

EDUCAUSE annual conference 2018
Visits to University of British Columbia,
University of Washington
& Colorado School of Mines
French Delegation report

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Forewords

For the sixth running year, a French delegation was officially assembled to participate in the annual EDUCAUSE conference. Like the previous five years, it was decided to take advantage of the trip to North America to visit three universities: University of British Columbia (Vancouver), University of Washington (Seattle), and Colorado School of Mines (Denver). This report follows the feedback meeting held in Paris on January 29th, 2019, and covers the three daylong university visits and the various workshops attended at the EDUCAUSE conference. It might also be completed by the multiple tweets posted par the delegation under the hashtag #EDU18fr.

French Delegation 2018



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The French Delegation part of core of EDUCAUSE international strategy

The French delegation was founded in 2013 by representatives of CSIESR and UNIF (UNPIdF at the time), with the support of UNIF and then the support of French Ministry of Higher Education and Research through its National Software Office. The purpose was to bring together the inputs of the French participants in the annual EDUCAUSE conference faced with the richness of information provided: around twenty sessions in parallel during each time slot, an exhibit hall with several hundred exhibitors and side events such as seminars, pre-conference workshops, and community group meetings.

This delegation extended the active participation of some French members of CSIESR and UNIF, who formerly attended since 2000 the annual conference on a regular basis. They had established friendly relations with Richard Katz, then Vice-President of EDUCAUSE, who later greatly helped the delegation by organizing university campus visits.

From 2014, an annual report is published in French to enable the community to understand better the digital issues and trends discussed during the conference. It is now a reference document for the French community but also has an international scope through its translation into English with a wide distribution beyond our borders, particularly in Japan.

This formalization via a delegation has been fruitful since we were quickly identified by the EDUCAUSE teams as privileged interlocutors on digital issues specific to French higher education. A meeting between the delegation and the President of EDUCAUSE is organized each year during the conference, with an official group photo. This meeting and the interventions of the members of the delegation during the conference contribute to the evolution of the international strategy of the President and directors of the EDUCAUSE association.

Indeed, one CSIESR member participates each year in a pre-conference meeting of the CHEITA group. This group aims to bring together around a table all the sister associations working on digital issues in higher education; at European level (EUNIS) and also in each country: South Africa (ASAUDIT), Germany (ZKI), Australasia (CAUDIT), Canada (CUCCIO), Chile (DUOC), China (CERNET), Spain (SIGMA), United States (EDUCAUSE), France (CSIESR and AMUE), Hong Kong (JUCC), Italy (CINECA), Japan (AXIES), New Zealand (NZ ICTC), Netherlands (SURF), United Kingdom (JISC and UCISA). It is an opportunity for these actors to share their experiences about the services offered to their members.

Besides, a member of UNIF and the delegation actively participates in the activities related to Learning Spaces led and/or supported by EDUCAUSE, particularly in terms of their international outreach. In particular, he has translated and adapted into French and Japanese the Learning Space Rating System¹ designed as part of the EDUCAUSE Learning Space Community Group, and is a member of the FLEXspace database steering group. He also gave five sessions during the annual EDUCAUSE and EDUCAUSE Learning Initiative (ELI) conferences, providing the community with an international perspective on the theme of innovative physical spaces.

¹ see the chapter *Learning Spaces* of this report

At the 2018 conference, John O'Brien, the President of EDUCAUSE, announced several initiatives that demonstrate the willingness to strengthen international bonds. A forthcoming blog note from the EDUCAUSE President will describe this strategy. His group photo with the French delegation and our annual exchanges will be visible in the article².

A regular meeting by videoconference with the President of EUNIS and his office is planned and allows for regular informal exchange. An international working group (International task force) has just been created which takes over the scope of CHEITA by inviting the presidents of associations including EUNIS and CSIESR. The first videoconference took place on January 23rd 2019.

The international openness within EDUCAUSE has also been fostered by the resumption of the design activity of the Horizon Higher Education report of the recently dissolved NMC consortium. The Horizon editorial panel of experts has always been largely composed of international members, several of whom are French; among them two members of the delegation at 2019 edition.

Finally, the programme committee for the future EDUCAUSE 2019 conference includes among its invited members the President of CSIESR, which is a recognition of the importance of the French delegation's place in the very organization of the conference itself.

The EDUCAUSE French Delegation steering committee:

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NMC Horizon Report Higher Education Expert

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Le Cnam Chief Digital Officer
NMC Horizon Report Higher Education Expert

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² <https://er.educause.edu/blogs/2019/2/educause-international-close-up>

Introduction & Trends of Higher Education & Research in the USA

Yves Epellboin & Laurent Flory

The EDUCAUSE congresses are a privileged place to take the pulse of American universities with more than 8,000 participants this year addressing all aspects of the use of technologies, whether for teaching and research or all aspects of social life around campuses. Technologies, innovation, and traditions are at the heart of this conference dedicated to Higher Education. EDUCAUSE is therefore for us, French, a unique opportunity to discover the dynamism of American universities and to be inspired by them to enrich our thinking.

The success of students remains at the heart of the concerns, as evidenced by the second position of this theme, just after security, in the "Top ten issues"³. Technologies appear as an essential means of solving problems, whether it is success or financial aspects.

The fears expressed last year at EDUCAUSE⁴ about the Trump Administration's policy have been partially confirmed, but the new administration is still not fully in place, and many questions remain.

For the mid-term elections, which were to take place in the wake of EDUCAUSE, estimates available during the conference gave a House of Representatives that switched to the Democrats at 85% and a Senate that remained in Republican hands at 85%. These forecasts have proven to be accurate. This alternation desired by many ESR actors who are rather resistant to the policy of the current administration is not, however, a sign of change. Beyond the mid-term elections, the main electoral issue remains that of 2020. Not only will a president be elected but 21 Republicans will have their seats put back into play in the Senate against 11 Democrats with a majority that is currently⁵ played with 5 seats and therefore with a possibility of switching the Senate to the Democratic side.

The changeover of the House of Representatives revealed a strong risk of tension, particularly around the issue of the wall with the Mexican border, at the risk of obliterating all the other subjects. The shutdown of the administration observed since then confirms the diagnosis of EDUCAUSE's lobby experts based in Washington DC.

Although the two parties agree on the main issues related to ESR: student debt, accreditation and the need for competency-based higher education... they diverge completely on the political and legal solutions to address these issues. The two major parties hope and expect a victory for both chambers and the 2020 presidential elections, postponing all major decisions, including the revision of the Higher Education Act reauthorization which governs ESR in the USA and which has been awaiting drafting and voting for ten years.

Republicans are wary of Higher Education and particularly Public Education. They criticize the organization of studies which they consider too long and which include subjects whose interest seems to them far removed from training for a job, a unique vocation according to them of Higher Education. Secretary of State for Education Betsy DeVos criticizes the "academy[for] too often maintaining traditions designed to serve

³ Top ten issues <https://goo.gl/2SMYzN>

⁴ EDUCAUSE 2017 French Delegation Report <https://goo.gl/wh3tWe>

⁵ In favor of the Republicans <https://goo.gl/s5Rr2H>

impressionable young minds and valuing teaching led by teachers and instructors with terminal degrees over real-world experience and instructors who better understand the requirements of the workplace"⁶.

