Canadian Universities and our Digital Future

A workshop by Universities Canada

Nov 30 – Dec 1, 2015
Vancouver

Technology ▶

Universities
Canada.

What are the main drivers of Canadian universities' adoption of digital technologies?

52% of institutions ranked the top driver as improved effectiveness in student outcomes, student retention, alumni relations, and services to faculty and staff.

- Universities Canada, Digital Technologies Survey, fall 2015

Introduction

Around the world, new digital technologies are transforming organizations. Digital innovations present boundless opportunities, helping organizations improve their effectiveness, efficiency, creativity and service delivery. Higher education is profoundly affected by these transformations and Canada's universities are actively exploring the powerful possibilities of our shared digital future.

Leaders from 25 Canadian universities participated in a Universities Canada workshop in Vancouver on November 30 and December 1, 2015 to discuss the trends, opportunities and challenges in leveraging digital technologies for research, university operations, and teaching and learning. The two-day event featured more than a dozen speakers and panelists from universities, industry and the federal government, as well as from the Leadership Council for Digital Infrastructure

> "The integration of the digital and physical are creating new ways to engage."
>
> – Diana Oblinger, president emeritus, EDUCAUSE

(including the Canadian University Council of Chief Information Officers, Compute Canada and CANARIE).

Speakers and panelists discussed digital disruptors that could affect Canadian universities and raised a number of questions for senior leaders to consider:

- How can we advance universities' missions and Canada's position as a leader in the digital economy?

- Can technologies help provide greater access to quality education and research at a lower cost to students and universities?

- How can Canadian universities provide more personalized education and best prepare students for the digital economy?

- Given the implications and pace of disruptive technologies, how can universities remain competitive and sustainable?

Speakers noted that complacency in the digital era will be dangerous for companies and universities alike. The companies that survive today are either buying up disruptors or developing their own innovations. But digital innovation is not limited to the private sector – the workshop highlighted key innovators in the higher education space.

Diana Oblinger, president emeritus, EDUCAUSE

Diana Oblinger, president emeritus of EDUCAUSE, encouraged senior university leaders to consider a different metaphor for thinking about technology. Rather than thinking of technology and face-to-face interaction as mutually exclusive opposites, leaders should embrace a combination of the physical and virtual to engage both those within and outside the university, and to increase universities' competitiveness and sustainability.

Impacts and opportunities in teaching and learning

Teaching and learning has changed significantly in recent years, in part due to digital technologies. While online courses used to be considered new and innovative, they are now embedded in academic programs at many universities.

Participants emphasized that for today's job market, students need to be digitally literate: able to use digital technologies to effectively access, evaluate, create and communicate information.

Speakers and panelists highlighted the following key digital disruptors, trends and opportunities in teaching and learning at universities today:

Student success through analytics
Students benefit from guided pathways for success. There are now tools based on analytics offered by companies like D2L that help students select their major, identify appropriate

"Students learn in many different ways. We need to transform ourselves to make sure we provide students with various types of experiences (including experiential learning opportunities) and not just lecture, as they can now download content from anywhere."

- Vivek Goel, vice-president, research and innovation at the University of Toronto

courses, and help professors identify at-risk behaviour and know when to intervene. These tools improve student retention and reduce the time it takes to obtain a degree, lowering costs for students and universities.

Mentored online experiential learning
Increasingly, professors can use online tools to engage students in problem-solving for higher-order learning and to augment the face-to-face lecture environment. If students use these digital tools in a mentored setting (both professors and students can be mentors) there are significantly higher cognitive gains. The collaborative nature of mentored learning also helps foster the development of soft skills that employers seek in new hires.

Vivek Goel, vice-president, research and innovation at the University of Toronto

> "The more pathways we can provide students, the more students we will help achieve their full potential."
>
> – John Baker, president, D2L

Game-based learning – as offered through *The Sims*, a life simulation video game series, for example – has been effective in getting students to work together in complex situations to find information and problem-solve. Virtual internships are also emerging to help students gain work skills and develop a professional identity; students are given a role with a company in an online simulation environment and work with online teams to solve real-world challenges. U.S. studies found that these kinds of internships, which model professionals in their field, have been effective in getting more women and minorities to become engineers.

Outcomes-based learning
Digital technologies are making it easier to personalise education through outcomes-based education. This model outlines the competencies and outcomes required for a job and learners then work their way through these competencies at their own pace. The online model provides the student with constant feedback on progress towards the attainment of a specific learning outcome and can quickly adapt the student's learning path as needed. This approach is currently being used by companies to help their employees upgrade their skills, but it also has the potential to transform the way universities offer programs.

