current situation regarding networks, according to senior IT managers, can be seen in Figure 3.

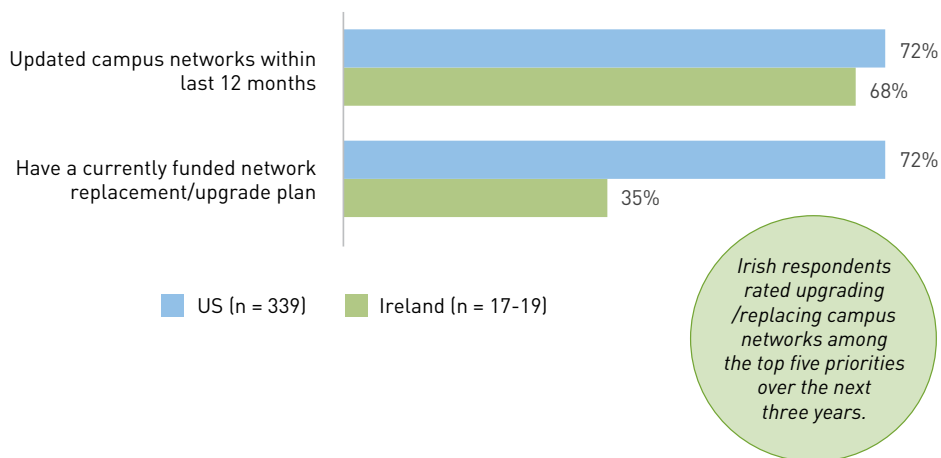


Figure 3 Plans to update/upgrade campus networks in the US and Ireland (Campus Computing Survey, 2016)

Wifi

Personal mobile devices have brought a growth in demand for Wifi in Ireland, with ubiquitous internet access now expected and available on public transport, through libraries and via open networks in bars, restaurants and many other public and private locations. Some municipal public Wifi schemes also exist across the country.²⁸ The CSO estimates that of all homes with broadband in 2016, 45% were using a mobile broadband connection.

All Irish campuses provide Wifi networks, and increasing volumes of students are reported to access campus services using mobile devices. Students and academic staff in Irish higher education can also access Wifi using Eduroam, an international Wifi authentication service facilitated by HEAnet, which allows Wifi connections for students and staff within their own campus and when visiting other participating institutions in Ireland and worldwide.²⁹ Having started in Europe, Eduroam is now available in 78 countries, and reported a billion connections in May 2016.³⁰

Almost every institution has responded to the increased demand by expanding Wifi networks and availability, and in general, acceptable levels of connectivity are reported within individual institutions. One university completed a full upgrade of its Wifi service in 2015 and describes it as one of the largest Wifi networks in Ireland in terms of size, complexity, density and speed.³¹ A recurring issue at many institutions relates to the challenges posed by older buildings, where the wireless range is inhibited by the physical infrastructure. Some institutions describe poor connectivity inhibiting the use of mobile apps at scale in large groups (e.g. for polling in lecture theatres, etc.).

IT security

The 2015 NMC Horizon Report for Irish Higher Education predicted that “Bring Your Own Device” (BYOD) practices would be mainstream within a year among Irish higher education institutions. As well as increasing flexibility for learners, new forms of access and the widespread use of personal devices are accompanied by the increased potential for confidential institutional data to be compromised. Data protection and security concerns extend to the use of portable unencrypted USB memory sticks, and the widespread use of services such as Dropbox and Google Drive where no formal agreement exists between the institution and the provider. In fact, the proliferation of “free” tools (e.g. Google’s YouTube, WordPress) coupled with the expectation of easy access from anywhere by students and staff alike has created a digital culture that responds very well to the needs of users but that does not always sit comfortably among those concerned with regulation, data protection and network security.

28 There does not appear to be a full listing of such Wifi hotspots in Ireland.

29 See <http://www.eduroam.ie/>

30 <https://ec.europa.eu/digital-single-market/en/blog/celebrating-billionth-connection-eduroam-name-education-and-innovation>

31 https://www.tcd.ie/itservices/assets/doc/general_external/annrep1415.pdf

Desktop computer provision

Although worldwide trends indicate a reduction in the usage and sales of desktop computers,³² an estimated 30,000 such devices are available to students on an open-access basis across the 25 institutions surveyed. Purchases of desktop and laptop computer hardware are made via the HEAnet framework, a process approved by the Office of Government Procurement which covers the supply for an agreed specification and price and which is available to all HEAnet member institutions. The current agreement is the result of a mini-tender process and runs until mid-2017.³³ Key figures regarding desktop provision can be seen in Figure 4. Some institutions reported opening new labs in 2015-16 in response to student demand. One university reported a plan to make a significant reduction in numbers of open-access computers due to funding issues, while other initiatives such as laptop loan schemes are mentioned by some institutions as a way to compensate for reduced desktop numbers.

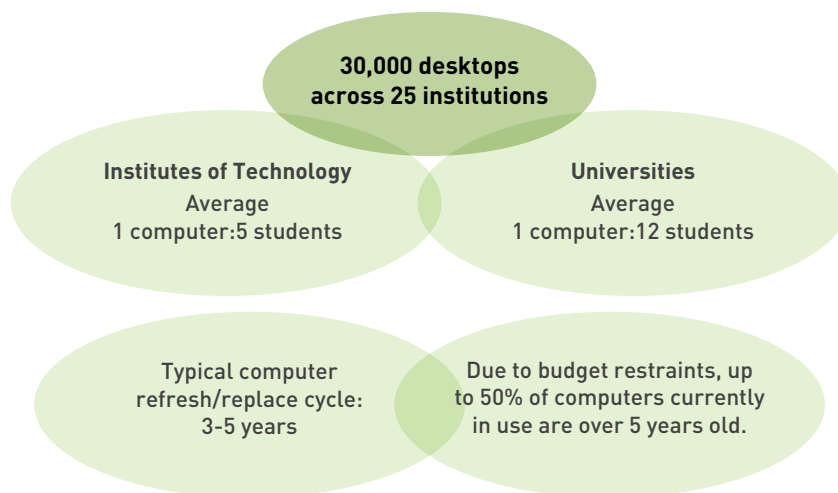


Figure 4 Key figures regarding desktop provision

Data storage

Key findings regarding how data is being stored:

- Most of the universities and the larger institutes of technology currently report local data centre storage capacity in the region of 200Tb via their on-site servers. Smaller institutions vary greatly in this regard, the lowest reporting 27Tb on-site with 300Tb the highest.
- Some of the larger institutions have made a formal agreement with Google for student email, which includes usage of Google Apps and “unlimited storage” for users (this is restricted to 15Gb where no formal agreement with Google exists).
- One institution indicated that it has entered an agreement with Dropbox in order to formalise the existing widespread use of its service.

³² <http://www.gartner.com/newsroom/id/3568420>

³³ <http://www.heanet.ie/brokerage/dtlt2016>

- A significant commonality across all institutions which will make cloud-based storage a reality is the near universal adoption of Microsoft Office 365. While all institutions have traditionally licensed Microsoft Office products for PowerPoint, email and word processing, the current deal with Microsoft brokered via HEAnet (which runs through mid-2017) includes Microsoft OneDrive, allowing for up to 1Tb of storage each for personal use by staff and students (representing in excess of 250 Petabytes for the sector.)³⁴
- While some institutions report low take-up and usage of this service to date, others anticipate that moving to such services will have a significant impact on the use of local storage facilities. At one institution it was estimated that it will reduce local storage requirements by up to 50%. Such change is imminent in the sector and may also have a significant impact on the role and organisation of information systems and services divisions within higher education.

Software

Virtual learning environments

In Ireland, the use of digital tools and the internet both within and beyond formal teaching environments has become a normalised and expected dimension of the teaching and learning experience.

Of the 25 institutions profiled, 13 use the open-source VLE Moodle. Of the remainder, ten use Blackboard, one uses Sakai and one does not use a VLE at institutional level. Because Blackboard tends to be the choice of the larger institutions, a much higher number of students and staff use that VLE: c.124,000 students and 14,000 staff use Blackboard; c.80,000 students and 8,000 staff use Moodle. Sakai has just over 13,000 students and 1,400 staff users in Ireland.³⁵

Table 2 Number and types of VLEs used across the sector

	Universities	IoTs	Colleges	Total
Moodle	2 (cloud-hosted)	8 (7 cloud-hosted)	3 (1 cloud-hosted)	13
Blackboard	4 (cloud-hosted)	6 (4 cloud-hosted)	-	10
Sakai	1 (hosted)	-	-	1
None	-	-	1	1

³⁴ <http://www.heanet.ie/brokerage/microsoft>. This deal also allows students and staff to obtain Microsoft Office 2013 ProPlus at no cost.

³⁵ In the US, Blackboard holds just under 40% of the market, about twice as much as Moodle, the remaining 40% being taken by Canvas, Desire2Learn, Sakai and others: see also Campus Computing Survey 2015 <http://www.campuscomputing.net/>

This range of VLEs in Ireland is not as varied as is found in larger countries such as the US, Canada, the UK and Australia, but follows a roughly similar pattern (see Figure 5).

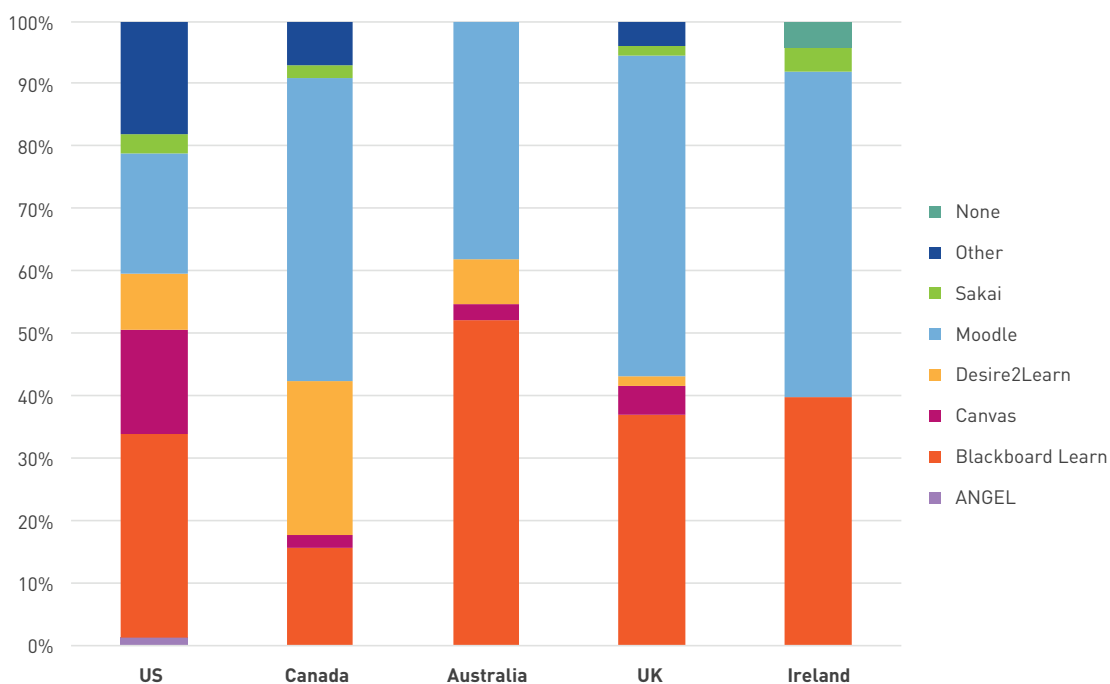


Figure 5 Global snapshot of 2016 data showing which learning management systems are in use by institutions in the US, Canada, Australia and the UK (source: www.edutechnica.com). Adapted to include figures for Ireland.

All Irish institutions report usage of the VLE by in excess of 80% of academic staff, although, similar to the experience in other countries, many note the under-utilisation of particular tools and the use of VLE as repositories for course content and as vehicles for administration rather than as pedagogical enhancements.³⁶ Of particular interest in the Irish context is the fact that over 80% of VLEs are hosted in the cloud: eight of the ten Blackboard instances are contracted to Blackboard Managed Hosting and just three of the 13 instances of Moodle were reported to be hosted in house.

Although the location of any such hosted services outside the EU can be an issue for some, cloud-based hosting offers cost effective solutions to VLEs, reducing the need for on-site server support. HEAnet has recently begun to offer a hosting service for Moodle (although responsibility for managing the application itself remains in house: some institutions rely on private companies for such management).

For the most part, this cloud development has been judged a success by those involved, although some institutions note that greater levels of in-house expertise would help to take full technical advantage of all the VLE features. A shortage of learning technologists to support academic staff in their pedagogical use of the VLE was also highlighted.

³⁶ See A. Risquez et al. (2013) "An investigation of students' experiences of using virtual learning environments: implications for academic professional development", in C. O'Farrell and A. Farrell (eds) *Emerging Issues III in Higher Education: from capacity building to sustainability*, Athlone: EDIN, <http://www.edin.ie/publications-3.php>; K.C. O'Rourke et al. (2015) "What's the Use of a VLE?" *Irish Journal of Academic Practice* 4:1 (Art. 10) <http://arrow.dit.ie/ijap/vol4/iss1/10/>; C. McAvinia (2016) *Online Learning and its Users: Lessons for Higher Education*, Cambridge, MA: Chandos/Elsevier.

The responses from senior IT managers regarding VLE-related questions in the Campus Computing Survey can be seen in Figure 6.

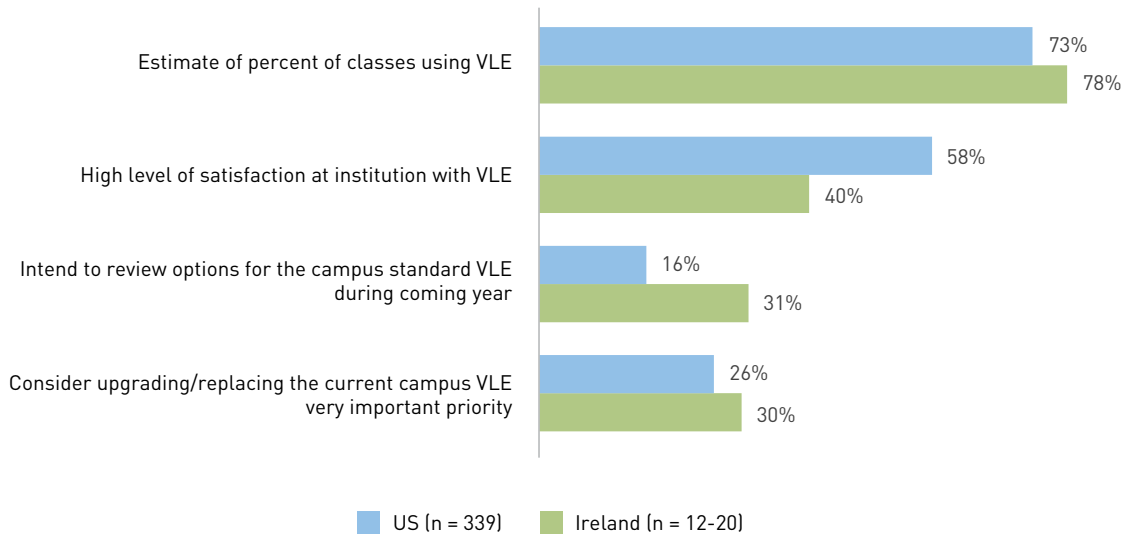


Figure 6 Perceptions of senior IT managers regarding VLEs in the US and Ireland (Campus Computing Survey, 2016)

Assessment software

Many institutions indicate that specific assessment functions within their VLEs have evolved in recent years, rendering less necessary the former practice of using supplementary tools for purposes such as assignment submission, multiple-choice quizzes, self-testing, etc.

Plagiarism-detection software is in widespread use, specifically Turnitin which is individually licensed by 22 of the institutions profiled. SafeAssign, the Blackboard equivalent, is used by just one university and one institute of technology, although current pilots of alternative plagiarism-detection software were reported (specifically Urkund).