*“Unfortunately, the academy has too often held onto traditions that were designed to serve impressionable young minds and that value faculty-led instruction and instructors with terminal degrees more highly than real world experience and instructors who better understand the demands of the workplace.” Betsy Devos
Secretary of Education*

The new regulations introduced by the Obama administration to define quality criteria for university accreditation and the right of students to access privileged loans to pay for their studies, which have put some private institutions in difficulty and amplified their closure, are partially lifted⁷ by the Secretary of State and the conditions for receiving flexible state support. It will be interesting to see how these for-profit institutions, which were often trying to turn the tide by switching to an officially non-profit model, will react.

At the same time, the rules for zero-rating donations to colleges and universities have changed, after a long waiting year⁸, and are less favourable, amplifying fears of a decrease in donations from alumni (former students). When we know the importance of these donations, especially for the best-known institutions, we understand that this is a frontal attack on the most prestigious universities, bastions, according to the most virulent Conservatives, of the ideologies they abhor. Universities may even have to pay new taxes on the highest salaries, reserved parking spaces and transportation costs reimbursed to employees.

At the same time, the funds provided by the States have steadily decreased over the past 15 years⁹ from 50% to 10-15% (at the University of Washington, for example, they have gone from 50% to 7%), so it is understandable that their funding is one of the major concerns of universities.

Since the 80s, international students have been seen as an alternative and increasingly important source of funding for universities because they pay the full tuition fees.

After a continuous and strong increase since the 80s¹⁰, the number of international students decreased by an average of 6.6% in most institutions¹¹ from the fall of 2017.

It is not the best-known universities, well ranked in international rankings, that pay the price, their prestige sufficient to attract a sufficient number of candidates, but smaller ones with more limited finances.

⁶ Inside Higher Ed. Décembre 2018 <https://goo.gl/w4V2uF>

⁷ Education Dive November 2018 <https://goo.gl/rqGKZP>

⁸ Inside Higher Ed January 2019 <https://goo.gl/aGnt7v>

⁹ Urban Institute November 2015 <https://goo.gl/CdmSmi>

¹⁰ MPI May 2018 <https://goo.gl/Y3d6fW>

¹¹ Inside Higher Ed November 2018 <https://goo.gl/LHMXTw>

This phenomenon is largely due to the new visa rules introduced by the Trump administration as well as the "anti-immigration rhetoric" mainly affected the main sources, China and the Middle East. The increased restrictions on obtaining an H1-B visa that allows students to stay in the United States after graduation to work are also an aggravating factor.

"It is a withdrawal into oneself that is probably unprecedented in history, whether on borders, markets or in education" Scott Jaschik, editor of Inside Higher Ed and one of the best Higher Ed experts in the USA.

Tuition fees, therefore remain high, even in small universities, currently at \$10,000 per year, up to \$45,000 per year, not to mention campus living and housing costs. It even goes so far as to suggest that three students share a studio originally designed for one person.

Total student debt continues to grow and exceeds \$1,500 billion¹². It increased more than threefold between 2006 and the end of 2017. The debt burden has always increased between 2006 and the end of 2017 from 3.5% of GDP to 7.6% of the US GDP¹³. Average student debt increased from \$23,000 in 2004 to \$35,000 in 2017. Eight hundred thousand students leave public universities each year with significant debt from the Bachelor level onwards¹⁴. Although held mainly by the federal and state governments, more than by the private sector, which represents only 7,65%¹⁵, this student debt could be one of the secondary factors of the next financial crisis¹⁶. Nevertheless, the student debt crisis is already beginning to translate into increased bankruptcies, bankruptcy and is expected to lead to major college and university closures in the next ten years¹⁷¹⁸.

"And a lot of debt now lurks in the shadows of the financial system" M. Phillips & K. Russel NY Times 12/09/2018

In a context of scissor crisis, between rising costs (but also rising school durations) and at best stagnating salaries, the question of the return on investment in higher education is more than topical. Learners' trade-offs include the cost of studies, salary opportunities at the end of the study period, the average length of time required to obtain a diploma and the success rates that force learners to become homo-economicus with pure and perfect reasoning or risk never being able to repay their debt¹⁹. The student debt of Americans over 50 years of age has risen from an outstanding amount of 36 billion in 2004 to more than 260 billion in 2018, with 40% of borrowers over 65 in default on their student debt. Thus the number of students enrolled in the humanities and sociology declines, and large companies must remember that the knowledge that underpins the skills they seek is also found in these courses. It is interesting to read the analysis that Anant Agarwal²⁰, one of Coursera's founders, presented at the time of the presidential elections, explaining that no candidate

¹² Forbes January 2018 <https://goo.gl/PjeKrU>

¹³ Wikipedia <https://goo.gl/GijGH6>

¹⁴ NY Times July 2018 <https://goo.gl/KYQKhB>

¹⁵ Nerdwallet December 2018 <https://goo.gl/upzC8G>

¹⁶ NY Times September 2018 <https://goo.gl/6BA4Cn>

¹⁷ Forbes December 2018 <https://goo.gl/JbYmEj>

¹⁸ CNBC Make IT August 2018 <https://goo.gl/utg32M>

¹⁹ CNBC November 2018 <https://goo.gl/anQMo5>

²⁰ LinkedIn June 2016 <https://goo.gl/Zvpgqb>

had understood the origins of the problem. He suggested ways to find solutions. Several universities, strong in the dynamism that their autonomy allows them, have quickly embarked on this process.

The profile of American students has changed over the past decade. 20% of the 20 million students are over 30 years of age²¹. 40% are enrolled in community colleges, institutions offering baccalaureate + 2 degrees, often professionalizing training leading to immediate employment. 37% are part-time students and only 60% graduate within six years.

The United States is the nation where education is most expensive²² after Luxembourg, but in this country it is state paid, not students paid studies! And according to the authors of this research, this does not mean that the studies are of better quality, even if a minority of universities, placed in the world's premieres, hide the reality of most institutions. One of the reasons for these high costs is the high proportion of so-called auxiliary services, housing, sports centres and everything that contributes to the accreditation of American campuses and that amazes us when we visit them. In this regard, let us mention the comparison with French universities: "The set of services offered by an American university and those offered by a French university are very different," explains David Feldman, an economist specializing in education at William & Mary in Williamsburg, Virginia. "Reasonable people may wonder whether American universities should offer these kinds of services, but just because we do doesn't mean that American universities are fundamentally ineffective. It marks them as different." ». This attractiveness of campuses is one of the factors that has historically differentiated between universities. Digital services are also becoming a key differentiating factor. It is an important reading grid in a context where the learner is a client who invests in his studies, a model fundamentally different from that of our learners, users of public state service. Economists note that higher education has followed the same trend as health, with an inability to control costs, not only because of these ancillary services but also because higher education is essentially a labour enterprise that requires highly skilled workers.

***"Finally, technology must demonstrate that it can contribute to reducing operating costs, in order to meet the dual challenge of funding ESR by universities and future students. John O'Brien
President of EDUCAUSE***

O'Brien also warns against a vicious circle where the increase in services implies an increase in operating costs, an increase that is passed on to students who become more indebted and also increase their extracurricular paid activities, to the detriment of their success. Far from the initial target of deploying these new services, namely to support student success.