Combining online courses and workplace practicums
University students increasingly choose to enrol in a mix of campus and online courses, which offers more flexible schedules that accommodate work and family obligations. Digital technologies are also enabling students to combine online learning with workplace practicums. Northeastern University in the U.S. recently announced that it will offer students in Toronto the opportunity to enrol in one of three professional master's degrees. While the coursework will be completed online, Northeastern has partnered with companies in the Toronto area to offer prospective students workplace practicums as part of their degree.

Digital technologies for outreach to communities at home and abroad
Digital technologies allow students to be more socially connected with people within and outside their university. They connect classes in Canada and around the world and enable learners to exchange ideas and perspectives without having to board a plane. New technologies are also helping students become more socially connected with local communities. At the workshop, Sabina Trimble, a master's student from the University of Victoria, spoke about her graduate project working with the Soowahlie First Nations community. She is creating a digital story map to archive, share and keep alive the many stories of the Soowahlie community. By making the map

> "Universities are hubs for social learning. We can go to Google for content. Universities teach us how to learn. Digital can bring social learning to an international level."
>
> – Clélia Cothier, McGill University student

Suzanne Fortier, principal of McGill University

publicly accessible on a digital platform, her work invites non-Indigenous people to think more critically about the complicated histories of change, loss and resilience that characterize shared environments. Such projects demonstrate how technology can help connect communities, which is particularly important for improving collaboration and strengthening relationships between Indigenous communities and universities.

New fee models

Universities are currently exploring new business models by offering courses at different price points. At the Georgia Institute of Technology in the U.S., for example, a student can follow one online course for free. After this first experience, there are increasing fees for each of the following steps: a course online with a certificate but no mentoring; a course online with a certificate and mentoring; a degree online; a degree on campus. The institution has seen an increase in the number and quality

> "Equipping students with the environment and infrastructure they need to develop their innovation potential is now an essential element of a university education. These are the generations that will carve Canada's innovation future."
>
> - Suzanne Fortier, principal of McGill University

of applicants to campus programs as a result of the reach and recognition earned through online offerings.

This discussion raised several key issues and questions:

· How can universities help students develop their digital credentials to be employable and competitive?

· Will experiential learning opportunities, including those through digital means, become the cornerstone of future degrees?

· How might new fee models affect program offerings?

The emerging research and innovation ecosystem

Canada's digital research infrastructure
The current digital research infrastructure ecosystem in Canada is complex and fragmented. Budget 2015 set out the goal of developing "a Digital Research Infrastructure Strategy that includes new policies on research data management and storage and a coordinated long-term approach to the funding and provision of networking, high-performance computing, and software tools." The federal government is carrying out consultations to develop a new DRI strategy and Universities Canada is providing input in this process.

During a panel discussion on Canada's Digital Research Infrastructure, speakers concluded that:

- Canada should not aim for a perfect strategy but rather one that will advance the DRI agenda as efficiently and effectively as possible.

- One of the biggest challenges of this strategy will be creating the human infrastructure required for data management, curation and discoverability, due to the diversity of data from the varied scholarly communities that will be engaged.

- Clear and defined data management principles and requirements will be important in the years ahead for provinces, the federal government and institutions. We will need to look at the global picture for data management and the creation of global databases. Some disciplines are doing this well at the international level already, and can serve as models. Legal issues and research privacy will also need to be addressed.

- Systems will need to be created that allow for the cross-disciplinary linking of data.

- More shared digital infrastructure in Canada would be beneficial. As one participant said, "we need to stop competing on research infrastructure so we can compete in research."

- The various institutions and organizations involved in university research need to continue to coordinate and work collectively at the national level.

"Data management is arguably going to be the toughest nut to crack."
- Brent Herbert-Copley, executive vice-president, Social Sciences and Humanities Research Council

What are the top two priorities for digital
administration and operations?

1. Ensuring the digital technologies being used are secure.

**2. Applying digital technologies to support the university's
business functions (e.g. finances, human resources, marketing,
student support services) and ensuring legislative
requirements are met.**

- Universities Canada, Digital Technologies Survey, fall 2015

Emerging trends in digital research and scholarship

Speakers also discussed emerging trends in digital research and scholarship:

- Every field of scholarship is being transformed by analytics and open access, which is making data and research results more widely available.

- The world's most pressing problems are now being addressed through very large online collaborations involving researchers, students and other professionals from Canada and around the world.

- Large companies and NGOs are disrupting traditional research models by increasingly offering prizes to individuals and teams who solve scientific problems through open digital platforms like InnoCentive.

- Crowdsourcing volunteer efforts are being mobilized using digital platforms to help with research and even assist with the analysis of large amounts of data generated in emergencies. For example, after a category 5 cyclone in the Pacific Ocean in 2015, drones were sent over the area and images were uploaded to the cloud. Thousands of volunteers were able to

A panel examines Canada's digital research infrastructure system

> "Innovation and entrepreneurship are key for universities to stay relevant in Canada's booming digital economy."
>
> - Sheldon Levy, former president of Ryerson University

review them and score the images based on the level of damage they observed. A map was quickly created from this information, allowing emergency responders to establish what resources were required and where to deploy them.