Table 3 Plagiarism detection software used across the sector

	Universities	IoTs	Colleges	Total
Turnitin	6	13	3	22
SafeAssign	1	1	-	2
None	-	-	1	1

Most institutions have expressed an interest in using e-portfolios as a form of assessment, and some institutions reported the desirability of a national cloud-based approach to e-portfolios. Mahara is currently the e-portfolio of choice for five institutions, Pebblepad is used by three institutions and others are using bespoke tools such as Student Diary Pro. However, more than half of the participating institutions report not using e-portfolios, with some of these indicating an awareness of local pilots and independent initiatives at school and departmental level that use cloud platforms and free software not included in the official inventory. In such cases, students are encouraged to use freely available online tools such as WordPress to construct e-portfolios.

Table 4 Range of e-portfolios used across the sector

	Universities	IoTs	Colleges	Total
Mahara	3	1	1	5
Pebblepad	1	2	-	3
StudentDiaryPro	-	2	-	2
Other	-	2	-	2
None/Piloting	3	8	2	13

Communications, audio and video

Of the tools used to supplement VLE functionality, webinar software is widely used by all universities and institutes of technology, with Adobe Connect being the most frequently reported software of institutional choice (11 institutions) followed by Blackboard Collaborate (eight institutions). Two institutions report using Big Blue Button, an open-source alternative, and almost all mention widespread use of Skype (now part of Microsoft Office 365). There is also some use of Google Hangouts and other tools such as Vidyo in teaching and learning contexts. These tools are used by some institutions as an alternative to lecture-capture software (which can automatically record and archive live lectures for later viewing). While use of lecture capture software was reported in six of the seven universities, its deployment was found to be rare in institutes of technology, only two of which reported usage.

Table 5 Communication tools used across the sector

		Universities	IoTs	Colleges	Total
	Adobe Connect	2	7	2	11
	Bb Collaborate	4	4	-	8
	Skype/Vidyo	1	2	-	3
	BigBlueButton	1	1		2
	None/Unknown	-	-	2	2
Blog (excl. native VLE)	WordPress	3	3	-	6
	Blogger	1	1	-	2
	PBworks	1	1	-	2
	Wikispaces	-	1	-	1
	None	-	-	1	1
Lecture Capture	Panopto	2	1	-	3
	Extron	1	1	-	2
	Echo360/Kaltura	2	-	-	2
	In-house	1	-	-	1
	Mediaste	-	-	1	1
	Unknown	-	-	1	1
	None/Piloting	1	12	2	15

There were limited mentions of asynchronous groupware not native to the VLE (e.g. Microsoft Yammer), although some institutions noted that alternative tools for wikis and blogs are preferred within departments and specific courses.

The use of Google Apps (recently renamed G Suite) is widespread by students and staff across the sector, although it is formally licensed by just one-third of institutions. A small number of institutions also use a texting alert service, sometimes integrated with their VLE.

Email usage

Most institutions use institutional student email accounts as an official medium of communication, although the overall use of email by students is reported to have diminished significantly over the past decade. One institution has discontinued the practice of issuing students with email accounts, allowing them to use their own preferred email service. Student email has in almost every instance been moved to the cloud. In terms of email usage, a small-scale study at one Irish university in 2014 noted that “staff members checked their emails on average 17 times per day compared to students who checked their email just over 4 times per day”³⁷.

37 LTE 4G Trial at TCD, April-May 2014, <https://www.heanet.ie/wordpress/wp-content/uploads/2014/10/LTE-4G-Trial-2014.pdf>

Table 6 Email services currently used across the sector

		Universities	IoTs	Colleges	Total
Student Email	MS Outlook/Office 365	3	9	2	14
	Google	4	3	1	8
	Zimbra	-	1	-	1
	None/Unknown	-	1	1	2
Staff Email	MS Outlook/Office 365	4	12	2	18
	Google	2	1	-	3
	MS Exchange	1	-	-	1
	Zimbra	-	1	-	1
	In-house	-	-	1	1
	Unknown	-	-	1	1
Personal Productivity	Microsoft Office 365	7	14	2	23
	Google Apps (Licensed agreement)	4	2	2	8

Mobile apps

The usage of vendor-specific mobile apps is the norm across the sector, with few institutions reporting development of bespoke local apps for their institution, and two indicating no app deployment at all.

The key findings regarding mobile apps are as follows:

- Moodle is accessible via a free app, but awareness of it is inconsistent across the sector, with one institution attributing low usage to the mobile-friendliness of the main Moodle application.
- Blackboard mobile is used by all institutions using that VLE, with – in all but one instance – the institution absorbing the vendor cost.
- The use of vendor-supplied apps as audience-response “clicker” systems is also fairly widespread. Such systems, whether mobile phone or vendor handset-based, tend to be used locally by individual departments and schools, which often independently purchase tools and technologies specific to their discipline.
- Common software includes tools for recording student attendance at class, AutoCAD (design), MathLab, SPSS and Minitab (statistics), Endnote (referencing), FinalCutPro (film editing), surveying tools (e.g., SurveyMonkey) and tools such as Articulate and Audacity used to create online teaching and learning resources. Such purchases are not always included in the central IT services portfolio, and in some instances departments also employ independent technicians and support personnel.

Table 7 Apps and clickers used across the sector

		Universities	IoTs	Colleges	Total
Mobile Apps	Moodle	2	6	2	10
	Blackboard	4	3	-	7
	Local/bespoke	3	-	-	3
	Adobe	1	-	-	1
	Office 365	1	-	-	1
	Mediasite	-	1	-	1
	None/Unknown	1	2	1	4
Clickers*	Turning Point	2	1	-	3
	Generic	-	2	-	2
	Quizdom	1	-	-	1

* Usually departmental

MOOC development

Six of the universities and four institutes of technology reported having developed or participated in the development of one or more MOOCs:

- MOOCs created and run in Ireland to date focus on topics as diverse as humanities areas including Irish life and language, music, media, and history; business topics such as leadership and conflict resolution, change management and Lean Six Sigma; science topics such as disease prevention, ageing and pharmaceuticals; and educational topics including transition to higher education, and coding for teachers.
- Two Irish universities are partners in FutureLearn, a private company owned by the Open University, which offers free online courses from universities around the world.

Table 8 MOOCs across the sector

	Universities	IoTs	Colleges	Total
FutureLearn	2	-	-	2
Kadenze	1	-	-	1
Open Learning Academy	1	-	-	1
CourseSites	1	-	-	1
Locally Created	-	2	-	2
Participating	1	2	-	3
None	1	10	-	11

Websites

Participant responses suggest that websites tend not to be especially intuitive – a phenomenon that is reflected in higher education sectors across the globe.³⁸ An informal review of the websites confirms that many of them are difficult to navigate and basic information is not always easy to find. Many of the institutions do not report having an official central module catalogue available to students. Instead, they offer broad course descriptions and specific detail is made available via student handbooks, etc. after registration.

Table 9 Online module catalogues used across the sector

	Universities	IoTs	Colleges	Total
Coursebuilder	-	4	-	4
Locally Created	-	3	-	3
Bespoke*	2	-	1	3
Other	-	2	-	2
None/Reviewing	-	5	2	7

* Links to brochures, PDFs, etc.

Library systems

At the time this review was conducted, all the institutes of technology used the Millennium library management system, a proprietary software purchased by An Chéim on behalf of the sector some years ago, and at that time this was out to tender for replacement via EduCampus.³⁹ Such traditional library catalogues are now being superseded by “discovery services” which facilitate user searching across multiple resources including the catalogue component of a library management system, institutional repositories and other web-based content, presenting all findings to the end user in a single set of results.

Printing

Printing for students is managed in a variety of ways, with at least 10 of the 25 institutions reporting that they have outsourced student printing facilities to a third party.

Table 10 Student printing approaches across the sector

	Universities	IoTs	Colleges	Total
Outsourced	5	5	-	10
In-house	2	4	2	8
Unspecified	-	5	-	5

38 See, for example, Melanie Fullick (2016) “University websites: The so-so, the bad, and the egregious,” *University Affairs*, 4 July 2016, <http://www.universityaffairs.ca/opinion/speculative-diction/university-websites-bad-egregious/>

39 <http://www.educampus.ie/applications/library> In 2016, Koha was chosen as the preferred sectoral supplier and is currently being rolled out across IoTs.

Comments to Conclude Section 1

Short-term budget planning has a constraining effect on digital infrastructure development, precluding the possibility of making strategic and financial decisions that can result in long-term efficiencies. The increase in shared services, however, is welcome and, along with the potential for collaboration and collective negotiations this brings, is likely to have a positive impact in the future.

Use of VLEs and other pedagogically-focused technologies are well embedded across the Irish higher education sector, and there is an expectation among staff and students of ubiquitous connectivity, access to online resources and the availability and use of digital tools in almost every aspect of their work. The rise of cloud computing is especially evident in the context of technologies for teaching and learning, with a large majority of institutions opting to have their VLE hosted by third parties outside of their institutions.

While there have been notable innovative strides, much potential remains to be tapped. As with many emerging technologies, there is wisdom in sharing innovation within and across institutions and in identifying potential synergies/efficiencies, while taking into account local contexts.

Section 2: Content

Changing Approaches

A 2014 international study of undergraduate students and IT (which included students at Irish institutions) found that more than 50% of those surveyed had used an eBook as part of their studies.⁴⁰ The Central Statistics Office does not specifically measure eBook purchases, but reports that in 2015, almost a fifth of the Irish adult population purchased books, magazines, newspapers or related eLearning materials online. In addition, 3% reported purchasing eLearning material.

Table 11 Online purchases by persons ages 18 years and over, 2015 (source: www.cso.ie)

Online Purchase	% of Respondents Who Made Purchase(s)
Clothes/sports goods	31
Tickets for events	29
Other travel arrangements	29
Holiday accommodation	27
Books/magazines/newspapers /e-learning material	18
Household goods	14
Electronic equipment (incl. cameras)	14
Films/music	13
Telecommunication services e.g. TV, Internet, phone	10
Other purchases (not specified)	7
Share purchases/financial services/insurance	5
Food/groceries	4
E-learning material	3
Computer hardware	3
Medicine	1
Video games software and upgrades	..
Other computer software and upgrades	..

.. indicates that the observation is missing or fall under the limit of discretion/uncertainty.

40 ECAR Study of Undergraduate Students and Information Technology 2014, cited by Aimee deNoyelles, John Raible and Ryan Seilhamer, 'Exploring Students' E-Textbook Practices in Higher Education', *Educause Review*, July 2015 <http://er.educause.edu/articles/2015/7/exploring-students-etextbook-practices-in-higher-education>

Within Irish higher education, eBook purchases by students at discounted rates are occasionally negotiated by departments or individual teachers directly with publishers, but this practice does not yet appear to be widespread across the sector.⁴¹ Lower individual levels of book ownership do not necessarily mean that print is being superseded by a preference for digital, but it is reflected in a reliance on libraries and other sources for access to relevant course materials, including the use of online databases and services.⁴²

Illegal downloading and sharing of “pirated” academic works across the sector is acknowledged to exist but appears to be largely unmeasured. One domain for which Irish data does exist is Sci-hub – a website described by the *Chronicle of Higher Education* as “the piracy network for academic journals” – which averaged 80 downloads per day in Ireland over the six-month period between September 2015 and February 2016.⁴³

eBooks

The key findings regarding eBooks are as follows:

- The reported availability of eBooks across the sector ranges from the low hundreds at the library of one institute of technology to more than 220,000 at one university, with much variation in between.
- One university library reported 900,000 eBook chapters viewed in the academic year 2014–15, adding that it makes many books available as eBooks, either through large thematic collections or as individual items.
- Smaller libraries with lower budgets report difficulty in purchasing site licenses for electronic versions of core text books due to publisher policies. Such policies include restrictions on the number of concurrent users (generally no more than three) and limited formats (generally readable PDFs rather than streamed documents) which, when coupled with higher costs (eBooks reportedly cost about one-and-a-half times the amount charged for the printed equivalent and attract VAT at 23%, which is not levied on print), require different models of evaluation and acquisition within libraries themselves.
- In common with other departments, libraries’ non-pay budget allocation has reduced over the past number of years (see Table 1).

A multi-supplier framework agreement for the supply of library goods, including eBooks, was put in place on behalf of the sector in 2015 and, while this is not binding, some institutions expressed the belief that such frameworks may help to facilitate the development of eBook collections.⁴⁴

41 Irish institutions are regularly approached by private companies seeking finance and expertise in the development of online courses and resources: see, for example, www.epigeum.com/collaboration/

42 An August 2016 US study reinforces much of this, suggesting that a majority of learners prefer studying on paper, but most also want learning materials to be accessible online: see *Inside Higher Ed* “Study: Student, faculty views on digital materials”, 4 October 2016, <https://www.insidehighered.com/quicktakes/2016/10/04/study-student-faculty-views-digital-materials>

43 See <http://www.sciencemag.org/news/2016/04/whos-downloading-pirated-papers-everyone>

44 <https://irl.eu-supply.com/ctm/Supplier/PublicTenders/ViewNotice/172280>

eJournals and Databases

The purchasing model for databases and online journals in Irish higher education is quite mature, attracting a high proportion of the acquisitions budgets at most institutions across the sector.⁴⁵ In this context, the success of the Irish Research eLibrary (IReL) is noteworthy.⁴⁶

A Note on IReL

An initiative of the Irish Universities Association (IUA) librarians, IReL was founded in 2004 as a consortium to facilitate the purchase of access to online resources in science, technology and medicine. It has since grown to include resources for the humanities and social sciences.

Funding for the initiative, which totalled just over €9.4 million in 2015,⁴⁷ has been provided by the Higher Education Authority (HEA), Science Foundation Ireland (SFI), the Department of Jobs, Enterprise and Innovation (DJEI) and the IUA, and expenditure averaged in the region of €7 million per year between 2007 and 2012.

Underpinning its research agenda, the main focus of IReL is on access to relevant eJournals (25,000 full-text titles) and databases (26 in total), with a lesser emphasis on eBooks and other reference materials (16 collections in total).

Staff and students of the seven universities have access to all IReL resources (colleges formally associated with a university also enjoy full access by virtue of that relationship). Staff and students at RCSI have access to multiple discipline-relevant collections, while the institutes of technology have limited access (two multidisciplinary journal collections).

Selection of resources has been based on criteria that include value for money (cost per download), annual usage figures and ensuring that no discipline becomes unduly disadvantaged as a result of any decision. Individual institutions, as they see fit, subsequently can and do maintain their own separate subscriptions to resources discontinued by IReL. Similarly, while the institutes of technology benefit from the limited access provided via existing IReL agreements, individual institutes must negotiate separate deals for other relevant online resources, resulting in a very uneven digital landscape across that sector. University libraries all have over a hundred database subscriptions while subscriptions in institutes of technology tend to run at 50 or less (and in one instance as few as 18).

Resources are selected for inclusion following consultation with researchers and academic staff at the participating institutions, and access is managed locally by each institution via their library's website. IReL has developed a 'model licence' which is accepted by approximately half of publishers. Annual eJournal downloads via IReL are counted in millions, with close to 16 million database searches reported in 2014 and in excess of half a million eBook sections consulted annually.

The evidence suggests that IReL has worked well and the model of negotiating with suppliers on behalf of the entire sector using cooperative purchasing power is one that could be replicated or extended to include the entire higher education sector. Given the increasing demand for access and static budgets over recent years, IReL has tried to maintain access to the most relevant resources.

45 Such subscriptions constitute the topic of much sectoral debate: see Times Higher Education, 30 October 2014, 'Spending on subscriptions to journals rises by up to 50%' <https://www.timeshighereducation.com/news/spending-on-subscriptions-to-journals-rises-by-up-to-50/2016635.article>

46 <http://www.irelibrary.ie/>

47 <https://www.djei.ie/en/Publications/Publication-files/The-Research-and-Development-Budget-2015-16.pdf>

Open Access

In direct contrast to commercial subscription models, the open-access movement in Ireland and internationally seeks to make publicly-funded research outputs freely available to all.⁴⁸ Most institutions subscribe to this philosophy in principle but it tends to remain implicit rather than explicit across the sector. An example of good practice exists in local repositories of research theses submitted for examination at MPhil and PhD level: in addition to bound printed copies, a growing number of institutions now require digital submissions which are subsequently made freely available for download from locally-hosted repositories. (One university library has undertaken a large retrospective digitisation project of PhD theses and has made more than 2,000 of these available as open access e-texts via the institutional repository from December 2016.)