There are many other issues of concern to universities and to the Trump Administration. As guardians of their nation's democratic and equality traditions, they oppose the end of web neutrality and refuse to abandon accessibility regulations, which they believe guarantee access for all to free information. Attempts by the states (California, Washington, but also Vermont, Oregon and New York...) to restore the obligation of net neutrality, in opposition to the federal administration, are being sued by telecom giants. If the judges agree with the two states of New York and California, more than 20% of the US population would be (re)protected by a net neutrality law. For accessibility, steps backward from the early days of the Trump administration leave for the time being institutions without a formal framework at national level only regulations and more often than not local case law apply but locally.

²¹ Education Dive July 2017 <https://goo.gl/i6WSTz>

²² The Atlantic September 2018 <https://goo.gl/72Fi88>

The last aspect of digital issues in ESR's news is data security and privacy. After a phase of fears related to the RGPD or CCPA (California Consumer Privacy Act) very close to the RGPD in spirit and form with three main points: 1. the user is the owner of his data, 2. the user has the right to control his data and 3. companies are responsible for the security of personal data. Institutions are beginning to realise that the risk of prosecution for non-compliance with the GDPR will be low and that the probability of European sanctions against them is almost nil given the difficulty of the procedure. There is a clash of cultures between the IT teams that are most often sensitive and in favour of these notions of security and privacy, and that seek a compromise between data exploitation, security and privacy, and the Trump administration, which, suspicious of the ESR, wishes to apply audit procedures deemed inapplicable and inappropriate by institutions in the event of a leak of financial data. Thus 1700 heads of ACE member institutions (American Council on Education, equivalent to the French CPU) asked²³ the scholarship authority FSA (Federal Student Aid) to suspend its investigations and requests when data leakage problems occur and to work with its representatives to converge on the recommendations made by the experts of the EDUCAUSE working groups. This includes the scope of the information to be reported to the administration, sometimes in violation of local data protection laws.

The American university is, in its social and cultural dimensions, an important element of American culture. Academics are aware of the difficulties of this model and its cost. They are constantly looking for solutions, combining technology and tradition, to perpetuate this model and demonstrate the dynamism and innovative capacities reflected in the EDUCAUSE congresses.

This report, published on the 5th day in French and English, presents the reports of the site visits carried out by the delegation: the University of British Columbia, the University of Washington and the Colorado School of Mines, probably one of the Higher Education institutions in the USA closest to our French engineering school model.

The report also highlights some points considered as relevant and characteristic by the delegation. This is necessarily done with a strong editorial bias, as the richness of such a conference with more than 300 sessions and 800 presenters can hardly be summarized. The points highlighted in our 2018 report, beyond the traditional state of the art on learning spaces, the top 10 issues of CIOs for 2019 and the feedback on the visit of exhibition areas (275 companies) are: blockchain learning analytics, alumni management, the omnipresence of AI, the cloud, accessibility, user experience, digital services for students outside the classroom, mobile learning, the use of social networks and a point on virtual reality.....

On behalf of the entire delegation, we hope you find this reading interesting and look forward to seeing you next year in Chicago EDUCAUSE 2019 conference.

²³ ACE February 2018 <https://goo.gl/VynW9k>

EDUCAUSE top 10 IT issues 2019

Laurent Flory

Educause top 10 IT issues is the Educause annual study on IT priorities and main issues for Higher Education. This study led by a group of CIOs and IT leaders is a one-year work released every year in February. At Educause conference held in autumn attendant have the opportunity to preview the content of this study.

This Educause top 10 IT issues is a historical part of our report in French, published before December. Since the Educause official content (in English) is released by the time we translate our French Delegation annual report in English, it makes no sense to have it in this document. You will find here after the link to access it: <https://www.educause.edu/research-and-publications/research/top-10-it-issues-technologies-and-trends/2018> .

There is no real surprise in this report. Just as in 2017, security and student success are the number 1 and number 2 priorities. I want to take the liberty to underline the growing trend of data as the primary issue both in its use to achieve strategic goals and as a soft skill that every HE stakeholder should master.

So let me share a few words on my vision of this report. More than its yearly content, which is always illustrated by Educause with fantastic infographics²⁴, it's the evolution over time of some of the topics that is very interesting. You should, therefore, have a look at this URL : <https://www.educause.edu/~media/interactive-content/it-issues-trends/index.html?la=en>: it lets you browse the top ten IT issues over time since year 2k. Despite the need to market the report that leads to having new clusters for the priorities every year, I would like to underline as a personal point of view. Not only this editorial choice of pooling issues leads to a better understanding of the trends it is also a handy communication tool. We can notice a tendency to stabilization of the top 10 issues. A decade ago, priority would rocket up and collapse from year to year. They are now much more stable. It might show that we are all getting to a stage where our IT maturity presents fewer gaps and where our goals are also merging.

²⁴ <https://www.educause.edu/~media/files/educause/research/2018/2018-top-ten-infographic.pdf?la=en>

University visits: forewords

Yves Epelboin

The three universities we visited this year present a particularly interesting panorama for the French reader.

Located 200 km away, UBC (Vancouver) and UW (Seattle) look strangely similar at first glance. The American-style campuses are very similar and if we didn't pay attention to the spelling of the signs, English on one side and American on the other, we wouldn't know we were in two different countries.

The difference appears when we look at the social and political environment. As explained below, this results in completely different strategies in the use of digital technology. And it allows us to think about the limits when we want to apply the American model in France and Europe.

Colorado School of Mines (Denver) is striking for its similarity with the leading French schools: a very selective model and very technology-oriented studies. The friends of the Ecole des Mines would find their way around easily, with one essential difference. This small university follows the same curriculum rules as all other universities: a bachelor's degree followed by a master's degree and possibly a PhD. Its recruitment method, although very selective, does not distinguish it from any other higher education institution. Hence the difficulty in explaining to an American why our grandes écoles represent a completely different curriculum.

Visit to University of British Columbia (Vancouver)

Yves Epelboin & John Augeri

UBC²⁵, on the Vancouver campus, has 50,000 students and a second campus in the Okanagan Valley has 10,000 students. A public university, it primarily serves the region but boasts a strong presence of foreign students. Its total budget is CA\$2.6 billion, its staff includes 16,000 people, including 5,500 teacher-researchers. It is therefore comparable in every respect to its US counterparts and offers facilities of the same quality.

The only difference, but significant, is that the Canadian government, through all its levels (50% from the region), bears a large part of the costs. Tuition fees are in the order of CA\$5,000-6,000 for national students, which is low compared to its counterparts in the United States. Nevertheless, the cost of housing, which is very high in Vancouver, leads students to share rooms, up to three people, in university housing estates.



UBC Studios Emerging Media Lab

UBC Studios²⁶ is a department that offers all the facilities for the producing of projects around video, using new technologies. The staff consists of 14 people who are in charge of teacher training as well as the management of teaching projects. These are funded either directly by the university, through UBS Studios or by the requesting departments. Small projects can be hired free of charge by the studio. UBC Studios is also financed through external projects that may be commercial.

²⁵ UBC : www.ubc.ca

²⁶ UBC Studios : ubcstudios.ubc.ca

The projects range from the simple production of course videos - UBC is setting up a production chain that will allow teachers to film themselves - to a complete chain that goes from reflection to the complete production of ambitious and professional documents.

EML's role is to reflect on the most modern uses of technology and its integration into education: virtual reality, face-to-face filmed courses on the board... and leads monthly meetings on these topics.

Learning Spaces

UBC has a dedicated team²⁷ to set up and operate the campus Learning Spaces. The latter is part of an industrialized process involving 341 classrooms - more than 100 of which were the subject of work in 2017 - and is based on an annual budget of CA\$ 4.5M.