- Large companies like Google and Microsoft are carrying out research with resources on a scale not available at universities. They are recruiting some of the best talent and collaborating with university researchers.

- High performance computing will continue to improve and there will be a greater shift to cloud-based services.

Fostering innovation

A growing number of universities are housing incubators to nurture and support students' innovations. For example, DMZ at Ryerson University is one of the country's largest business incubators for emerging tech start-ups. It supports entrepreneurs whose technology innovations promise economic and social impact. DMZ has had a powerful effect on Ryerson's academic plan; entrepreneurship and innovation are now integrated into all university programs, and mechanisms are in place for students across faculties to engage and interact with one another to discuss new ideas and innovations.

Abdullah Snobar, executive director of DMZ

This discussion raised several key issues including:

- How should tenure and promotions be adjusted for the digital era?

- How can Canadian universities better leverage collective intelligence from on and off campus to improve discovery?

- How might high-performance computing affect research in the future?

40% of Canadian universities have a specific strategy to guide the institutional adoption of digital technologies while another 40% are in the process of developing a digital strategy.

- Universities Canada, Digital Technologies Survey, fall 2015

Optimizing operations

Universities Canada presented the results of a 2015 survey of member institutions' successes and challenges in leveraging digital technologies in teaching and research. The survey found that the two greatest challenges are a lack of resources (financial and human), and the need to develop change management capacity and strategies which facilitate the adoption of digital technologies.

Institutional approaches

University presidents shared their reflections on the institutional challenges and opportunities posed by digital technologies. While digital is not the core business of universities, technologies are impacting the way institutions do business. And while they present opportunities to do things in new ways, they also raise new expectations. Technologies must be viewed as horizontal enablers or tools to help achieve the university's various strategic objectives.

Governance structures and strategies to address digital issues will naturally differ depending on the size and type of university – there is no one model to fit all institutions. While most universities address technologies in their strategic plans, others also see the value of having specific digital strategies. It is highly beneficial to have an IT advisory committee comprised of the Chief Information Officer and representatives from different units including faculty, students and even representatives from outside the university. These advisory committees meet to discuss issues, identify needs and priorities, raise ideas and provide advice to senior management.

Opportunities abound and Canadian university leaders recognize that they must adapt in order to stay relevant in the digital era. Many universities aim to be leaders in distance learning or data management, for example, and are ahead of other institutions, funders and policy makers in these areas. These leaders will continue to leverage technologies to foster innovations and institutional change – some of which will be disruptive and some incremental.

"Digital needs to be supported by a strong governance structure, be user-centred and agile, be based on a vision that motivates users, and be accountable and sustainable."

– Jim Ghadbane, president, CANARIE

What do Canadian universities need to become digital leaders?

1. More sustainable and flexible funding models and resources.

2. Improved capacity for institutional change management.

3. Improved collaboration both within and between institutions.

4. The development of national strategies and greater coordination among all levels of government, service providers and universities.

5. The sharing of best practices and evidence-based technology investments.

- Universities Canada, Digital Technologies Survey, fall 2015

University leaders foresee making increased usage of analytics to drive decision-making in teaching and learning, recruitment, fund-raising and resource optimization, among other areas. They also plan to apply the learning from research on disruptions better. Sharing results on improvements and successes resulting from the application of digital technologies is more likely to help speed up the adoption of technologies at their universities. Social media tools like Facebook could also be leveraged to deliver live addresses and interact with students, faculty and other stakeholders in new ways – further facilitating change management. Participants concluded that more opportunities to share best practices and models in digital technologies would be helpful.

Lawrence Hanson, assistant deputy minister, science and innovation at Innovation, Science and Economic Development Canada

91% of Canadian universities plan to undertake significant digitally enabled projects over the coming two years.

- Universities Canada, Digital Technologies Survey, fall 2015

Shaping our digital future

Given these trends and the creative ways in which digital technologies can be used to support universities' teaching and learning, research enterprise and administration, Canadian universities are presented with a range of opportunities and ways to innovate.

Universities will continue to incorporate digital technologies to attract more students, support their success, engage students in new ways, cater to their learning styles and needs, and better prepare them for their future careers. They will also use digital technologies to support a robust research environment involving online collaboration and access to increasingly large data sets and high-performance computing networks. And they will use technologies to offer a more secure, effective and efficient administrative environment, including improved student services.

Universities Canada is committed to supporting the federal government in the development of a national strategy for digital research infrastructure, and will continue to engage with stakeholders and partners to advance towards our digital future. Universities Canada will also continue to create a platform for member dialogue and exchange on this important aspect of the university mission.

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