Such digital repositories also include other research outputs from staff and students including conference presentations, reports, articles and book chapters (copyright allowing), and locally-edited open access journals. Increasingly, masters theses are now being similarly collected. In some cases, the management of such repositories is shared by libraries across a number of institutions, and many institutional repositories are searchable via RIAN, a portal which aggregates open-access research from across Ireland.⁴⁹

Traffic to individual repositories from researchers all over the world is high, and annual downloads across the Irish sector amount to millions, with one institution reporting visitors from 148 different countries and territories in 2015. This is enabled by the fact that such repositories are being made discoverable to academic staff through online search engines and social media.

Academic staff use open resources that they have found online and which may be available under creative commons licenses, but there is an acknowledged need for increased awareness of issues surrounding copyright and intellectual property restrictions.⁵⁰ One institution listed several resources in use by academic staff including OER Commons; MIT Open Courseware; Coursera and other MOOC providers; Code Academy; Code School; and KHAN Academy materials.

Most of the libraries within institutions reported using industry-standard metadata in their work. Other than research theses deposited (as noted above), in general libraries have no involvement with student-produced content which is commonly stored and archived within the institutional VLE or locally by departments and schools who also provide the sole route for access.

The responses from senior IT managers in the Campus Computing Survey regarding questions related to open access can be seen in Figure 7. There is an implication in the responses that open access is at a developmental stage in Ireland and that it is seen as holding significant potential for enhanced teaching and learning in the future.

48 See Open Access Ireland www.oaireland.ie

49 <http://rian.ie/>

50 Creative Commons (CC) is a non-profit organisation devoted to expanding the range of creative works available for others to build upon legally and to share. See <https://creativecommons.org>

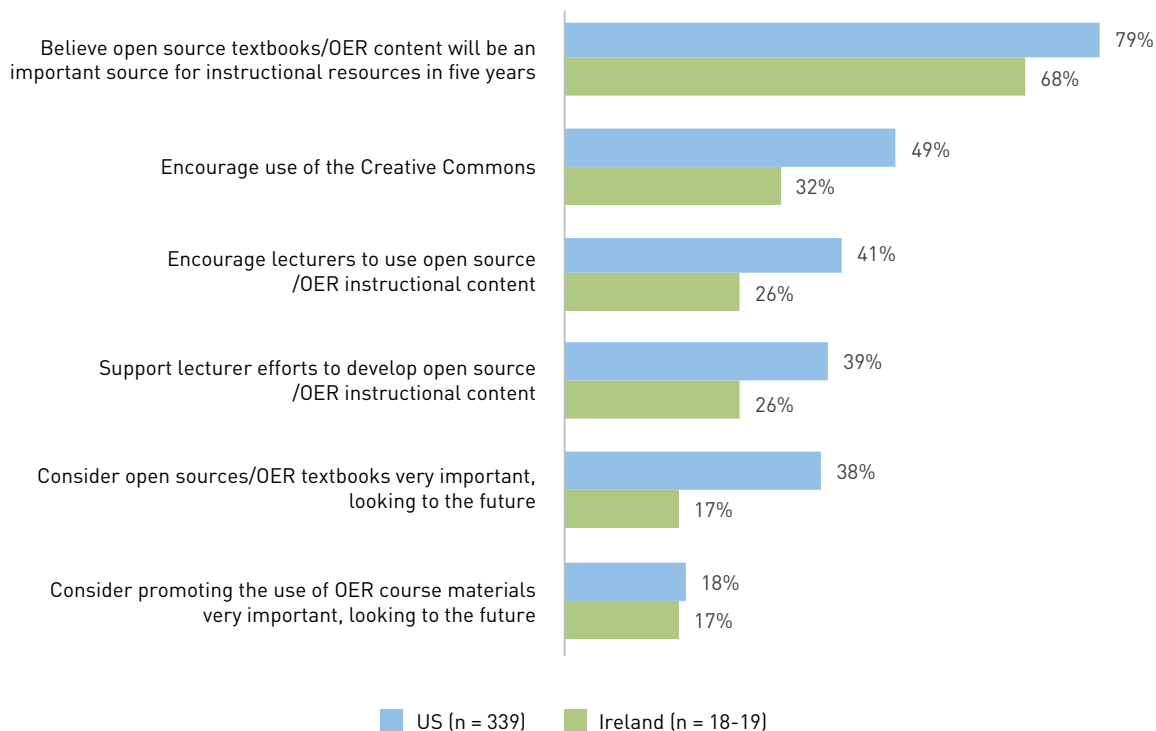


Figure 7 Perceptions of senior IT managers regarding open access in the US and Ireland (Campus Computing Survey, 2016)

A Sectoral Approach to Curating and Collaborating with OERs

A 2014 National Forum research project set out to explore how OERs could be curated and shared in the Irish context and, in line with findings from abroad, the majority of participants indicated low levels of awareness and understanding of associated issues. In general, libraries are leading the drive to educate and inform academic staff, not least in the areas of increased awareness of copyright and IP restrictions (including ownership of materials produced by staff employed on academic staff contracts within the sector). One institution described how its library has designed and made available a suite of reusable OERs on core academic skills, research, referencing and plagiarism, while another has created a policy on open access and organises an awareness-raising week annually.

Institutional representatives indicated that some academics are not inclined to engage with open-access resources due to concerns about quality, especially those resources that have not been explicitly peer-reviewed in the traditional manner.

Comments to Conclude Section 2

There has been a radical change in the ways in which content is accessed for teaching and learning in higher education. Concerns about quality, licensing and copyright remain, and IReL has played a key role in enabling access across the sector. The positive impact of IReL suggests that it should become a national body extending its services to the IoTs and other research performing organisations.

The potential to further enhance a sectoral approach to open access remains strong, with national level work continuing to develop this potential. In addition to open access policy development in the IRC and SFI, the National Open Research Forum is looking at updating the open access national policy and developing a new national policy for open data. This is co-chaired by the Health Research Board and HEA and the secretariat is provided by the Department of Business, Enterprise and Innovation. Open access is set to be an eligibility requirement for future H2020 funding and the development of a national approach to enabling this is of critical importance for Irish academics. A sectoral advisory group on open access is also currently being set up by the National Forum. This advisory group will inform work undertaken as a part of an upcoming pre-specified, nationally co-ordinated project which will investigate the impact of research on teaching and learning in an open access environment.

Section 3: Teaching and Learning Strategies, Blended Learning, and Learning Environments: Views on the Digital Dimension

Teaching and Learning Strategies

Almost all institutions profiled in the context of this review have explicitly formulated and formally approved a strategy or policy for teaching and learning within their organisation.⁵¹ In some institutions, the teaching and learning strategy is presented as part of an overall institutional strategy. A small number of institutions have developed a dedicated digital strategy. Many have also produced (or are in the process of creating) complementary policies and principles for curriculum development, flexible learning and student enhancement, all of which refer to the development of digital capacity for teaching and learning. Such strategies tend to have a lifespan of three to five years. The pattern of development described at most institutions is similar:

- The strategy (or policy) receives initial impetus from or through individuals or committees nominally responsible for teaching and learning within an institution, is developed through consultation and workshops with the wider community, and ultimately approved via formal processes and bodies such as academic council.
- Awareness-raising of strategies with the wider community tends to happen via dissemination through newsletters and emails within most institutions.
- In general, academic staff were reported to be “reasonably aware” of key teaching and learning-related policies and procedures in their area or function. However, detailed familiarity with the content may extend only to where it applies to their own particular contexts or where it is referenced for particular pragmatic purposes.

eLearning/digital learning strategies

Regarding eLearning/digital learning strategies and developments, the following were the key findings:

- Many institutions stated that they had chosen not to create an eLearning/digital learning strategy separate to their teaching and learning strategy, holding that eLearning is simply another form of learning but, in some cases, emphasising or prioritising digital learning in the overall strategy.
- Some institutions have created guidelines and tools for evaluation of digital efforts by teachers and some are now either developing or considering the development of new policies for online courses.
- Most institutions report that they currently have no separate quality assurance processes in place for digitally-enhanced or online courses, holding that the same standards apply to digital learning as those used in face-to-face learning. The need for such policies, however, becomes evident in the case of previously validated programmes which propose to adopt new teaching and learning approaches, including blended learning, and some institutions have already introduced a separate process for these approaches.

⁵¹ Twenty-three of the institutions profiled have published their strategy, and the majority have made it publicly available on their websites.

At a sectoral level, the National Forum has recently completed a review of the existing policy landscape in the higher education sector and developed guidelines for the creation of enabling policies for teaching and learning in a digital world.⁵²

Online and Blended Learning

Most institutional strategies recognise that more flexibility in learning modes is needed across the sector, and in most cases this is seen to involve the use of digital technology. However, due to inconsistencies in the categorisation of flexible learning, and variety in the ways terms are defined, formal national figures on students engaged in distance learning, eLearning and in-service enrolments have tended only to present a partial picture.⁵³

Key findings related to online and blended learning were as follows:

- Almost all the 25 institutions profiled indicated that they have at least one online offering, with some having increased provision in recent years.
- Institutional representatives also highlighted the importance of considering wider issues such as offsite and out-of-office/house user support, staff development and recognition of the time required to develop online provision.
- The majority of higher education teachers across all institutions are using technology such as the VLE to some extent in their teaching. Findings from ISSE 2015 indicate that only 14% of students have never used their VLE to discuss or complete an assignment.⁵⁴ This is consistent with the findings from the 2016 Campus Computing Survey (see Figure 6 – 78% of classes are estimated to use VLE).
- An ongoing study of VLE usage by students across the Irish higher education sector over a number of years reported that *“technical issues such as system reliability, usability, access, etc. did not represent significant barriers to use, regardless of the choice of VLE in an institution. Instead, lack of use by higher education teachers (24%) was by far the most common barrier to use identified, and students clearly would like their higher education teachers to make more use of the VLE.”*⁵⁵ Moreover, *“while the provision of class notes seems to have a beneficial effect on the student learning experience, the data would seem to suggest that the content repository role is very dominant with far less emphasis on the utilisation of the more interactive elements available on VLEs.”*

52 See <http://www.teachingandlearning.ie/priority-themes/mapping-digital-capacity/pre-specified-nationally-coordinated-projects/enabling-policies-for-digital-teaching-and-learning/>

53 For example, recent national level statistics indicate that during the academic year 2014–15 the numbers of students engaged in distance learning, eLearning and in-service enrolments in publicly-funded Irish higher education totalled just under 5,500 (HEA, 2015). However, this number may be an underestimate as the various ways in which students on such courses are categorised within institutions makes definitive totals difficult to obtain.

54 Irish Study of Student Engagement (ISSE) 2015, available at http://studentsurvey.ie/wp-content/uploads/2015/11/ISSE-Report_2015-final-tagged.pdf

55 Riskey et al (2013) “An Investigation of students’ experiences of using virtual Learning environments: implications for academic professional development”, in C. O’Farrell and A. Farrell (eds) *Emerging Issues in Higher Education 3, From Capacity Building to Sustainability*, Athlone: Edin.

Table 12 Percentage of students who reported having used an online learning system to discuss or complete an assignment during the 2014-15 academic year (ISSE, 2015)

	All Students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Never	14.0	12.9	14.3	16.7
Sometimes	22.8	21.5	24.2	22.9
Often	26.2	26.7	26.3	24.4
Very Often	37.0	38.8	35.2	36.0

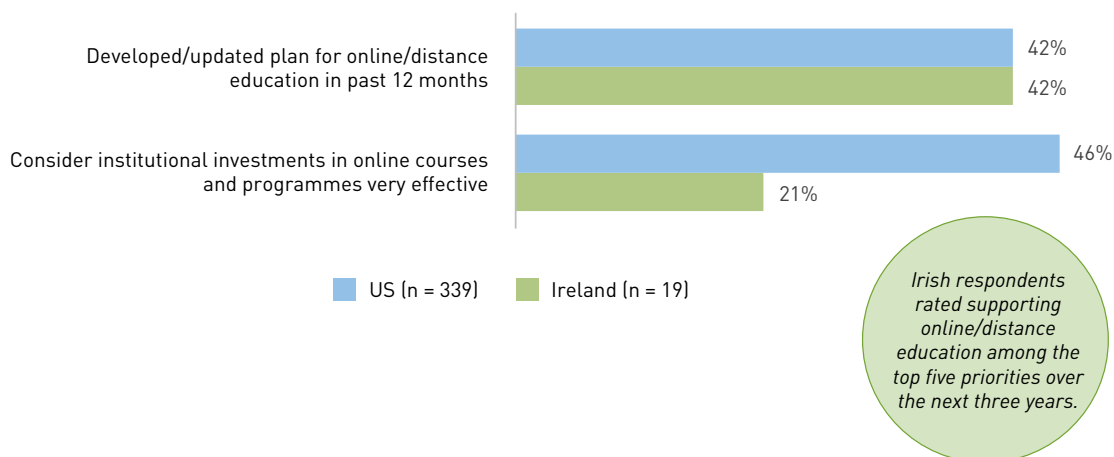


Figure 8 Responses from senior IT managers regarding online/distance education in the US and Ireland (Campus Computing Survey, 2016)

While some institutions ensure that every module available for students in the registration system has a corresponding presence in the VLE, there are in general no minimum or threshold standards of content or information (e.g., learning outcomes, staff contact details, timetables, reading lists, etc.) to which these modules must adhere.⁵⁶ It is recognised that this can lead to an uneven pedagogical landscape for students.

⁵⁶ For one viewpoint on this, see <http://learntechgalway.blogspot.ie/2012/02/threshold-standards-for-blackboard.html>

Learning Analytics

The use of learning analytics to support learning and teaching and to engage in stronger approaches to personalised learning is not widely reported throughout the sector. Data from the Campus Computing Survey confirms this (see Figure 9). However, there is a strong appetite across the sector to engage with the potential of learning analytics.⁵⁷ Some institutional representatives suggested a sector-wide provision of resources to support the implementation of learning analytics similar to that provided by JISC in the UK would be beneficial.

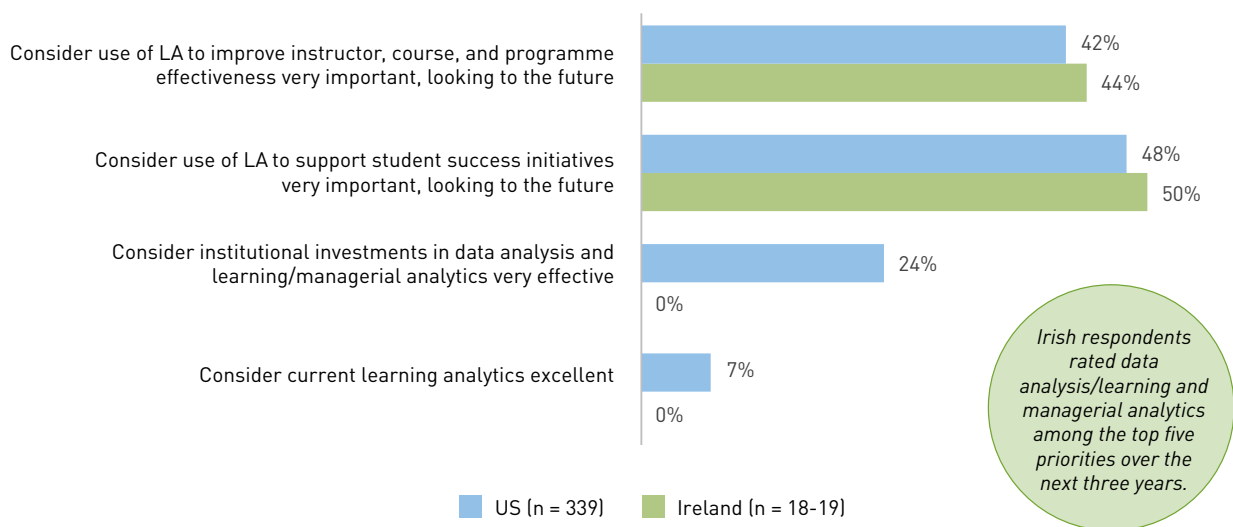


Figure 9 Responses from senior IT managers regarding learning analytics (LA) in the US and Ireland (Campus Computing Survey, 2016)

The Learning Environment

The design of classrooms and tiered lecture theatres, often with fixed furniture and a single point of focus towards the presenter/presentation screen, clearly reinforce an inbuilt pedagogical expectation that can be difficult to resist.⁵⁸ Some efforts to reconfigure classrooms as more flexible learning spaces is evident, but for the most part these tend to be the exception rather than the rule.