Design guidelines for Learning Spaces were established in 2011 and revised in 2014 and 2018. They are an unrestrictive reference document that has been used in many campus projects.

Design guidelines for Learning Spaces at UBC are based on six basics:

- Interaction: enable active and effective collaboration between users
- Technology: provide a technological level that allows to support diverse and enriched practices and uses
- Environment: designing sustainable places that can catalyse the learning experience
- Flexibility: design for a wide range of practices, with potential for evolution
- Accessibility: ensure that the design incorporates an accessibility dimension that can provide all users with the same experience
- Location: locate Learning Spaces in order to apply effective zoning, circulation and access

UBC Information Technology²⁸

Like many universities, UBC is still in a phase of recentralization of its IT resources, after a decade of rather disorganized activities. Several faculties are still autonomous. However, the UBC IT department has 450 employees and a budget of \$60 million.

The information technology budget represents 7% of the university's total budget.

UBC is not very advanced in its use of the cloud and this is mainly due to Canadian law, which is very strict about the transfer of personal data abroad. The recent installation of data centres in Canada is changing the situation: the Canvas educational platform is installed on AWS.

For the same reasons, reflection on learning analytics is still at an early stage. Our hosts consider Canadian law to be much more restrictive than the European GDPR. As for the use of blockchain, the reflection is not really underway yet.

The department is in charge of pedagogical uses and 80 people work at the Centre for Learning Technology. Students are employed on a part-time basis for various services and projects as well as to assist teachers. A committee composed of representatives from the different faculties and departments defines the direction.

²⁷ UBC Learning Spaces team

²⁸ UBC IT : it.ubc.ca

UBC IT is in charge of all aspects of online course delivery, with the participation of teachers. However, distance learning is not yet a priority. The uses are mainly aimed at students who regularly come to the campus.

In collaboration with teachers CLT also builds teaching software. The articulation with UBC studios, on the points where technologies meet, was not explained to us.

UBC has changed its educational platform to Canvas over the past year. They also use Open EdX. The satisfaction rate exceeds 90%.

UBC, in many ways, is very similar to US universities. It holds its place among the best. However, there are differences in the vision of relations with the State. The latter has not withdrawn from the institution's funding and therefore has a power of influence that brings UBC closer to European universities.

Visit to University of Washington (Seattle)

Yves Epelboin



We visited the University of Washington in 2015²⁹. Our visit this year was to understand the evolution of a university whose dynamics impressed us.

UW ranks among the top ten in international rankings, serves³⁰ 58,000 students and manages 30,000 people, including 4,400 teacher-researchers, not to mention hospitals. The annual budget is US\$3.4 billion. Like all public universities, UW suffers from the disengagement of the state: financial support has increased from 50% 15 years ago to 7% today.

Central IT

The IT organization remains highly decentralized, which multiplies the administrative levels since each department depends on its department or faculty and has no hierarchical relationship with Central IT. Central IT must therefore consider how to maintain links with both administrations and teacher-researchers. The board, which is responsible for decisions, had to be organised to take these characteristics into account.

Central IT manages all aspects of information systems, from administration to teaching and research. It has 400 people to carry out its missions, not to mention the staff employed in local services. This number represents only 32% of the total staff, the rest being 25% in medicine in hospitals and 42% distributed in departments. Only the network is entirely managed by Central IT.

The thinking and use of the cloud is very advanced. The contrast is striking when compared to the caution of Canadians in Vancouver, 200 km away!

The benefits of the cloud can be summarized as follows:

- « Pay for what you use when you use it » : resources can be resized at any time according to needs.
- « Very fast provisioning and deprovisioning » : adaptability to needs at any time. The costs are billed to the services on a monthly basis.
- « Opt in, opt out » : great flexibility in the services offered. It is possible to provide services to faculties and departments without requiring long-term commitment.

All levels of the cloud are implemented: SaaS, PaaS, IaaS.... adaptable to needs at any time while offering guarantee and robustness.

UBC works with all the major players in the sector, including Google, AWS, IBM, Microsoft... Our interlocutors insist on the drafting of contracts, in terms of real response to needs, the quality of their APIs, the choice of integration method either directly with the supplier's APIs or by developing its own abstraction layer. This last point is particularly critical in the perspective of being able to change suppliers.

²⁹ EDUCAUSE annual conference 2015. Rapport de la délégation française : https://formation.unpdf.fr/fichier/p_media/54/media_file_rapport.EDUCAUSE.2015.pdf

³⁰ <https://finance.uw.edu/uwar/annualreport2018.pdf>

Central IT must constantly overcome the mistrust of departments that often prefer to negotiate directly the purchase of services from vendors.

The reflection on the uses of the blockchain is very advanced not only to manage diplomas but also for other more original uses: management of their data by the staff, identification...

When the question is asked about the impact of the GDPR, the answer is that this problem must be considered at a broader level than that of the university and that a group of public institutions, currently being set up, will look into it; this will lead to a review of all contracts.

Use of technology for teaching

UW has been using Canvas since 2011 and Google for Education tools but each teacher and department remains free to choose.

A major effort is being made to develop tools adapted to the needs and meet all aspects of the teaching profession and students. The mail was switched to Google and Microsoft and the local system was deleted.

A major effort is also being made to provide informal learning spaces and FabLabs with a very wide range of openness and co-management by students.



Learning Analytics

The development of the uses of learning analytics, (LA), designed to improve the student experience and help them succeed, is an important area of development. A balance must be found between an administrative vision and those of teachers and students, which are necessarily different. UW wants to develop its own solutions, rejecting those of suppliers who are too oriented according to their own vision.

We are therefore seeing the simultaneous development of proposals for a dashboard for use by students and teachers and a system for monitoring the choice of courses to be taken and degrees to be obtained in order to access the degree sought. These tools are built with users according to a vision that differs according to whether they are students or teachers. Our interlocutors insist on the need to educate users on the use of

these tools because they can be dangerous if we do not understand their limits. The teachers strongly reject the implementation of an orientation tool, the killer of dreams.

Consideration is being given to the privatization of data along the lines of the GDPR because the American system is quite lax.

UW is committed to the principle of competency-based education. The reflection is led by the Department of Distance Learning (Continuum College). The three elements of the reflection being:

- Time is only a variable. Not all students have to go through a degree in the same amount of time.
- The students' objective is the most important factor
- All students must have a clear vision of their objectives and the purpose of the courses they are enrolling in.

A software tool is under development that must offer them, at all times, a visualization of the point at which they are, in pursuit of their final objective, and allow them to adapt their teaching path in a dynamic way. This has led to a review of the division of the modules into shorter elements, repeated or not, and to more flexible enrolment conditions in each term to allow students to decide on their pace and the content of their studies.

The use of LAs for predictive analysis is only in its infancy and UW is working with Berkeley on this subject.

In conclusion our visit confirmed the impression left by the previous one: UW is certainly one of the most dynamic universities we have visited, always looking for the best use of technology, in order to best serve its community.

Visite to Colorado School of Mines (Denver)

Yves Epelboin

Colorado School of Mines (CSM) is a small university, by its size: about 6300 students, 1300 accepted each year for more than 13 000 applications, 625 teacher-researchers. The school's budget was \$286 million in 2017³¹. 10% of the resources come from the State and have fallen sharply over the past fifteen years, as in all public institutions. Similarly, the number of foreign students is decreasing, following the restrictions introduced by the Trump administration.