When students bring their own laptops, phones and tablets, access to electric power becomes an important factor. In both newer and older campuses, student demand for power socket availability in library spaces tends to be a key focus. While newer teaching rooms and lecture theatres are being designed with better availability of power outlets, older spaces are generally not being retro-fitted. However as was noted by some, battery life in devices is improving significantly and, as this continues to improve, access to power outlets is likely to be less of an issue.

⁵⁷ This has been demonstrated by the widespread engagement throughout the sector with the National Forum led learning analytics project (<http://www.teachingandlearning.ie/wp-content/uploads/2017/03/Final-LA-insight.pdf>)

⁵⁸ For a discussion of classroom design in the primary and secondary sector context, see Catherine Lange "Architecture's Pivotal Role in the Future of K-12 Learning," *Edsurge* 11 July 2016, available at <https://www.edsurge.com/news/2016-07-11-the-secret-to-architecture-s-pivotal-role-in-the-future-of-k-12-learning>

Comments to Conclude Section 3

The development of strategic planning in the area of teaching and learning by HEIs is encouraging to see. The fast-paced nature of developments in the area of digital technology is such that the digital aspect of such planning can often occur in a necessarily organic way. An overarching strategic vision, however, is important for providing stability and direction while allowing for flexibility and responsiveness to digital change.

An important point to note from the findings of this section was the absence of clear definitions for online/blended learning and the barrier this poses for understanding the characteristics and scope of this important area of teaching and learning.

The potential of learning analytics is also yet to be realised within the Irish context. The National Forum pre-specified national project Learning Analytics for Learning Impact will be key in furthering the ability of HEIs to realise this potential.⁵⁹

⁵⁹ <http://www.teachingandlearning.ie/priority-themes/mapping-digital-capacity/pre-specified-nationally-coordinated-projects/learning-analytics-and-educational-data-mining-for-learning-impact/>

Section 4: Staff and Students

Digital Literacy Among Staff

When asked about their general ability to use technology, academic staff working in Irish higher education have consistently tended to rate themselves highly. For example, the 2014 study *Voices of Academics in Irish Higher Education* reported that “the respondents defined themselves as quite competent and proficient users of the technology”. A sector-wide study funded by the National Forum found that more than 80% of teaching staff expressed confidence in the use of technology in teaching and an equal proportion agreed that HEIs encourage the use of technology in the interests of learning.⁶⁰ This is consistent with findings reported from individual institutions: in 2014, two-thirds of academic staff at one university agreed with the statement “I am confident using technology in my teaching” (see Figure 10), while a 2013 survey at an institute of technology identified that 13% of higher education teachers described their digital skills level as poor, more than half rated their digital skills as adequate and almost a third regarded their skills as proficient or advanced.⁶¹

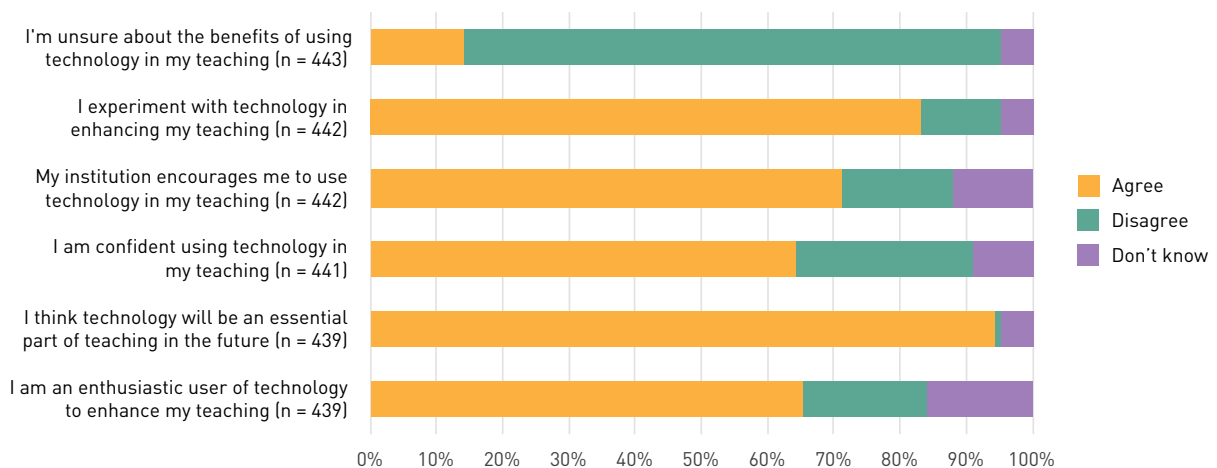


Figure 10 Attitudes to technology-enhanced learning among staff at UCC (UCC Technology Enhanced Learning Survey, 2014)

Nevertheless, a substantial proportion of staff still “struggle to keep up with the use of technology demanded by students”,⁶² current EU estimates suggest that more than half of the Irish population are lacking in basic digital skills.⁶³ Findings from several European studies suggest that self-assessment is not an accurate measure of digital skills.⁶⁴

60 Technology Enhanced Learning Survey, 2014. Available at www.teachingandlearning.ie

61 UCC, Technology Enhanced Learning Survey 2014, p. 4, available at <https://www.ucc.ie/en/media/support/ovpt/documents/TELSurveyREPORT.pdf>; O'Rourke, K.C.; Rooney, Pauline; and Boylan, Frances (2015) “What’s the Use of a VLE?,” *Irish Journal of Academic Practice*: Vol. 4: Iss. 1, Article 10, p. 14, available at: <http://arrow.dit.ie/ijap/vol4/iss1/10>;

62 Technology Enhanced Learning Survey, 2014, pp. 41, 45.

63 <https://ec.europa.eu/digital-single-market/en/scoreboard/ireland>

64 See “Digital Skills at the heart of education,” Chapter 11 of The e-Skills Manifesto, European Commission (December 2016) at <http://eskills4jobs.ec.europa.eu/manifesto>

Almost all institutions profiled as part of this review indicated widespread interest and high levels of engagement by academics in both accredited and non-accredited courses in technology-enhanced learning. Figure 11 displays perceptions of senior IT managers in the Campus Computing Survey regarding helping higher education teachers to integrate technology into instruction.

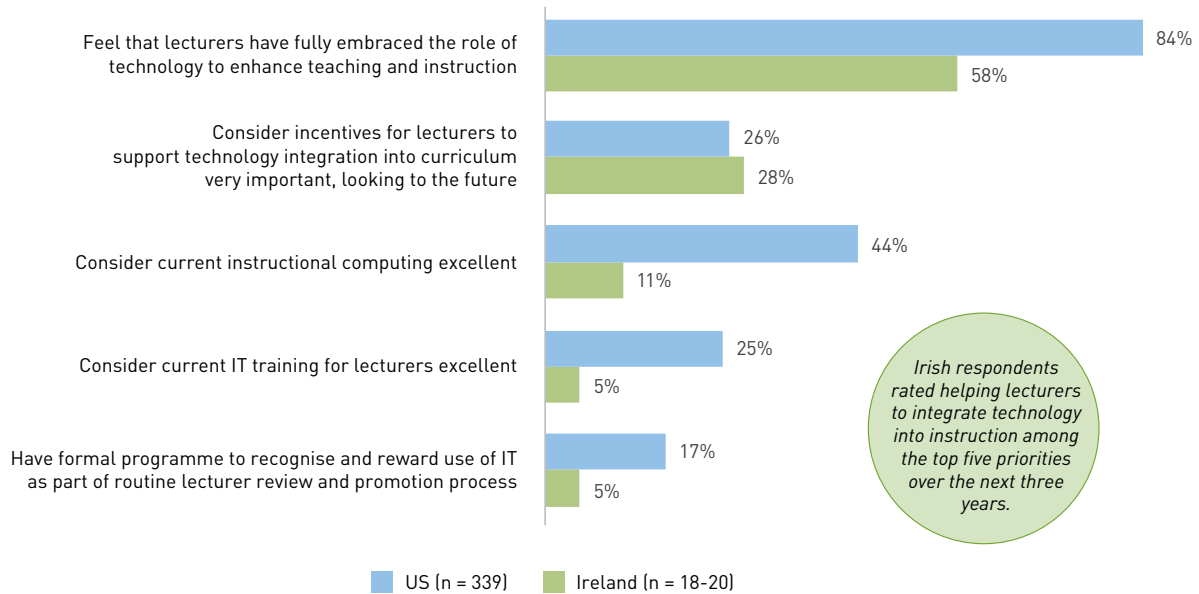


Figure 11 Responses from senior IT managers regarding helping teachers to integrate technology into instruction in the US and Ireland (Campus Computing Survey, 2016)

Projects funded by the National Forum designed to raise awareness and increase digital literacy and skills, such as the “All Aboard” and “Take 1 Step” initiatives, are demonstrating significant impact among both students and staff across the sector.⁶⁵

Many initial efforts to integrate technology into teaching and learning still risk being abandoned due to inadequate support, knowledge and time. At the same time, there is a clear need to help academics to engage with digital tools and technologies in academically relevant ways. (This phenomenon is not unique to Ireland: a 2016 report on eLearning from the Conference Board of Canada put forward the view that “A lack of institutional commitment to e-learning is reflected in e-learning design and execution. Institutions do not support faculty and – however well-intentioned – faculty tend to design poor e-learning courses. Faculty are subject matter experts, not e-learning designers!”)⁶⁶

The national digital skills framework developed by the All Aboard project has been integrated into the National Professional Development Framework for those who teach in higher education to support teachers to use technology to enhance their teaching.

⁶⁵ <http://allaboardhe.org/> ; <http://www.t1step.ie/>

⁶⁶ <http://www.conferenceboard.ca/reports/briefings/learning-digital-age/chapter-4.aspx>

Digital Literacy Among Students

There does not appear to be any comprehensive system for determining the digital literacy levels or needs of students as they enter higher education. Different institutions reported different ways of measuring student digital literacy, both formally and informally. As one institute of technology reported, a significant proportion of incoming first year students generally have some experience of training such as the ECDL,⁶⁷ but tutors report limited skill levels in year one. Key related findings were as follows:

- It was noted that mature students tend to encounter more challenges in the development of their digital literacy. However, while most new entrants from second-level education experience fewer problems with basic computer interactions, in some cases, their computer skills do not extend far beyond using a browser and engaging with social media. For example, one university described the situation where students anecdotally report high levels of familiarity with tools and platforms, but subsequently demonstrate poor levels of digital literacy when they are tasked with applying this knowledge and exploiting digital tools to engage with complex issues. On the other hand, some respondents indicated that such problems appear to be decreasing.
- When students at one university were asked to self-judge as part of the 2014 ECAR survey, 50% reported they would be more effective if they were better skilled at using technology. Findings from ISSE 2015 indicate that two thirds of respondents believed that their higher education experience had contributed to their knowledge, skills and personal development in the area of using computing and information technology (see Table 13).

Table 13 Percentage of students who reported their experience at their institution during the 2014–15 academic year having contributed to their knowledge, skills and personal development in the use of computing and information technology (ISSE, 2015)

	All Students	Undergraduate Year 1	Undergraduate Final Year	Postgraduate
Very Little	10.6	10.3	9.1	14.6
Some	24.5	24.6	24.0	25.1
Quite a Bit	32.8	33.9	32.8	29.8
Very Much	32.2	31.2	34.1	30.5

67 <http://www.ecdl.org/>

Building Staff and Student Digital Literacy through the Teaching and Learning Enhancement Fund

As part of the Teaching and Learning Enhancement Fund 2014-16, 32 collaborative projects have been funded to build digital capacity across the sector. (The full list of projects funded under the Enhancement Fund can be found in Appendix B.) A selection of these projects, listed here, focused specifically on building the digital literacy of staff and students. The impact of these projects has been reviewed on an ongoing basis by an international review panel and summaries of impact will be detailed in forthcoming in National Forum publications.

All Aboard All Aboard created a National Digital Skills Framework for Irish higher education that captures the range of knowledge, skills and attributes that are relevant for both staff and students.

TEL Tools This project developed teaching and learning resources that equip higher education teachers with the tools and knowledge required to utilise tools and resources for TEL in an effective and practical manner.

Enhancing Digital Literacies for Language Learning and Teaching This project developed an online open resource centre in the area of languages. It is of use as a significant student support mechanism, and also as an online learning tool for a number of different purposes.

Irish Engineering Graduates Advancing Global Manufacturing Competitiveness: Design Simulation for the Process Industries This project focused on the development of novel, shared, vertically-structured sets of tools, integrating theory, experiment and simulation, across different core modules of the undergraduate chemical engineering curriculum.

Transformation Through Collaboration – Building Digital Literacy in HEIs At the core of this project was the recruitment of staff as Digital Champions in each of the five partner institutes. Staff became champions for the improvement of digital literacy skills within their academic discipline, their department and ultimately across the regional cluster.

Digital Skills in Action This project focused on embedding digital skills into everyday teaching and learning practice. It enlisted members of academic communities in the creation of digital case studies and e-practicums, it supported innovation and it promoted continuous professional development in digital skills.

The Geoscience e-Laboratory (GeoLAB): Developing Digital Teaching and Learning Resources for the Virtual Microscope. The GeoLAB project was designed to deliver teaching and learning resources to improve the development of essential petrological skills at the four national higher education geoscience units across Ireland.

Technology Enhanced Learning: What Works and Why? This project aimed to build digital literacy and engagement for students and teachers by exploring the question: “What works and why?” The basic premise was there is no ‘one-size-fits-all’ approach to the effective use of new digital technologies for teaching and learning.

Take one Step – TEL Week in the Shannon Consortium Take 1 Step (#t1step) is a sector-wide initiative to stimulate staff and students to 'Take One Step' in engaging with digital literacy. The campaign built on the National Framework for Digital Skills, thereby embedding its skills framework and resources systematically across the SC, and contributing back to it through OER development and curation.

Technology Enhanced Assessment Methods (TEAM) in Science & Health Practical Settings

This project aimed to develop a framework for applying the principles of good assessment and feedback to practical assessment and facilitate dialogue among stakeholders about what it is we want students to learn in practical classes and how our assessment can facilitate this.

An ePortfolio Strategy to Enhance Student Learning, Assessment and Staff Professional Development

This project aimed to foster new ways to encourage academic staff to reap the benefits which ePortfolios can bring to academic programmes of the future by encouraging them to re-think their curricula in light of the possibilities offered by digital technologies.

Transforming Personal and Professional Digital Capacities in Teaching and Learning Contexts: A Collaboration between Social Policy Educators, Students, and Learning Technologists

This project is expanding social policy educators' digital capacities and improving their confidence in integrating digital skills into curricula. Educators will be transformed into 'Digital Champions', whose journeys will be documented throughout the process. This will provide a map for others who wish to follow in their footsteps.

The DSTEP Project - Developing Staff To Enhance Programmes

This project seeks to address the issues of student learning, quality assurance and enhancement on the psychology programme. Utilising a community of practice approach led by an intra-institutional curriculum design team, a collaborative network of interdisciplinary peers and advisors will empower the psychology unit to engage in meaningful continuous professional development (CPD).