CSM is much more like a great French school, like the Mines, than a university, in the sense we use that term in France. The main difference is that its degrees and recruitment methods do not differ from other universities. It differs only by its highly specialized themes. It is also worth noting the care taken to create esprit de corps: first-year students, for example, must reside on campus.

The history of the information system is similar to that of most American universities: information systems have been grouped together in the Office of IT since 2006. Previously they were scattered in the fifteen departments. It employs 70 people and about 30 part-time students. Its budget represents 7 to 8% of the university's budget. Administration and teaching are managed by a single IT department.

³¹ <https://www.mines.edu/about/by-the-numbers/>

The university is cautious in its choices and remains committed to a classical approach. The student information system is Banner, which is quite old. The LMS is Blackboard gradually replaced by Canvas but it seems that the teachers' choices are quite varied, the main use being limited to document storage and teacher-student communication.

All solutions and architectures must be reviewed in 2019, in order to improve the quality of services, allow for better integration and make savings. There is a feeling that the service is still in a phase of seeking the best coordination with relatively autonomous teachers to date, although the university claims to rely on technologies to differentiate itself.

The cloud is used in a moderate way, the use is essentially limited to using the operation in the cloud of the offers provided by the selected service providers (LMS...).

A Director of Data Privacy, not part of the IT department, has recently been appointed. He works closely with the security manager. Nevertheless, the GDPR does not appear to be a major concern, "the cost of the risk of not being so is not higher than the cost of complying with it". For mail the university offers gmail to students, Exchange to teachers but they get on gmail.



Computer biology lab

With regard to teaching activities, an educational engineer advises teachers who so wish. Students provide support for video and multimedia.

They have a competency-based approach that inspires instructional design but is limited by the hours of instruction provided. Despite 45,000 participants in their MOOCs, they consider it not a viable model. Finally, for distance examinations they study solutions such as Proctor U, but also Artificial Intelligence.

Colorado School of Mines is probably the university we visited that is closest to the spirit of its French counterparts, moderately involved in the most modern developments and uses of information technology. It does not give the impression that neither teachers nor students are pushing for this, and the Office of IT is affected by this in the policy it can conduct.

Transforming the student experience

Bertrand Moccoquet

What are we talking about ?

The emergence of this concept, which could be defined as an approach to the construction of the University's digital services in which students or trainees influence the content, activities, equipment and pace of use, had already been discussed in the 2017 report. The report stated that *"This evolution is reflected in the implementation of student-centred information systems, before, during and after their studies, but also and above all in exchanges and co-construction of services in a permanent dialogue with students."*(French Delegation to EDUCAUSE, 2018).

We thus understand that some institutions and universities would transform themselves into student-centered institutions with the challenge of better *"understanding and advancing the role of technology in defining the student experience on campus (from candidates to alumni)"* (Millichap & Dobbin, 2017). As a result, IT solutions take on a different form, like the user-centric solutions³² that one finds in other digital societal contexts. Digital use, addressed in French-speaking research since 2012 by Jauréguiberry F. & Proulx S. or Vidal G., would then be an entry point for the construction of new IT solutions.

It is in this state of mind that we approached the 2018 conference.

A quantitatively increasing trend over the past 3 years

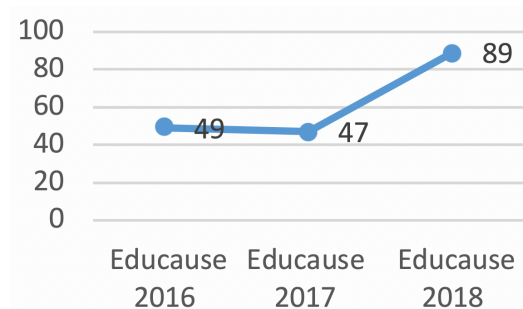


Figure 1: Number of communications of the topic « Transforming the Student Experience »

Looking at the programs of the last three years, we can see that the number of communications is increasing significantly, with this year 89 communications or posters on the topic *"transforming the student experience"*, whereas this number was less than 50 communications or posters for the two previous years.

This feedback from universities or institutions can be understood as a strong interest in this approach, which for some of the papers presented is closely linked to student success, both of which are mutually nourishing.

We have been unable to attend all the presentations in 3 days and we have focused our attention on some of them only and supplemented this presence with an a posteriori reading of the documents posted online by the speakers.

Analysis of the titles of the 89 communications: towards an annual categorization of the topics covered

We have arbitrarily selected 7 categories. The most important in terms of number of communications is digital pedagogy (39). We have grouped together all the communications that are part of a technology project applied to transforming the student's learning experience. This category contains the technologies discussed in the other parts of this restitution (LMS, Blockchain, Virtual Reality, Learning analytics...). In this category we focus more on the organizational transformation of institutions (25), or how to better involve students in the design of devices with a view to success (10), how to integrate digital use (8) while respecting accessibility constraints (3). On the fringe, we retain 2 papers on entrepreneurship and 1 on the e-reputation of students.

³² Analysis of the audience of a device by focusing on the Internet user of the site

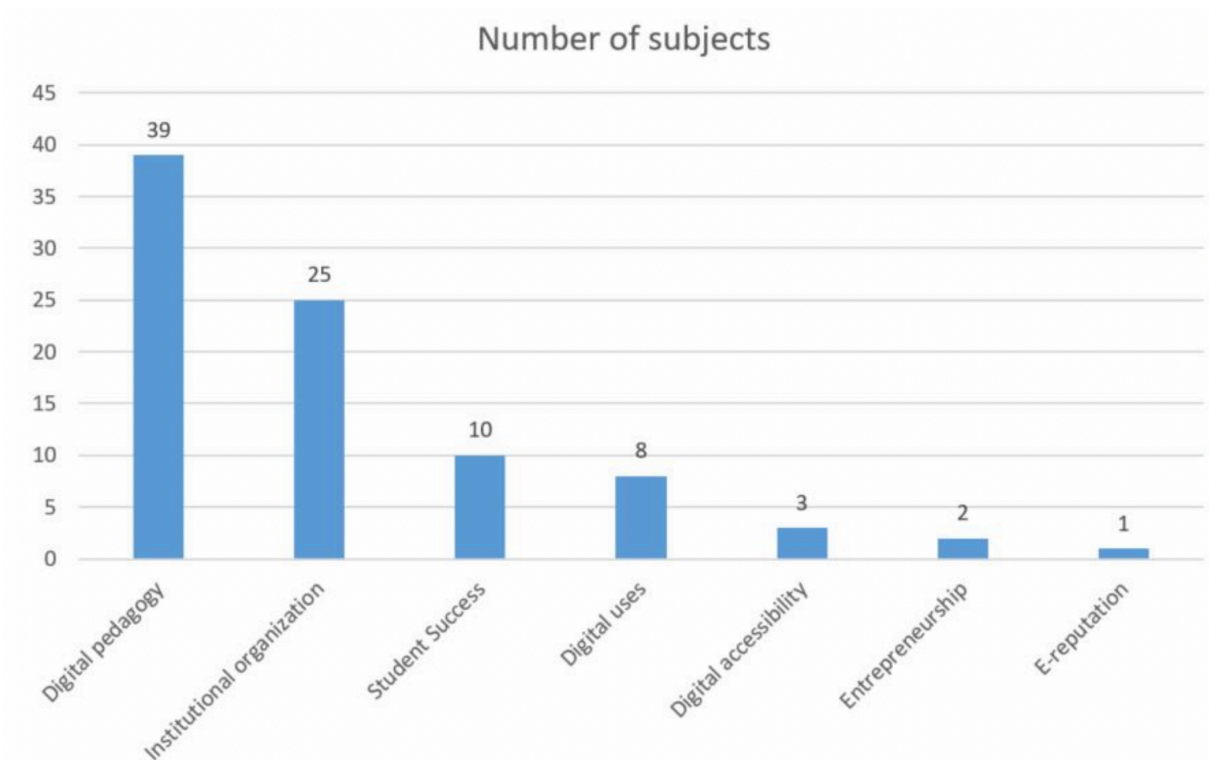


Figure 2: Distribution by major topics, EDUCAUSE Annual Conference 2018 data

What we propose to retain about the institutional organization at the service of the transformation of the student experience

We position ourselves in a logic of institutional transformation and modestly suggest, through a few North American experiences, some elements that retain our attention for the implementation of this transformation of the student experience.

The 25 communications reveal a logic of a global system positioned at the highest level of the institution's organization and the purpose of these systems centred on the user.

Examples of global mechanisms include "*Building and Sustaining a Higher Education Model for Transformative Student Success*" by the Bill & Melinda Gates Foundation and Deloitte, "*How Smart Campuses Transform Student Engagement, Health, Productivity, and Retention*" by Citylife Inc., Ucruo's "*Your Teamwork Strategy Needs Some Help*", "*Exceeding Student Expectations by Modernizing Processes Across Your Institution*" from Texas A&M University, "*Redesigning Spaces, Services, and Training for Creative, Collaborative Student Experiences*" from New York University. Among the other global services we note the use, by more than three universities, of CRM³³, cloud and communication thought 360°.

For the student-centric purpose, the following three communications seem to be emblematic of this dynamic of change: « *Blurred Lines: Creating a Unified Student Experience* » from University of Colorado Boulder, « *Leveraging the Cloud to Achieve Implementation Success and Support Institutional Change* » from the University of North Carolina at Wilmington and « *Beyond Technology: Creating the Next-Generation Student Experience* » from the Johns Hopkins University at Baltimore.

Rather than describing the different communications, we propose to deal with common thinkings, that is:

- the notion of the student experience journey,
- how to understand students' digital uses,
- and the modalities of student participation in the construction of the IT system.

³³ Customer Relationship Management

Proposals for schematizing the student experience

Reasoning a journey

The study conducted in 2016 by the John Hopkins University in collaboration with Deloitte, Epm, and Continuum U, presented at this conference, proposes a student-centered approach. When this university identified the need to replace its obsolete student information system, it seized the opportunity to rethink its overall interaction with students. As we can see in Figure 3, the approach proposes to consider the student path from the application for admission to the alumni relationship after graduation, obviously including all the student services during their studies (support, training, advice...). A real digital transformation project based on the student experience was thus born.

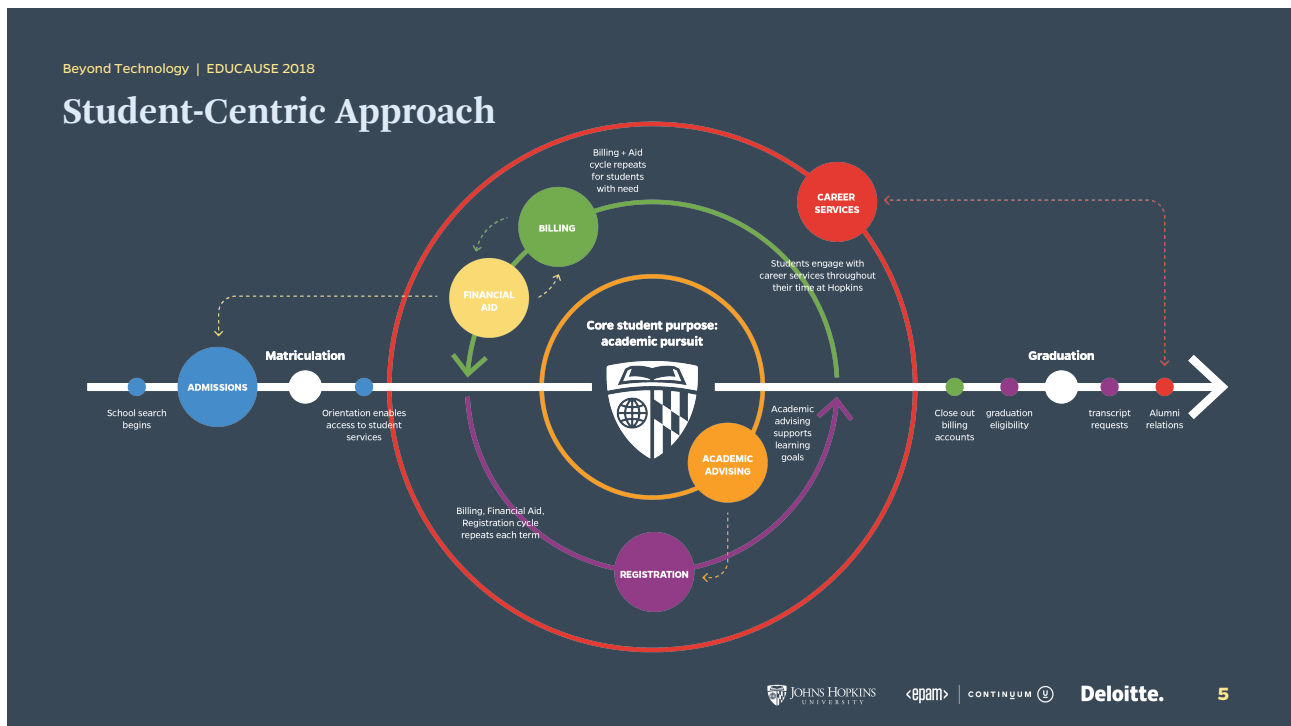


Figure 3: A student-centred approach (John Hopkins University, Deloitten Epgm & Continuum U, 2016)

Speakers advise to identify opportunities for transformation, to drive by the value of the education, avoiding failure which is costly for the student. This student-centred approach in the digital ecosystem, taking into account strategy and processes, engages stakeholders (students, teachers and staff) to build the IS in order to create a dynamic for change. This form of transformation reduces the traditional silos of the institution's organization.

Use design thinking

Another proposal for mapping the student experience is presented in another conference. This is the study conducted for Portland State University (Bass, Jhaj, Kelly, & VanDerSchaaf, 2018). The approach targets a student-centred use of the IS and proposes a scheme for changing the current student experience, shown on the left in Figure 4, into a future student experience. They draw four parallel axes to represent this change (coordinated service network, interaction map, user experience and design) and four steps (discover, design, implement and use), so that participants identify concrete ways to apply design thinking to transform the students' digital experiences into digital plans.

Design thinking is an essential skill, according to them, which makes it possible to innovate and take advantage of user-centric approach by involving the user and rapid prototyping.