Access to Digital Tools

Staff access

Key findings related to staff access are as follows:

- Across the sector, all full-time and a majority of part-time and casual academic staff are reported to have access to a computer and the requisite software to enable them to perform their assigned teaching duties.
- Generally, staff are issued with computers purchased under the HEAnet's agreed framework.
- Some institutions indicated that shared computers and hot-desking are a feature of academic life, especially for part-time and casual staff.
- Administrative staff all have computer access to perform their duties while other non-academic support staff tend to have either personal or shared access to equipment in order to perform work tasks, including email access, etc.
- Recognising that older equipment continues to be used across the sector, decisions around replacement can be discipline-dependent, with levels of demand/usage and software compatibility with underlying hardware among the determining factors.
- Staff have access to institutionally-licensed and discipline-specific software packages, which can number in the hundreds across individual institutions.
- The purchase and issue of laptops (as opposed to desktops) for academic staff varies from institution to institution, with some having a policy whereby staff choose which device they require. Others report a formal application and approval process for institutional laptop purchase and usage.
- Institutionally-supplied smartphones and tablet computers with data contracts tend to be the preserve of senior managers and those on special projects, especially in the institute of technology sector, and in these contexts are not primarily associated with teaching and learning. One university has a policy in place that allows staff members to use their own smartphone, laptop or tablet providing these devices are registered with IS services and comply with certain specifications. Another explicitly states that corporate data should not be stored on personal devices. Generally, however, such usage currently appears to be largely unmeasured and for the most part unregulated.
- The phenomenon of "Shadow IT" (defined by Gartner as "IT devices, software and services outside the ownership or control of IT organisations") was regularly acknowledged and identified in this review as a threat to institutional data.⁶⁸
- The extensive unofficial use of cloud storage services such as Dropbox was also explicitly and regularly mentioned.

68 For a discussion of Shadow IT see Andrew Froehlich "Shadow IT: It's much worse than you think" *Information Week*, 6 August 2015, <http://www.informationweek.com/cloud/shadow-it-its-much-worse-than-you-think/a/d-id/1321637>

Student devices

Key findings related to student access are as follows:

- Students' personally-owned devices also constitute a large but unmeasured and unmonitored quantity at most institutions: in a significant number of profiles, the sections dealing with student devices were either left blank or it was stated explicitly that no data beyond anecdotal evidence was available.
- While the use of software including the institutional VLE and Microsoft Office 365 (now licensed for free student downloads at every institution deploying it) can be measured and monitored, the use of freely available software is widespread. One institution noted that students are advised by academic staff to obtain various freeware products relevant to their academic discipline in order to support/enhance their coursework.
- Where it has been measured, data around student desktop computer ownership is surprisingly varied, reported at just 30% in one university and at over 90% in one institute of technology. However, when the question is extended to include laptops, the answers are more consistently close to 100%.
- One university indicated that their students in general expect IT facilities to be supplied by their institution, and even though half of students possess their own laptop, less than 20% bring these to college, citing weight, the possibility of it being lost or stolen, or insufficient power outlets on campus as main reasons. Others estimated that anywhere from 15–60% of students regularly bring their own laptop to college. This practice is expected to increase, as evidenced by the growing volume of hot desk utilisation in library and IT centres reported by some institutions.
- Some institutions indicated that they provide laptop and tablet loan schemes for student use, and at least one institution indicated that while some courses report that 100% of students have their own laptops other courses have less of a requirement for digital content such that the issue of devices is not raised as much.
- A small number of institutions indicated that students are actively encouraged to provide both their own hardware and software.
- Smartphone ownership among students is generally estimated at over 90%, on a par or higher than laptop ownership, while surveyed tablet ownership tends to be in the region of 40–50%.

One study of VLE usage in Irish higher education suggests that:

the growth of social media tools has taken inter-student engagement away from the management space of the VLE and into spaces like Facebook or Twitter. Anecdotally, many students prefer to put their interactions, even on course discussions, in these spaces as they are often more immediate and ubiquitous, and they are not monitored or moderated by the higher education teachers. They are more an extension of student corridor or cafeteria conversations than of formal in-class discussions that map to online discussions within the VLE. However, there is also growing evidence that, at least for the present, the 'Facebook' generation wants to keep formal learning space separate from activities in web 2.0.⁶⁹

69 Riquez et al. (2013) "An investigation of students' experiences of using virtual Learning environments: implications for academic professional development", in C. O'Farrell and A. Farrell (eds) *Emerging Issues in Higher Education 3, From Capacity Building to Sustainability*, Athlone: Edin.

Comments to Conclude Section 4

There are varying approaches and views relating to the ways in which staff and students engage with and develop competence in the use of technology. While increasing levels of engagement can be observed across the sector, individuals and institutions still struggle with aspects of existing and emerging technology. This emphasises the need for agility when it comes to the changing digital landscape. Further, the differing higher education contexts encompass varying patterns of local engagement, suggesting, again, that leadership on the ground continues to be as important as ever in the realm of digital strategy. Key National Forum Teaching and Learning Enhancement Fund projects (see page 36-37) have demonstrated substantial progress in engagement and competence development both within and across academic disciplines.

In addition, we should be cautious about drawing firm conclusions about actual levels of competency given the absence of a recognised standard of digital literacy and the widely-recognised tendency to over-rate personal digital skills that has been noted among the general population in several European studies.⁷⁰ Indeed, an objective measure of digital skills may be warranted.

70 See "Digital Skills at the Heart of Education," Chapter 11 of *The e-Skills Manifesto*, European Commission (December 2016) at <http://eskills4jobs.ec.europa.eu/manifesto>

Section 5: Perceptions of Key Aspects of the Infrastructure

Top Institutional Priorities in Ireland and the US

During discussions with CIOs and IT managers as part of this infrastructure review process, the desirability of a clear international benchmark for the sector became evident. Consequently, the National Forum licenced the US-based Campus Computing Project annual survey for use in Irish higher education to provide such a benchmark. The survey consisted of over 50 questions relating to IT usage within academic institutions. It was completed by CIOs/IT managers at 22 Irish institutions in the period August-September 2016 and maps to the US version of the survey conducted in September-October 2016 (see www.campuscomputing.net). Some differences in perceived institutional priorities between the US and Ireland were evident in the results. Respondents were asked to rank institutional IT priorities for the coming three years on a scale of 1-7: the top three issues (i.e. those given most 6s or 7s) are illustrated in Table 14. In Ireland, upgrading/enhancing network and data security was identified as the top priority; this contrasts with US data which ranked hiring and maintaining suitably qualified staff as the highest priority.

Table 14 A comparison of Irish and US sectoral IT priorities for the next three years (US: n = 339; Ireland: n = 20)

Rank	Irish Higher Education Priorities	US Higher Education Priorities
1	Upgrading/enhancing network and data security (90%)	Hiring and retraining qualified IT staff (82%)
2	Providing adequate user support (85%)	Helping lecturers to integrate technology into instruction (81%)
3	IT business continuity/disaster planning and recovery (75%)	Upgrading/enhancing network and data security (81%)

Perceptions of Irish IT Managers Regarding Infrastructure and Related Investment

When asked to rate various aspects of the technological infrastructure in their institutions, Irish senior IT managers ranked computer networks/data communications and user support services highest (see Figure 12). User support services was the only aspect of the technological infrastructure for which Irish respondents gave a greater proportion of high ratings than their US counterparts.

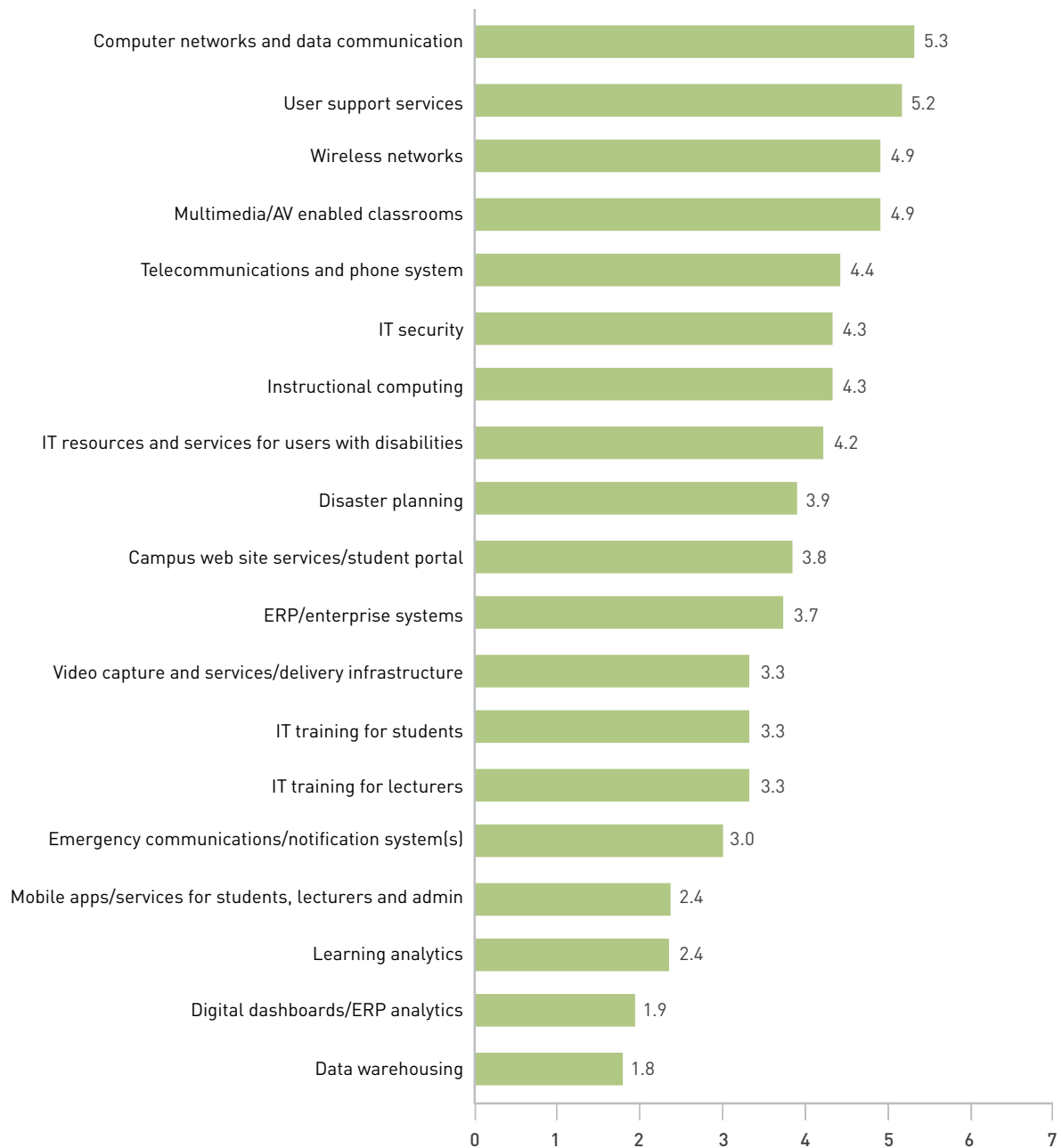


Figure 12 Average rating of elements of Irish institutions' technology infrastructure (n = 19; seven-point scale; 1 = poor, 7 = excellent)

The perceptions of Irish senior IT managers regarding the effectiveness of investment in various technology resources and services at their institutions are illustrated in Figure 13. On-campus teaching and learning and library resources and services received the highest average rating. For all aspects of investment, the Irish respondents gave lower proportions of high ratings than their US counterparts.



Figure 13 Average rating of effectiveness of investment in technology resources and services at Irish institutions (n = 19; seven-point scale; 1 = not effective, 7 = very effective)

Insights from Institutional Profiles Regarding Future Developments

Many institutional representatives share similar concerns regarding funding available to support ICT provision, observing that they are struggling to maintain existing provision in response to growing demand and highlighting the increased use of digital technologies in teaching and learning. Some institutes of technology considered their existing ICT service provision to be at risk, were concerned about their current levels of network connectivity and indicated that provision of end user computer equipment needs to be upgraded.

At a national level, while acknowledging that collaborative approaches currently do exist across the sector, a number of institutions suggested that the scale and pace of digital development could be significantly increased through more collaboration and that collective negotiation could include strengthened approaches to common purchasing of software and cloud services such as VLE, video hosting and plagiarism systems.

There is a perceived need for systems integration and single sign-on, in order to avoid inefficiencies associated with multiple usernames and passwords for staff and students across numerous systems. Many representatives highlighted the need for a single, transferable student ID system recognising that transferability of credits and qualifications across institutions is still not a reality in Ireland, despite growing demand for, and focus on, part-time and flexible modes of education to facilitate lifelong learning.

Strategies, policies and infrastructure to facilitate staff and students to safely and conveniently use their personal devices in a flexible manner were seen as crucial for optimising the potential of digital technology in teaching and learning. Developments that would be welcome include laptop rental and loan schemes, a recognised BYOD (“bring-your-own-device”) strategy, better Wifi and improved provision of open access areas for both students and staff, the possibility of using virtual desktops to give students remote access to relevant software and more usage of “thin client” simple devices,⁷¹ and increased use of cloud-based services.

One issue identified by many institutional representatives was student access to institution-licensed software on personal devices, usually packages associated with their specific discipline or course of study (e.g. design, statistics, etc.). Such licencing agreements would allow students to work with the software in their own time and space, rather than limiting them to the use of computers in campus-based computer labs where access can often be restricted and constrained by opening hours.

The ability of the sector to retain experienced IT staff in the face of the significant demand from private-sector organisations, while not considered the top priority it was rated as in the US, was highlighted as a major concern. This in turn is seen to have affected the ability of the higher education sector to develop the IT infrastructure required to support evolving teaching and learning models.

71 For an explanation of “thin client”, see here: <https://www.britannica.com/technology/thin-client>

International Responses to the Infrastructure Review

Commentators from Northern Ireland, Scotland and Canada with knowledge of the field agreed to read an early draft of this report and were invited to comment on the emerging findings and insights. Each commentator was selected on the basis of their knowledge of the digital profile of their country's higher education sector at both local and national levels, and each confirmed that the findings of this review were reflected in their own national contexts:

The situation in Ireland bears comparison with [my country]. The issues within universities are likewise wholly familiar. Anyone from [my country] looking at this report would feel comfortable with the content – no obvious major omissions – and the issues and questions raised about digital technologies and their impact on the educational experience students have, and the ways in which students progress through a university (admissions to alumni) is managed. There is much still to do in Ireland just as there is in [my country].

All the issues and trends you describe [in section 1] are highly consistent with my own experience and I believe would resonate with most [of my country's] universities.

Again, it would be impossible to make a direct comparison to [my country] because of provincial jurisdiction (and variation) but this section [section 2] all had a ring of familiarity with respect to my personal knowledge of the system.

Issues surrounding VLE usage as repositories for content and the issues in relation to recognition for online teaching time were also noted as familiar. Similarly, the need for coherent strategies was recognised as a feature not particular to the Irish setting:

[In my country's HE system] there is a culture of digital everything without any rich understanding of what this means – or indeed how this will improve things for students, staff and partners. Resources are declining, universities are increasingly being viewed as business and innovation centres.

The challenge of 'shadow IT' and ambiguity over IT leadership and roles also resonated for one commentator who emphasised the necessity of looking at the context of the bigger picture:

Although the review is about infrastructure supporting teaching and learning, this cannot be viewed in isolation from research and innovation, professional services, globalisation and more civic responsibilities of a university.

Commenting on the issue of IT expenditure, one international commentator estimated that overall expenditure on IT in UK universities runs between 4% and 10% of turnover, but also observed that increased expenditure on IT does not necessarily lead to better output: gaps in a strategic approach and a need for clearer prioritisation have meant that budgets may be spent in the wrong areas. Moreover, "ubiquitous computing and digital needs to take into account significant governance and security issues especially in an academic environment"; and "Lack of a corporate approach to IT in universities creates significant security issues." The need for flexibility was noted as a key driver in the HE sector.

The Scottish Funding Council's current work on a 10-year capital expenditure strategy (including IT), was suggested as a possible future benchmark and model of good practice. A growing interest in moving to cloud provision, from user applications to corporate MIS, was also recognised as prevalent there. Additionally, it was noted that:

In Scotland, there is a clear move away from IT equipment in general being treated as capital expenditure, and a desire for it to be funded more flexibly as revenue expenditure. One university has even gone so far as outsourcing (in effect) its network hardware; this now being supplied on a lease-type basis by a third party, and therefore not even owned by the university. It plans to extend this to other IT equipment too.

The international commentators generally concurred with the key findings and insights in the report, highlighting the importance of keeping up to date with the rapidly changing and fast moving developments internationally, while also signalling the ways in which new developments are giving rise to key shifts in infrastructural requirements for institutions and for whole sectors.