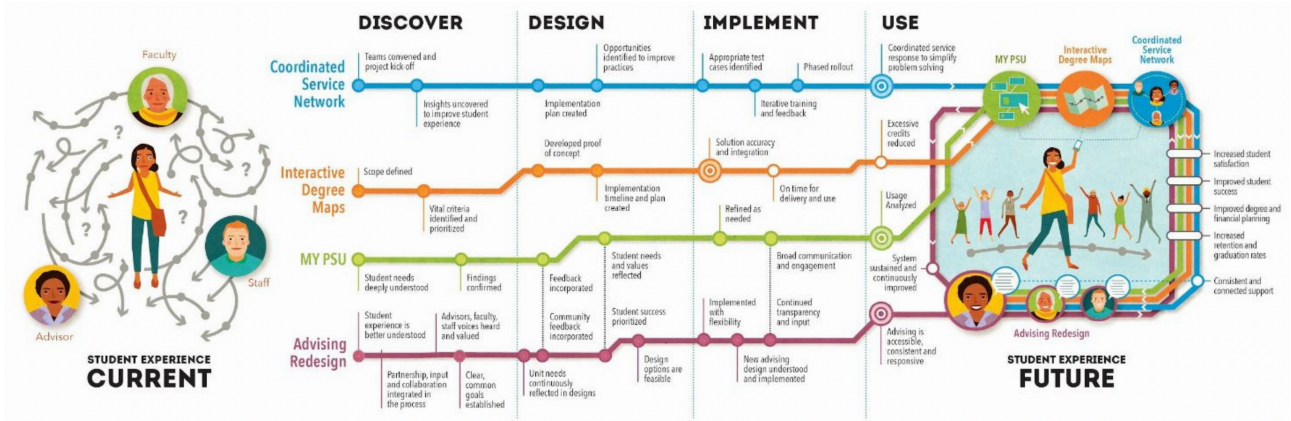


Figure 4: Building of the best student experience in a design thinking mode (Bass, Jhaj, Kelly, & VanDerSchaaf, 2018) Portland University State University

Center the points view

A third representation of the experiment is proposed by Boulder Colorado University. There were more than 100 systems offering various services to CU Boulder students, as well as hundreds of forms to initiate various processes. The USE (Unified Student Experience) project, presented as a poster at the conference, aims to remedy this by creating a single, simple starting point from which each of these systems and processes can be found. This new portal proposes that the student no longer sees which system is in the process of being filled in.

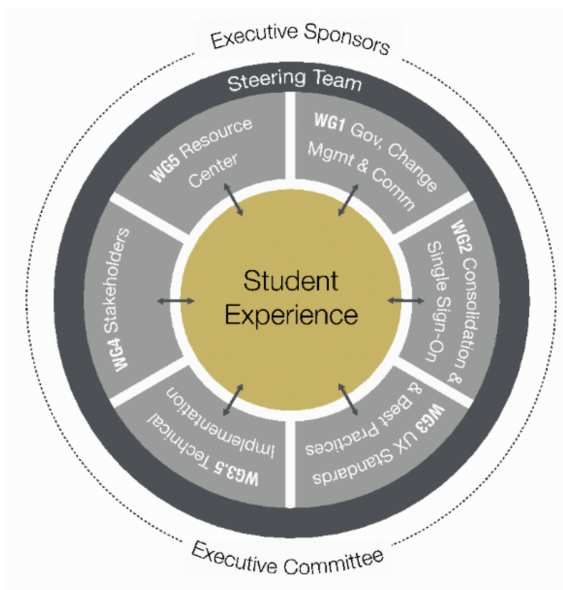


Figure 5: Creating a unified student experience at Boulder Colorado University (Paul O'Brian, Elaine Schrieffer, & Robin Swif, 2018)

Working groups have been set up to enable this transformation (strategy, single authentication, digital uses, stakeholders, process approach and user approach). Some groups are made up of students, we will talk about this point later, and it is one of the elements characterizing this construction approach.

For a better understanding of their user, the student

By using a CRM

Three universities proposed to report their current practice of customer relationship management (CRM) software in managing the relationship with each student: School of Business University of Colorado Boulder, Cornell University and Indiana University. Beyond the tool itself, CRM is a strategy for customizing student interactions with the institution, from pre-admission to graduation.

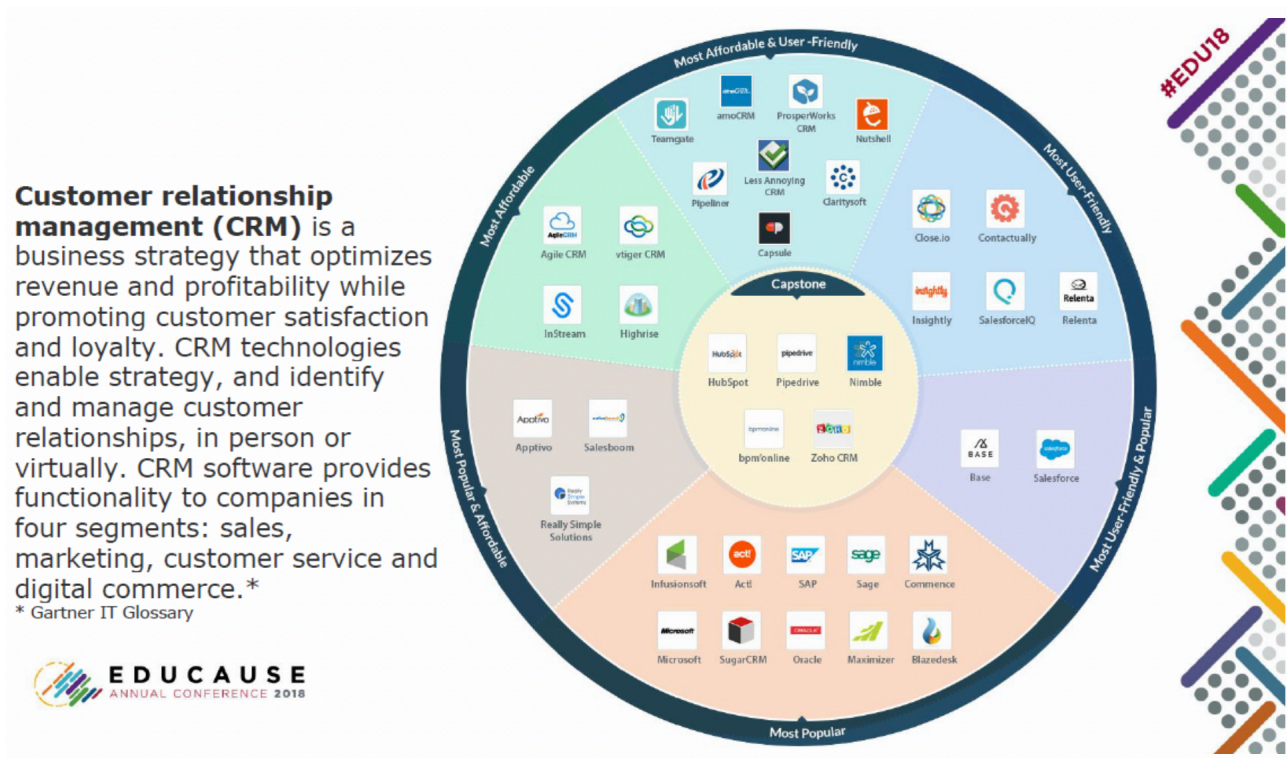


Figure 6: CRM software provides functionality to companies in four segments: sales, marketing, customer service and digital commerce

In this case study of three North American universities, we see the value of managing students as clients of the institution, since the cost of tuition fees is more than significant.