Key Insights, Developments and Recommendations Arising from the Review of Infrastructure

The review has provided an overall picture of the technical infrastructure of Irish higher education, by presenting evidence and data, and by outlining the implications with a view to enhancing our teaching and learning practices across the entire sector. As a result of engagement in this review, each participating institution now has a full profile which details relevant data regarding their institutional infrastructure. Arguably, the generation of individual institutional profiles and the establishment of collaborative dialogue on the basis of these profiles has been one of the most valuable aspects of the work that has informed this review. Many institutions are beginning processes of developing strong evidence-based digital strategies and so it has been timely to generate infrastructure-related data to inform such strategic developments.

The process of engaging with institutions in order to conduct this review has generated value in itself. It has, for example, strengthened collaborative networks, brought key leaders together to share information and given rise to an understanding of national approaches, and perspectives on capacity and capability. Crucially, it has also given rise to the recognition that all our institutions tend to share similar challenges and opportunities when it comes to maximising the benefits that digital technology can bring to higher education environments and to the enhancement of teaching and learning.

Key Insights and Recommendations Arising from the Review

Many of the findings of this review reflect the opportunities and challenges experienced by higher education sectors across the globe and, compared to many other countries, Ireland shows itself to be advanced in terms of engagement with and use of digital technology. Based on this review, the following insights and recommendations have been identified.

1. Funding schedules at a national and institutional level do not enable a strategic approach to planning.	
Recommendation: Extend budget planning to a time frame of at least three years to enable longer term strategic planning and development within institutions for IT infrastructure in ways that align with institutional strategies.	HEA, DES (consideration as part of revised funding allocation model)
2. Strategies for developing digital infrastructure have tended to be more emergent than deliberate.	
Recommendation: Develop more explicit and focused digital strategies at institutional level. (Notably, some institutions are in the process of developing more robust, strategic IT plans and this needs to be further supported and accelerated. A collaborative approach to strategy development across institutions should also be considered.)	HEIs, THEA, IUA, QQI

<p>3. There is an absence of comprehensive data relating to students’ choice of technology, their digital skills levels, access to Wifi and to the number of online, blended and distance learning students in the system.</p>	
<p>Recommendation: Establish more clearly-defined modes or categories of technology enhanced learning.</p>	<p>QQI, NF, HEA</p>
<p>Recommendation: Renew existing sectoral data collection templates and approaches to clearly reflect the number of online/blended learners (see previous recommendations) in the system.</p>	<p>HEA</p>
<p>Recommendation: Incorporate digital skills profiles of students entering higher education as part of induction.</p>	<p>HEA, HEIs, IUA, THEA</p>
<p>4. The use of multiple student ID formats across the sector does not facilitate lifelong learning.</p>	
<p>Recommendation: A single transferable student ID system should be identified, developed and used.</p>	<p>THEA, IUA, HEA, HEAnet, Educampus</p>
<p>5. There is a strong move to cloud-based solutions and these are widespread in teaching and learning practices.</p>	
<p>Recommendation: The impact of cloud-based solutions on teaching and learning needs to be considered strategically in line with best practices internationally.</p>	<p>IUA, THEA, HEAnet, EduCampus, HEI CIOs and IT managers</p>
<p>6. Upgrading/enhancing network and data security was identified as the top priority by CIOs and IT managers in Ireland.</p>	
<p>Recommendation: Plans need to be put in place regarding how best to upgrade/enhance network and data security across the sector.</p>	<p>HEAnet, HEIs</p>

<p>7. While there is a balance to be struck between respecting institutional autonomy and advocacy for increasing shared service, the full scope for shared service provision remains underutilised. The scale and pace of digital development could be increased through more inter- and intra-institutional collaboration and collective negotiation for common purchasing of software and cloud services.</p>	
<p>Recommendation: Develop new structures and shared fora that promote and enhance strong inter- and intra-institutional and stakeholder collaboration.</p>	<p>IUA, THEA, HEIs, HEAnet, EduCampus, QQI, HEA</p>
<p>Recommendation: Within such collaborative fora aim for a wide representation of stakeholders to ensure that current decision making processes are appropriately consultative and that decision-makers understand how shared service is and can being maximised across the sector.</p>	<p>Stakeholders including technical, teaching & learning, HEI representative organisations, HEA and DES</p>
<p>Recommendation: Develop an easy, low maintenance Wifi service that could be readily scaled in response to demand across the sector.</p>	<p>HEAnet</p>
<p>8. Overall, the policy terrain supporting digital infrastructure development is fragmented and exists within ever-evolving contexts.</p>	
<p>Recommendation: Address key policy implications at a national level while ensuring that policy is strategic and agile to recognise the dynamic nature of the digital environment.</p>	<p>DES, HEA</p>
<p>Recommendation: HEIs should engage with the development of enabling policies at an institutional level while also ensuring high levels of protection and security for the institution, staff and students (particularly given the increase in BYOD).</p>	<p>HEIs, QQI, NF</p>

9. There are tensions within institutions in relation to use of freeware (these tensions relate to concerns with consistency and standardisation on one hand versus support for innovation on the other).	
Recommendation: Awareness should be raised regarding the use of freeware and enabling policies related to this developed within institutions.	HEIs, HEI CIOs and IT managers, teaching and learning centres
Recommendation: HEIs should consider and make explicit decisions around the extent to which they will enable/manage and/or constrain innovation on such platforms	
Recommendation: Develop better approaches to sharing information on the developing range of digital tools available across the sector.	
10. The current IReL model needs to be expanded to benefit all students in the higher education sector.	
Recommendation: Address the impact of IReL on the quality of the student experience in the institute of technology sector.	DES, HEA, THEA, IUA
Recommendation: Provide a shared service to IoTs in commissioning digital content, as funding allows.	IReL, in partnership with the sector
11. While there has been much development in skills and capacity in the use of digital technology, many students and staff still find technology difficult to use and are not aware of its full potential in supporting and enhancing teaching and learning.	
Recommendation: A continued focus on the development of digital confidence and competence for teaching and learning including further enhancement funding.	DES, HEA, NF, HEIs
Recommendation: An objective measure of digital skills is needed in line with European Commission recommendations. ⁷²	
Recommendation: Programme design should incorporate opportunities for students to develop their digital skills while they complete their studies.	HEIs
Recommendation: Explicit reference should be made to digital literacy in institutional graduate attributes.	

72 See "Digital Skills at the heart of education," Chapter 11 of The e-Skills Manifesto, European Commission (December 2016) at <http://eskills4jobs.ec.europa.eu/manifesto>

Concluding Note: Digital Infrastructure and the Teaching and Learning Enhancement Agenda

The capacity of digital technology to enhance, transform and develop our collective approaches to teaching and learning remains full of exciting potential. It is clear from this review that the Irish higher education sector has embraced and engaged with this potential in all sorts of ways. Despite constrained resources and the resultant underinvestment in higher education technological infrastructure in recent years, the appetite for innovation remains high, and, at a national level, opportunities to innovate and enhance using digital technology have been responded to, often quite collaboratively, setting the scene for further and more widespread developments in this space. At a national level alone, innovations from across the sector have enabled a very strong set of developments which have added capacity to innovate around such areas as e-assessment, flexible access, TEL tools usage, digital skills and literacy, MOOCs, design simulation and virtual learning tools. In particular, the development of digital capacity within disciplines is now leading to transformative teaching approaches and curriculum change in many institutions across the sector (see samples of Teaching and Learning Enhancement projects in Appendix B and case studies of good practice outlined in Appendix C). Cost effective approaches to open access are currently being explored and again at a national level, shared digital spaces are now being used for enhancement purposes in a range of important T&L related domains.

More generally, key developments in technology include a move to cloud computing, mobile technology, social media and networking, and the increasingly diverse ways in which teachers and learners can now produce and access content and information.

Already, across the sector we have seen strong responses and initiatives including the development of micro credentials, new approaches to assessment of, for and as learning, the development of capacity and skills for video capture and management, sharing and developing our approach to the effective use of learning analytics and much more.

Clearly, much more needs to be done. In keeping with the recommendations of the digital roadmap of 2014, this report provides another sectoral snapshot that should act as a useful point of reference for institutional leaders and others throughout the sector. It highlights some important basic features and recommendations to help us set our sights on enabling technology to make a greater contribution to maximising the learning potential of all our students.



Appendix A

Participating Institutions

Athlone Institute of Technology (AIT)

Cork Institute of Technology (CIT)

Dublin City University (incl. Mater Dei Institute of Education and St. Patrick's College, Drumcondra) (DCU)

Dublin Institute of Technology (DIT)

Dundalk Institute of Technology (DkIT)

Dún Laoghaire Institute of Art, Design & Technology (IADT)

Galway-Mayo Institute of Technology (GMIT)

Institute of Technology, Blanchardstown (ITB)

Institute of Technology, Carlow (ITC)

Institute of Technology, Sligo (ITS)

Institute of Technology, Tallaght (IT Tallaght)

Institute of Technology, Tralee (IT Tralee)

Letterkenny Institute of Technology (LyIT)

Limerick Institute of Technology (LIT)

Mary Immaculate College, Limerick (MIC)

Maynooth University (MU)

National College of Art and Design (NCAD)

National University of Ireland Galway (NUIG)

Royal College of Surgeons in Ireland (RCSI)

St Angela's College, Sligo

University College Cork (UCC)

University College Dublin (UCD)

University of Dublin, Trinity College (TCD)

University of Limerick (UL)

Waterford Institute of Technology (WIT)

Appendix B

Teaching and Learning Enhancement Fund Projects

Project	Description	Lead HEI	Collaborators
2014 Projects⁷³			
ePrePP	ePrePP is a collaborative initiative to enhance student learning in practical/clinical placements to ease the transition from student to professional. The project is led by a group consisting of medicine, nursing, pharmacy and pedagogy and has applications for not only health disciplines but also for the wider student body.	UCC	UL, IT Tralee, UCD, TCD, NUIG
Y1Feedback	The Supporting Transition: Enhancing Feedback in First Year Using Digital Technologies (Y1Feedback) aims to enhance the quality of the learning experience for all students at third level, be they full-time, part-time or flexible learners. The project specifically seeks to address challenges associated with feedback in the first year of higher education and to leverage the potential of digital technologies to support and enhance feedback approaches.	MU	DCU, DKIT, AIT
TEEME	This project aims to leverage the potential of NUMBAS (online assessment tool – University of Newcastle) to construct localised formative e-assessment for first year mathematics and statistics courses at UCC and CIT. The project focuses on the implementation and evaluation of this mathematics e-assessment tool.	UCC	CIT
TEL Tools	This project focuses on developing teaching and learning resources that equip instructors with the tools and knowledge required to utilise tools and resources for TEL in an effective and practical manner. Resources focus on assisting instructors in identifying different teaching approaches and the technologies that can support and enhance those approaches.	CIT	UCC, IT Tralee, UCD, DIT

⁷³ A National Forum Insight is available for each of the 2014 projects, providing more detail and updates, at <http://www.teachingandlearning.ie/forum-resources/national-forum-insights/>

Project	Description	Lead HEI	Collaborators
2014 Projects			
Transitions MOOC	This MOOC has been designed to address the needs of students making the transition from 2 nd level to higher education. The MOOC combines online content with optional teacher-led classroom activities, online forums and quizzes. Digital Badges are awarded to participants.	ITS	UL, GMIT, LIT, MIC, NUIG, LyIT
Student Success Toolbox	The aim of the Student Success Toolbox is to support transitions from thinking about study to the first weeks in order to increase retention and completion rates, particularly for flexible learners. The project provides flexible learners with a suite of digital tools that will help them to assess their own readiness, provide feedback and lay the foundation for successful programme completion.	DCU	MU, DkIT, ITS
All Aboard	All Aboard centres around a National Digital Skills Framework for Irish Higher Education that captures the range of knowledge, skills and attributes that are relevant for the wide diversity of roles and experiences encountered as we work or study. The project is producing (and release under a flexible CC licence) a set of training materials and resources some of which will be for individual self-study and others aimed at providing tools for learning technologists, staff developers and trainer to run their own workshops. In addition, the project is exploring the use of 'digital badges' as a practical means of capturing and recognising learning and competences in this domain and is facilitating a number of pilot badge implementations.	NUIG	UL, MIC, UCD
Inter-professional Education	Inter-professional education (IPE) takes place when at least two professions learn with, from and about one another to enhance collaborative practice. This project aims to implement and evaluate the impact of an online IPE programme designed to promote collaborative practice within undergraduate health care disciplines.	NUIG	UCD

Project	Description	Lead HEI	Collaborators
2014 Projects			
AfL 1st Year Mathematics	This project concerns the development of formative assessment techniques to improve the teaching and learning experiences in first year undergraduate mathematics modules. It involves the development of formative assessment tools for use in the classroom and the development of interactive tasks which can be used by students to monitor their own progress and support this progress with the identification of relevant existing e-learning material and the provision of new online resources.	MU	AIT, DkIT, DCU
Live and Learn in Ireland	This project focused on a survey of international students in five HEIs and the production of open source digital objects to assist the transition into Ireland for students, based on the results of the survey. Digital objects have been developed to assist higher education staff who are working with International students.	IT Tralee	WIT, ITC, CIT, UCC
2015 Projects⁷⁴			
Enhancing Digital Literacies for Language Learning and Teaching	Against the backdrop of a need for more flexible support for language learners during various transition periods, this project aims to develop a digital interactive resource centre for languages. It will be of use as a significant student support mechanism, and also as an online learning tool for a number of different purposes.	UL	DCU, DIT, LIT, MIC, NUIG
Rex – Research Expertise Exchange	This project brings together three institutions involved in all levels of ITE to build a digital bridge between academic and professional practice through the creation of a web-based portal, the Research Expertise Exchange (REX), to nurture the digital skills for research and meet a real-world demand for expertise.	MIC	UL, NUIG

74 A National Forum Insight is available for of the 2015 projects, providing more detail and updates, at <http://www.teachingandlearning.ie/forum-resources/national-forum-insights/>

Project	Description	Lead HEI	Collaborators
2015 Projects			
Irish Engineering Graduates Advancing Global Manufacturing Competitiveness: Design Simulation for the Process Industries	For Chemical Engineering, one of the cornerstones of the curriculum is the 'Design Project', which encompasses ab initio process development, design, scale-up and optimisation. This project is focused on the development of novel, shared, vertically-structured sets of tools, integrating theory, experiment and simulation, across different core modules of the undergraduate chemical engineering curriculum, culminating in deployment within the capstone design project.	UCD	CIT, DCU, DIT, UCC, UL
Transformation Through Collaboration – Building Digital Literacy in HEIs	At the core of this project is the recruitment of staff as Digital Champions in each of the partner institutes. These staff have become champions for the improvement of digital literacy skills within their academic discipline, their department and ultimately across the Southern Cluster.	UCC	CIT, WIT, ITC, IT Tralee
Digital Skills in Action	This digital initiative focused on embedding digital skills into everyday teaching and learning practice. It enlists members of academic communities in the creation of digital case studies and e-practicums; it supports innovation; and it promotes continuous professional development in digital skills.	IADT	MIE, NCAD, TCD, UCD
Recognition of Prior Learning (RPL) ePortfolio Roadshow	This project launched the My Experience RPL (Recognised Prior Learning) Assessment Toolkit. The toolkit includes an information website and an online RPL application tool for candidates looking for access or advanced entry to a higher education programme. In addition, a free open online course has been developed for higher education staff seeking professional development in RPL assessment skills and in supporting RPL applicants effectively.	GMIT	ITS, LyIT
The Geoscience e-Laboratory (GeoLAB): Developing Digital Teaching and Learning Resources for the Virtual Microscope.	The GeoLAB project is designed to deliver teaching and learning resources to improve the development of essential petrological skills at the four national higher education geoscience units in Ireland. The project will see the collaborative development of a suite of shared teaching and learning resources agreed by all partners, with the ability of each partner to utilise the resources in their own teaching programmes.	UCC	TCD, NUIG, UCD, Open University

Project	Description	Lead HEI	Collaborators
2015 Projects			
Technology Enhanced Learning: What Works and Why?	This project aims to build digital literacy and engagement for students and teachers by exploring the question: "What works and why?" The basic premise is there is no 'one-size-fits-all' approach to the effective use of new digital technologies for teaching and learning. This initiative includes the launch of a Mentoring Circles initiative to build stronger communities of practice across our cluster and within disciplines.	DCU	AIT, DkIT
Take one Step – TEL Week in the Shannon Consortium	Take 1 Step (#t1step) is a sector-wide initiative to stimulate staff and students to 'Take One Step' in engaging with digital literacy. The campaign built upon the National Framework for Digital Skills, thereby embedding the skills framework and resources systematically across the Southern Cluster, and contributing back to it through OER development and curation.	UL	MIC, LIT
Street Law	'Street law' involves teaching practical law to grassroots audiences using interactive teaching methodologies. The collaborating HEIs partner with secondary schools to introduce the law to pupils in an accessible, engaging and interactive way to positively impact second level students and their communities while HE students develop professional and transferable skills.	LyIT	TCD, NUIG
Technology Enhanced Assessment Methods (TEAM) in Science & Health Practical Settings	This project aims to develop a framework for applying the principles of good assessment and feedback to practical assessment and to facilitate dialogue among stakeholders about what it is we want students to learn in practical classes and how our assessment can facilitate this.	DkIT	ITS, ITC, AIT
An ePortfolio Strategy to Enhance Student Learning, Assessment and Staff Professional Development	This project seeks to foster new ways to encourage academic staff to reap the benefits which ePortfolios can bring to academic programmes of the future by encouraging them to re-think their curricula in light of the possibilities offered by digital technologies.	DIT	ITB, IT Tallaght, Hibernia College

Project	Description	Lead HEI	Collaborators
2016 Projects⁷⁵			
Developing a Professional Development Framework to Promote, Acknowledge and Evidence Teaching and Learning Professional Development Activities for Staff at a Disciplinary Level (Engineering) within an Institute of Technology.	This project aims to develop a professional development framework for those who engage in teaching and learning activities in the discipline of engineering. The project will begin by identifying core and discipline-specific competencies required to deliver excellent teaching in engineering for all staff who engage with teaching and learning activities. The project will identify and map formal and informal teaching and learning professional development opportunities and activities offered through the institutes in line with the new national framework typology. It will also identify any gaps in professional development within the institutions and create learning and training opportunities to meet them.	DIT	ITB, IT Tallaght
Aligning MU Accredited T&L Programmes with the National PD Framework	This project will support the review and re-design of MU existing accredited provision in teaching and learning: the Professional Certificate in Teaching and Learning for Tutors and Demonstrators (CTL1), and the Postgraduate Diploma in Higher Education (PGDHE) – to align with the National Forum's National Professional Development Framework. The re-designed curricula will place emphasis on supporting participants to develop a professional teaching and learning portfolios that may be used to evidence progress in relation to the framework's five domains.	MU	

⁷⁵ More information on the 2016 projects is available at <http://www.teachingandlearning.ie/digital-enhancement-funding/2016-tl-fund-proposals/>

Project	Description	Lead HEI	Collaborators
2016 Projects			
Transforming Personal and Professional Digital Capacities in Teaching and Learning Contexts: A Collaboration between Social Policy Educators, Students, and Learning Technologists	This project aims to expand social policy educators' digital capacities and improve their confidence in integrating digital skills into curricula. Educators will be transformed into 'Digital Champions', whose journeys will be documented throughout the process. This will provide a map for others who wish to follow in their footsteps.	UCC	IT Tralee, UCD, TCD, WIT, ITC, CIT
Alignment and Development of an Online Programme for Graduate Teaching Assistants	There is a growing demand from schools and from TAs themselves to support their development on a larger and more sustainable scale. This project will align the existing institutional initiatives from the named institutions to the professional development framework. It will broaden the scope of current offerings to address any gaps. A 5 ECTS online programme will be created that aligns to the framework domains, and includes research-informed multimedia content and a workshop package indicating formative assessment, peer interaction activities and links to websites and resources.	TCD	NUIG, Marino Institute of Education, IADT
ATLAS (Aligning Teaching and Learning Across the Technological Sector)	This project seeks to (i) map existing provision against the PD framework, (ii) interpret existing provision using the PD framework domains, (iii) identify opportunities to align provision to the Digital Capacity Framework (for example, through Digital Badging) and (iv) explore the development of a framework/tool to support colleagues in using the framework to guide and inform ongoing professional development.	AIT	DkIT, ITC, LyIT, WIT
The DSTEP Project - Developing Staff to Enhance Programmes	This project seeks to address the issues of student learning, quality assurance and enhancement on the psychology programme. Utilising a community of practice approach led by an intra-institutional curriculum design team, a collaborative network of interdisciplinary peers and advisors will empower the psychology unit to engage in meaningful continuous professional development.	DCU	

Project	Description	Lead HEI	Collaborators
2016 Projects			
Professional Development Capacity Building in the Shannon Consortium - Enhancing Teaching and Learning through a Regional Accredited Programme	Drawing on the identified domains and values espoused by the new National Professional Development Framework, the Shannon Consortium will align and enhance a recently developed Graduate Diploma/MA in Teaching, Learning and Scholarship in Higher Education UL programme to the needs of the three partner institutions. This will make the programme future-ready providing valuable CPD opportunities for teachers in Higher Education in the Shannon Consortium (SC) and developing participants to meet the increasing challenges in HE.	UL	MIC
Collaborative Knowledge Exchange for Learning Impact	Senior management staff play a crucial role in higher education. This project will develop a flexible, 'light touch' (but high impact) initiative, built around establishing a network of enquiry/experience, informed by high level guest speakers and podcasts, a small number of meetings, and the provision of practical tools, the agenda shaped by consultation and collegiality.	NUIG	DCU, UL, MIC
L2L: Librarians Learning to Support Learners Learning	The generic term for what librarians teach is Information Literacy (IL). IL is recognised as a critical life skill allied to digital literacy enabling learners to find, use and manage information as teachers, librarians offer interventions embedded in discipline modules, co-teach with academics, solo teach to prescribed learning outcomes and offer e-learning programmes via VLEs. This project will involve primary and secondary research to inform existing policy and also create key recommendations to enhance the current PD practice of librarians in HE.	DKIT	ITC, DIT
Teaching and Learning Champions (TLC): A Professional Development Leadership Programme for Managers in Irish Higher Education	This project seeks to build a cohort of teaching and learning champions within the West /North West Higher Education Cluster. The project will encourage and facilitate an evidence-based engagement with the learning and teaching issues and ideas articulated in the National Professional Development Framework and the Roadmap for Enhancement in a Digital World.	LyIT	NUIG, GMIT, ITS

Pre-Specified Nationally Co-ordinated Projects

A small number of pre-specified nationally co-ordinated projects, identified through a consultation, research and scoping process, focus on key actions for the collective enhancement of the sector. The infrastructure review contained in this report was the result of one of such pre-specified nationally co-ordinated projects. The other projects are listed below.

Pre-Specified Nationally Co-ordinated Projects ⁷⁶	
<p>Learning Analytics and Educational Data Mining for Learning Impact</p>	<p>The overall aims of the Learning Analytics and Educational Data Mining for Learning Impact project were:</p> <ul style="list-style-type: none"> • To raise awareness of emerging national and international policy and practice relating LA/EDM in all sectors of higher education in Ireland, among the student body, library/learning support staff, ICT/services staff and academic staff at all levels engaged in developing and teaching programmes and in senior/academic leadership roles. • To establish a sustainable network of LA/EDM practitioners/collaborators in Irish HE with a view to proactive information sharing and development and dissemination of relevant case studies. • To provide informative briefings that can support the translation of LA/EDM research findings (national & international) into meaningful practice at scale within programmes/departments in different academic disciplines. • To develop a set of online resources (including links to already existing resources) relating to LA/EDM policy, practice and implementation at scale. • To foster intra- and inter-institutional collaboration in the development and implementation of LA/EDM initiatives, with particular reference in the first instance to implementation that target first year student retention.
<p>Enabling Policies for Digital Teaching and Learning</p>	<p>“Enabling policies” is a term used to encompass those policy topics which are contemporary and emergent in respect of digital teaching and learning. They are characterised by having wider pedagogical, institutional, legal, ethical and regulatory implications for the use of digital technology where a sectoral approach would support the governance responsibilities of individual institutions.</p> <p>The following work packages were identified as being central to the project aim of progressing development of a suite of enabling policies in Irish HE:</p> <ul style="list-style-type: none"> • Work package 1 will serve as an initiating piece in taking an overview of the sectoral policy infrastructure. • Work package 2 will lead to the development of in-depth policy frameworks for each of the five policy topics identified by the scoping group.

⁷⁶ More information is available on each of these projects at <http://www.teachingandlearning.ie/priority-themes/mapping-digital-capacity/pre-specified-nationally-coordinated-projects/>

Pre-Specified Nationally Co-ordinated Projects	
<p>An Interim Review of the Recommendations and Priorities Outlined in Teaching and Learning in Irish Higher Education: A Roadmap for Enhancement in a Digital World 2015 - 2017</p>	<p>This project was established to review progress to date related to recommendations in the Digital Roadmap and support future digital capacity development. Key aims were:</p> <ul style="list-style-type: none"> • Develop a systematic process to identify progress against the recommendations and priorities of the roadmap. • Assess the impact of the National Forum in supporting building digital capacity based on the commitments made in the Roadmap. • Assess how system-level changes identified in the Roadmap have been progressed. • Identify development priorities for 2017 to ensure the recommendations and priorities of the Roadmap are fully realised.
<p>Impact of Research on Teaching and Learning in Irish Higher Education</p>	<p>This project is currently in the scoping phase and terms of reference will be published in Q2 2017.</p> <p>Research-learning linkages are at the core of this project. The project sets out to uncover evidence for how the sector might be able to further develop and foster the relationship between research and teaching and learning in the future, with particular reference to optimising the potential of the open access environment.</p>

Appendix C

Digital Showcases

The scoping group suggested that at least 20 showcases should be included in the final report. Consequently, each institution was asked to suggest showcases, chosen to focus on innovative areas and non-traditional provision, including good practice in effective use of online learning. Below, in alphabetical order by institution, is a selection of the showcases received.

AIT	<p><i>FASTER (Financial Accounting Student eLearning Resources)</i></p> <p>An initiative to develop a more open and flexible approach to teaching financial accounting. With the help of the NDLR and local learning & teaching units, a small localised project with a specific goal of using technology to enhance flexibility has grown into a collaborative ‘open education’ project between three institutes of technology and a professional accountancy body.</p>
ITC	<p>Transformation Through Collaboration</p> <p>This project seeks to build digital literacy capacity among staff and to develop more effective engagement with students through online tools. At the core of the project is the recruitment of staff as Digital Champions in each of the parent institutes. These staff become champions for the improvement of digital literacy skills within their academic discipline, their department and ultimately across the sector. The project documents the journey these champions take and provides a map for others who wish to follow in their footsteps. http://www.digitalchampions.ie/</p>

CIT

E-learning Booths

Six “e-learning pods” or live e-learning booths were developed at CIT to offer bespoke spaces for individual higher education teachers to deliver live or synchronous online classes. Each room is sound damped and provided with an optimised workstation, two large monitors, a HD webcam and a shock mounted condenser mic as well as an optional graphics tablet with an integrated LCD to allow, e.g., for live annotations and drawing over lecture/presentation content or shared screen content. The rooms also allow higher education teachers to bring their own device, as required. The booths are primarily used in support of live distance lectures, with the lectures typically being recorded for asynchronous viewing later by the institute’s online students but the rooms are also used to co-ordinate virtual labs, to produce multimedia content such as podcasts (or other quality audio content) and instructional videos.
<http://tel.cit.ie/index.cfm/page/studios>

Online Teaching Community of Practice

Those teaching online in CIT are offered an opportunity to join an Online Teaching Community of Practice. The broad idea of this community is to give those teaching online time and space to interact regularly with each other on issues, concerns, queries, etc. arising for them as they try to improve and develop their practice. In operational terms, the community meets for an hour every two weeks during term time. Sessions to date have tended to coalesce around key themes and issues to do with hardware and delivery software, show and tell sessions from community members with regard to their own practices, ongoing efforts in the TEL department to help support and improve online teaching and there have also been some occasional online and face-to-face presentations from external industry experts and vendors. The community has given rise to a number of small but important improvements to the CIT online teaching model, the ongoing development of specific screencasts and other learning materials, a curriculum for online higher education teachers and, most recently, a working party of academic council to look at the feasibility of mainstreaming the use of remote online proctoring.

DCU

The National Institute for Digital Learning (NIDL)

NIDL aims to be a world leader at the forefront of designing, implementing and evaluating contemporary models of digital, blended and online learning. We have a mission of transforming lives and societies through listening, linking and leading for a better future. The NIDL is committed to providing strategic leadership, building strong communities of practice, and enabling and contributing to world-class research. We support a comprehensive suite of professional development opportunities in digital, blended and online learning from workshops to advanced postgraduate and doctoral study. Additionally, the NIDL is committed to promoting access to university-level online degrees and qualifications through DCU Connected and a suite of free online short courses through Ireland's Open Learning Academy. We have particular expertise in the research-informed design of high quality courses for digital, blended and online learning. Our staff are highly regarded for their research expertise, postgraduate supervision and practical experience in the school and higher education sectors, and play major leadership roles in leading publications and national and international professional bodies. <http://www.dcu.ie/nidl/index.shtml>

DCU Connected/Open Education Unit

DCU's Open Education Unit provides a range of online undergraduate and postgraduate programmes using modern digital technologies to help students achieve their educational goals without the need to regularly attend traditional campus-based classes. The Unit is part of the National Institute for Digital Learning and plays an important role in supporting students who are studying through DCU Connected. <https://www.dcu.ie/openeducation/index.shtml>

DIT

Dublin eLearning Summer School

In 2003, the then Learning Technology Team at the DIT ran, for the first time, a week-long boot camp type event for its academic staff to facilitate their engagement with technology enhanced learning. That year over fifty academics attended the week which encompassed an innovative combination of workshops and reflective sessions exploring both existing and new technologies and their practical applications with students. The week was such a success that the E-Learning Summer School became a fixed event in the Institute's academic calendar. As an event it has gone from strength to strength, attracting a lot of outside interest. In recent years it has grown to become the Dublin E-Learning Summer School run by DIT under the auspices of the Dublin Region Higher Education Alliance (DRHEA).

The 12 Apps of Christmas

The 12 Apps of Christmas 2014 was a free, open, short, online continuing professional development (CPD) course which ran from Dec 1st 2014 to Dec 16th 2014 (subsequently repeated annually) and was hosted at <https://the12appsofchristmas.wordpress.com/>. 700 participants worldwide registered to take part, and over the course of the 12 consecutive weekdays, were introduced to 12 different mobile apps. These apps included iMindmap, Socrative, Aurasma, Explain Everything, EasyBib, Thinglink, Instapaper, Animoto, Evernote, CamScanner, Bonfyre and Voice Recorder HD, all of which are available from both Google Play and the iTunes App store. Each app was evaluated in turn against the SAMR model of technology integration and explored in terms of its potential to enhance, modify, and redefine teaching, learning and/or assessment practices in the higher education context. The course itself adhered to the social constructivist theory of learning, and the content presented each day was influenced heavily by the TPACK framework.

<p>DKIT</p>	<p>Cross-disciplinary Teaching Groups</p> <p>Two cross-disciplinary teaching groups have been formed to explore the use of digital technology. The first is implementing an initiative to promote responsible digital citizenship within and beyond the Institute. The second group of academic and learning support staff, in collaboration with colleagues from AIT, are exploring the potential of digital technology to support student academic writing. Additionally, a short publication, funded through the What Works and Why project, ‘TEL Tales: Stories of Enhancing Learning Through Technology’, consists of a selection of narratives by teacher colleagues from DkIT and the wider region, who implemented technology interventions in their practice as part of the second module in the MA in Teaching and learning.</p> <p>https://whatworksandwhy.ie/ http://eprints.dkit.ie/525/</p> <p>Enhancing Learning Through Technology Module</p> <p>Since 2009 the MA in Teaching and Learning (MALT) has been offered to Institute staff and in 2015 it was also offered to educators in the region. To date, over 100 staff members have undertaken or are undertaking the programme. A core module in this programme is the educational technology module, Enhancing Learning Through Technology. 12 staff members from the current cohort will progress to this module in September. This module has been a key driver of staff digital literacy in the Institute, which, in turn, has had a consequent impact on student use of technology, in particular, the Moodle VLE. The programme was the first programme in the Institute to be delivered in blended mode. Evidence of the impact of the programme within the institute and beyond includes the increasing numbers of DkIT staff presenting at conferences such as EdTech, the majority of whom have completed or are undertaking the MALT programme. The work of the MALT team (and colleagues taking the programme) in effecting ‘systemic cultural change’ was recognised with a Special Commendation at the National Teaching Expert Awards.</p> <p>https://youtu.be/OMxMKrWhFj8?list=PLhJYW28cw2ebFoqivYpxNmCD_axLuTWnp https://youtu.be/OKjcPRbT6Xg</p>
<p>GMIT</p>	<p>RPL Assessment Portfolio Tool</p> <p>The RPL Assessment Portfolio Tool allows students to build an online portfolio to help them gain access or advanced entry into a higher education programme in the institutes of technology in the Connacht-Ulster region including GMIT, LyIT and ITS.</p> <p>http://www.myexperience.ie/how-to-apply-video/</p>

<p>LIT</p>	<p>LIT Ennis Learning Centre</p> <p>This is a successful trial deployment of IT equipment such as laptops and wireless/wired access to network and printing facilities for use by full- and part-time students pursuing a Higher Certificate in Business Computing. http://www.lit.ie/Courses/LC601/default.aspx</p> <p>MIS Training Room</p> <p>This is an ICT lab for staff training use – not timetabled for student use. Available to staff exclusively as a learning resource to assist with the enhancement of staff skills. Used for official Cisco and Microsoft training sessions and exams.</p>
<p>MIC</p>	<p>Supporting Student Self-Regulated Learning</p> <p>This is an online ‘immersive style’ six-credit module in Introductory Social Psychology which is run over a two-week period as part of the B.Ed. in Education and Psychology in MIC. This was the first fully online module to be offered to full-time undergraduate students at MIC. http://www.lin.ie/wp-content/uploads/2013/11/kerry-Greer.pdf</p>
<p>MU</p>	<p>UniDoodle: An Interactive Student Response System to Support In-Class Assessment & Feedback in the Engineering Classroom</p> <p>In response to limitations of traditional audience response systems and to provide greater insight into where gaps in students understanding existed in relation to course material, Dr Seamus McLoone at MU Department of Engineering has worked over a number of years to develop an app-based student response system for use in the engineering classroom to support student engagement and to provide immediate, ongoing and high quality feedback to students on problem-based learning activities. They have developed an app-based student response system that offers a flexible input mechanism in the form of sketching capabilities called UniDoodle. It enables students to input equations, graphs, annotations, circuit diagrams, Karnaugh Maps, etc. via the app on their smart devices such as mobile phones or tablets and offers a significant improvement over existing response systems that only allow for a multiple-choice selection as an input mechanism. UniDoodle involves three components: (1) a student app for the students to submit sketch-based responses; (2) a lecturer app for the lecturer to view and edit responses and to prepare and post questions and (3) a cloud based service (Google App Engine) to communicate between the two apps. The app is used in a number of ways including regular use in lectures to recap on material covered in the lecture and within dedicated tutorial classes to practice problem-based activities and questions. Responses are collected and presented in real-time in a gallery-style format for ease of viewing by the teacher. Deeper insight into exactly where and how students are making mistakes is now available. This is of great benefit to the teacher, and, moreover, offers a level of peer learning to students, as they now see exactly how their colleagues are approaching problems and where and how they are making mistakes.</p>

<p>NUIG</p>	<p>Online Results Entry Using the Grade Journey Tool</p> <p>The large-scale integration of the VLE with student records, module manager, CORE HR and now (since 2016) the examination systems, is a good example of good practice to support teaching and learning. This is something that is not visible to staff and students (nor should it be) but makes their use of the VLE much easier and has significantly supported the large take-up numbers that we experience. For a presentation about the ORE project, please see http://prezi.com/gksxtulcdini/?utm_campaign=share&utm_medium=copy&rc=ex0share</p> <p>A selection of NUIG’s ongoing learning technology projects, from the small to the substantial is available at http://www.nuigalway.ie/teaching-with-technology/showcasehighlights/ and https://nuigalway.mediaspace.kaltura.com/category/Teaching+%26+Learning%3EShowcase/32548861</p>
<p>ITS</p>	<p>Online Distance Learning</p> <p>60 programmes from Sep 2016, 1800 learners (2015-2016).</p> <p>Our commitment to making education more accessible led us into online learning in 2002. Our online programmes replicate the traditional face-to-face classroom by web-casting live classes over the Internet. During an online lecture, you can hear the lecturer and see the board and/or class material that they are working. All live lectures are recorded for those who may not be able to attend the lectures live. Therefore, if you have missed the live lecture, you can download the recorded version and listen to it in your own time. Online learning from ITS has been very successful with high examination marks and good feedback from our students. http://www.itsligo.ie/online</p> <p>Recognition of Prior Learning - A Collaborative Initiative</p> <p>A dedicated space has been created to guide students through the recognition of prior learning system: http://myexperience.ie/</p>

UL

Take One Step

The Shannon Consortium (SC) partners; UL, MIC and LIT, launched a sector-wide initiative to stimulate staff and students to 'Take One Step' in engaging with digital literacy. The campaign is built on the National Framework for Digital Skills 'All Aboard' and embeds its skills framework and resources systematically across the Consortium. Five 'TEL Days' were run on Consortium campuses over a six-week period. A series of innovation funds were also launched in each institution in order to encourage staff and students to engage. Findings from the application of the All Aboard Framework for Digital Skills were fed back to the project and will help to inform its future direction. <http://ulsites.ul.ie/telu/take-one-step-t1step-tel-week-shannon-consortium>

DigiLanguages: Language Learning in a Digital World

Enhancing Digital Literacies for Language Teaching and Learning is a project funded by the National Forum. The project aim is to develop a national framework of digital literacies for language teaching and learning in an Irish higher education context. The cross-institutional project team comprises language higher education teachers from across a range of geographically diverse locations, representing six HE institutions (UL, NUIG, DCU, MIC, DIT and LIT). The languages emphasis for the project extends to French, Italian, German, Spanish, Irish and English for Speakers of Other Languages. <http://www.digilanguages.ie/>

Addendum:

Digital Capacity in Higher Education: A Perspective from Private Colleges

Dara Cassidy, Hibernia College

In early 2016, as a response to the digital roadmap, the Higher Education Colleges Association (HECA) conducted a small-scale research project aiming to gauge the digital capacity of its member institutions. The purpose of the survey was to determine the extent to which HECA colleges were considering digital capacity at the institutional and strategic levels, as well as how that was translating into day-to-day operations and on-the-ground capabilities, with a view to highlighting what improvements could be made and perhaps identifying potential areas for collaboration. The questions were informed by the 'questions to consider' that appeared in *Teaching and Learning in Irish Higher Education: A Roadmap for Enhancement in a Digital World 2015-2017* (National Forum, 2015). The survey was followed by a one-hour focus group which aimed to delve a bit deeper and produce a more multidimensional perspective than that which was possible using the survey instrument. At the time, HECA comprised 15 members – National College of Ireland (NCI) had not yet become a member. Of those, 14 participated in the initial online survey and seven participated in a follow-up online focus group. Due to the small numbers involved in the survey, it is more meaningful to report the findings in absolute numbers than in percentages.

Of the 14 institutions that responded to the survey, eight had implemented a formal digital capacity strategy. Of those that had not, one viewed the development of a digital capacity focus as being highly important, three considered it of medium importance and two considered it of low importance. The survey also revealed that 11 respondents had a formally articulated teaching and learning strategy, and six of these teaching and learning strategies specifically addressed the issue of digital capacity. Eight of the respondents had produced formal statements of graduate attributes and four of these statements made specific reference to digital capability. Ten of the institutions had identified a senior manager with specific responsibility for digital capacity. Finally, in terms of the consideration of digital capability from a QA perspective, 10 of the institutions explicitly addressed digital capability in their QA policies.

Twelve respondents had deployed a learning management system (LMS), with Moodle overwhelmingly the most popular, and there was a requirement in all but one that all programmes make use of the LMS in programme delivery. The most popular uses of the LMS were uploading lecture notes and student upload of assessments and quizzes. Also popular were discussion forum use and video and multimedia presentations. The LMS was also used for student resource sharing, peer review activities and ePortfolio work. Ten of the institutions were engaged to some extent in online or blended learning, offering a collective total of 50 online or partly online programmes. In terms of IT support for online delivery, eight of the institutions had in-house support while five outsourced IT support. There were 38 full-time equivalent staff members and one part-time equivalent staff member with specific expertise in and responsibility for supporting digital delivery among the 13 institutions that responded to the question. The most common role was VLE Administrator, with Learning Technologist and Instructional Designer joint second and Educational Developer fourth. Closer examination of the data reveals that the expertise was not evenly spread among the institutions; two institutions accounted for just under half of those staff, one of which was specifically established to deliver blended learning and thus would be expected to be well-served in this regard. All but one of the institutions identified at least one part-time member of staff with responsibility for supporting digital delivery.

The survey also sought to determine the types of activities that the institutions were undertaking to promote technology-enhanced learning (TEL). It found that 10 of the colleges encouraged staff to advance their TEL skills and apply them to their teaching, 10 provided TEL training, nine required staff to incorporate TEL practices into their teaching and five offered incentives for creating TEL resources. Incentives included linking TEL practices to performance goals, paying staff to develop TEL materials, recognising and celebrating TEL-related achievements and providing funding for conference attendance and external education and training programmes. All respondents but one provided some sort of TEL training for interested staff. Training generally involved in-house and external workshops; think-tanks and idea-sharing events; support via phone, e-mail and in person and the provision of online tutorials and guides. TEL capacity was a consideration in just over half of the lecturer recruitment processes.

Eight of the respondents had developed specific policies in relation to copyright and intellectual property and seven in relation to discussion forum use. Four institutions did not have policies in place for either of these aspects. With regard to learning analytics, just four of the 13 respondents formally reviewed learner engagement with online resources at programme or institutional level. All the respondents signalled that they would be interested in collaborating with other institutions on projects aimed at enhancing their digital capacity.

Responses to an open-ended question about the challenges associated with developing digital capacity and follow-up questions during the focus group, resulted in a range of factors being identified. These can be grouped into concerns about:

- Staff buy-in and capacity
- Technology evaluation and choice
- Cost and organisational aspects

In relation to staff buy-in, there was a feeling that academic staff tended to see TEL integration initiatives as nothing more than additional tasks they were expected to carry out and that work was needed to encourage them to recognise the benefits of integrating this technology into their teaching. It was also felt that many higher education teachers possessed insufficient awareness of the appropriate pedagogies underpinning the use of ICT in education and, for many, ICT use was limited to making lecture notes available online. A lack of teacher confidence was also raised as an issue, and it was felt that higher education teachers perhaps required greater technological and pedagogical support than was currently available to them.

For some institutions, making decisions about which technologies to use was a source of difficulty, particularly because the pace of technological change is so fast. Another related concern was that it was sometimes difficult from an institutional perspective to keep track of what technologies individual higher education teachers were using in the absence of specific guidance from the college, and this was considered to be potentially problematic, presumably from a QA perspective.

A theme that emerged from the study in general was a tendency to conflate TEL with online and blended provision. It appeared that this conflation made the challenge of TEL provision appear more daunting than perhaps it needed to be for some institutions. In particular, some of the smaller providers felt that their size and limited resources meant it was not feasible for them to engage in technologically enhanced provision, which they associated with online and blended learning. One had experimented with blended provision and found it expensive to develop and deliver and it produced disappointing results. Others felt they lacked specific expertise and appreciation of the wider implications of engaging in blended and online learning in

respect of QA and managing and supporting learners. It was felt that the absence of an external QA regime for online and blended delivery in Ireland has meant that little domestic guidance has been available to assure the quality of such approaches. It is recognised, however, that this is soon to be addressed by QQI's upcoming guidelines for flexible and distributed learning, which are currently at the consultation phase. The cost, time and resources involved in creating online resources were also raised as an issue, as was the difficulty associated with change management of the scale that is necessary to fundamentally change delivery models. Others felt that the nature of the programmes their institutions delivered meant they were more suited to face-to-face delivery and traditional teaching methods. Finally, some respondents felt that it was difficult to get students to engage with online delivery vehicles such as discussion forums, despite considerable support from tutors.

The picture that emerges from this survey suggests that HECA colleges are generally very aware of the need to engage with digital capacity issues at an institutional level and many have already instituted policies and strategies that align with it. Across all the colleges, however, there is a somewhat uneven level of engagement, with institutions attaching varying levels of priority to digital capacity issues, depending on factors such as size, nature of programmes offered and technological expertise available. Across all institutions, there was clear recognition of the challenges involved in enhancing digital capacity and a need for specialist staff to support the existing teaching staff as well as helping to make informed strategic investment in infrastructure and technology. There is also broad support for inter-institutional collaboration and knowledge sharing as a way to share the costs associated with training and development.

About HECA

HECA is the representative body for independent, private providers of higher-level education in Ireland. Its role is to provide a unified voice for members in representations to government and legislative bodies in areas of academic and commercial interest. It also provides its constituent institutions with a forum to discuss common issues, concerns and opportunities. Since its establishment in 1991, it has grown from four to 16 members, most recently with the addition of National College of Ireland (NCI). According to the most recent figures, HECA colleges account for approximately 9,500 (ex NCI) of the 15,000 students studying at levels 6 to 9 in private higher education institutions (Castells, 2016). In addition, it serves approximately 4,500 students pursuing qualifications that are aligned to the National Framework of Qualifications (NFQ), such as the Association of Chartered Certified Accountants (ACCA), Chartered Institute of Management Accountants (CIMA) or those accredited by other awarding bodies such as the Institute of Commercial Management (ICM) (McKenna, 2015). HECA membership is only open to providers that deliver programmes at Level 7 or above on the Irish National Framework of Qualifications (INFQ), which are approved and validated by Quality and Qualifications Ireland (QQI). Table A1 shows the composition of the current HECA membership. As can be seen from Table A2, HECA institutions are generally small-scale providers, with many serving niche disciplines, such as psychotherapy, physical therapy and Montessori education (McKenna, 2015).

Table A1 HECA colleges and subject areas

Institution	Subject Areas Covered
Griffith College	Business; Computing; Counselling and Psychotherapy; Design; Engineering; Languages; Journalism and Media Communications; Law; Music and Multimedia; Pharmaceutical Science; Professional Accountancy
Hibernia College	Teacher Education, Health Science
College of Computing Technology	Computing; Web Design; Coding and Software Development; Networking; Systems Administration; Design; Games Development; Digital Marketing; Management; Data and Analytics
Dublin Business School	Accounting and Finance; Arts; Business and Management; Counselling and Psychotherapy; Information Technology; Law; Marketing and Event Management; Media and Journalism; Professional Accountancy; Psychology and Social Science
IBAT College	Business; Marketing and Management; Computing and ICT; Accounting and Finance; English Language
Open Training College	Management (Non-profit/Human Services sector), Social Care
Setanta College	Sport Coaching, Strength and Conditioning
St Nicholas Montessori College Ireland	Montessori Education
Institute of Physical Therapy and Applied Science	Physical Therapy
Galway Business School	Business; Management; Marketing and PR
IICP Education and Training	Counselling, Psychotherapy
Irish College of Humanities & Applied Sciences	Counselling and Psychotherapy; Business and Management; Childhood and Adolescent Care
SQT Training Ltd	Lean Six Sigma; Process and Project Management; Leadership and Personal Development; Compliance; Standards and Auditing

Institution	Subject Areas Covered
Irish Institute of Purchasing & Materials Management	Purchasing; Warehousing and Supply; Public Procurement; Business Procurement
Dorset College Dublin	Computing and Multimedia; Business; Accounting and Law; Healthcare and Childcare Education; English Language
National College of Ireland	Business, Management, Information Technology, Cloud Computing, Human Resource Management, Social Science, Finance

Table A2 Distribution of student population with reference to college size

Category	No. of Colleges	No. of Students	% of Students
Less than 500	13	1,892	20%
501 to 1,500	1	1,469	16%
Greater than 1,501	2	6,069	64%







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