We could imagine a transfer to European universities, which would like to manage their alumni in the same system.

By implementing a stereotypical analysis approach

We return now to the 2016 study from John Hopkins University in collaboration with Deloitte,

Epam, and Continuum U. The approach proposed here, to better understand the user, is a reasoning by typology, a science of elaborating types, facilitating the analysis of a complex reality and its classification.

The proposed classification is represented in Figure 7, according to two axes of reasoning: the abscissa represents the need of the user, from the need for direction to the need to control, and the ordinate the orientation of the user, from discovery to the precise objective. Of course, the speakers pointed out that this tool provides a better understanding of users, who are by nature more complex than the four proposed profiles:

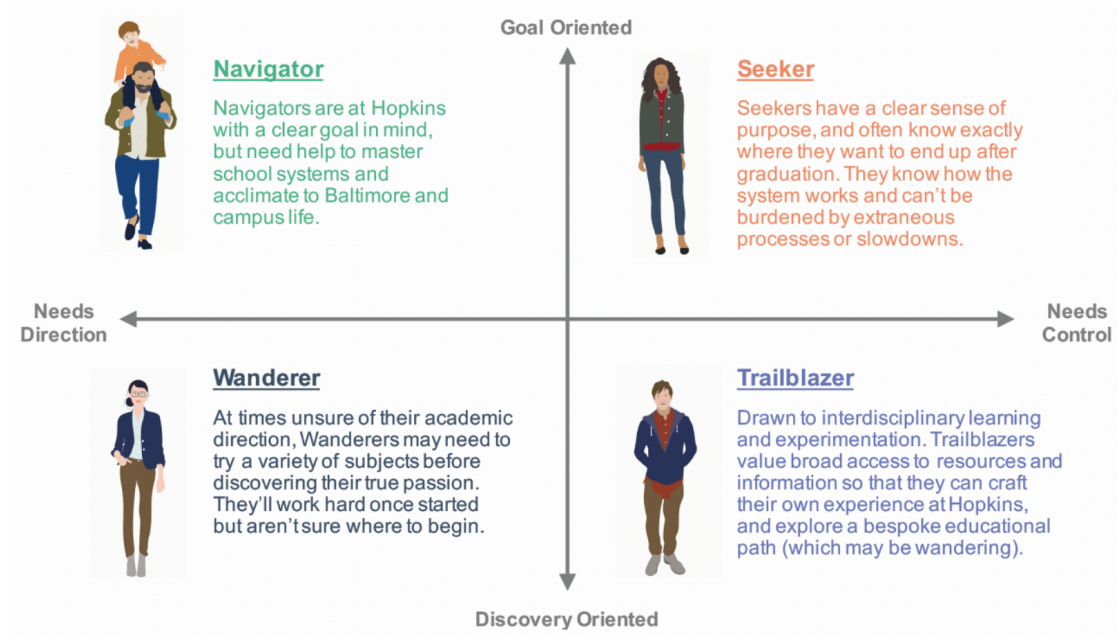


Figure 7: Student types (John Hopkins University, Deloitte, Epam, & Continuum U, 2016)

navigator, researcher, traveller and pioneer. The student navigator is at the university with a clear objective in mind, but needs to be guided to master the university system and acclimatize to the city and campus life. The student researcher has a clear sense of purpose, and often knows exactly what he wants to do next graduation. He knows how the university system works and cannot be overloaded by processes that slow him down.



Figure 8: Example of the path of the wandering student (John Hopkins University, Deloitte, Epam, & Continuum U, 2016)

The student traveller is sometimes uncertain about the direction of his or her studies and may need to try a variety of topics before discovering his or her orientation. They will work hard once they start but do not know where to start. Finally, the student pioneer is attracted by interdisciplinary learning and experimentation. He values wide access to resources and information so that he can build his own university experience. He explores a tailor-made education by making his way (which can be wandering).

The study proposes digital paths in relation to this typology. A representation is shown in this prospective comic strip.

Investing students in the construction of the digital device

Some papers, instead of using a CRM or a typological approach, to better understand the students needs, involve them in the construction of new digital devices. This inclusion of the user in the creative process is proposed through participatory devices (Matt Willmore, Kyle Shaver, & Ana Sanchez, 2018). The speakers propose strategies to involve students in building the digital ecosystem on their campus, by proposing several degrees of involvement.

Levels of student inclusion

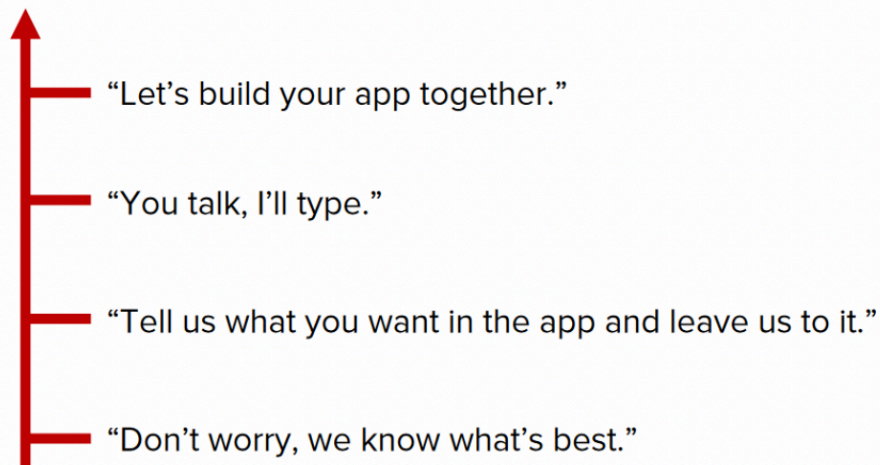


Figure 9: Students level of inclusion (Matt Willmore, Kyle Shaver, & Ana Sanchez, 2018)

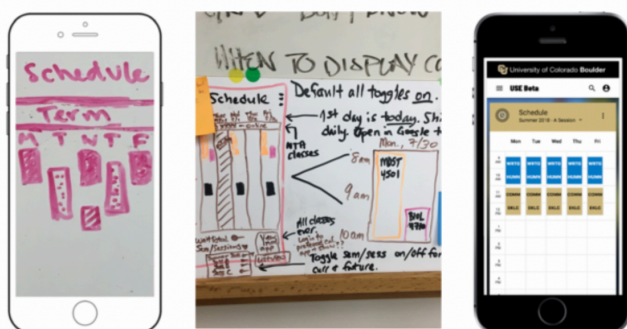


Figure 10: From the Student Workshop to Application at Boulder Colorado (Paul O’Brian, Elaine Schriefer, & Robin Swif, 2018)

Speakers reported several organizational features such as hackathons, hiring student for development teams, using user surveys and online discussions. Students are thus involved in changing the tools by designing them for their community.

This participation is also used by Boulder Colorado University, as part of a co-creation workshop. Figure 10 presents the evolution of an interface designed during a "students" workshop.

Finally, students are also involved in the creation of learning paths (Figure 11) to enable teaching teams to set up specific support paths, which are conditioned by alerts (CCRC, 2018). Students have been involved here in defining alert levels, with IPASS technology based on differentiated advice to promote

student retention. These councils provide formative assessment, and help students define, clarify and achieve their personal, academic and professional goals.

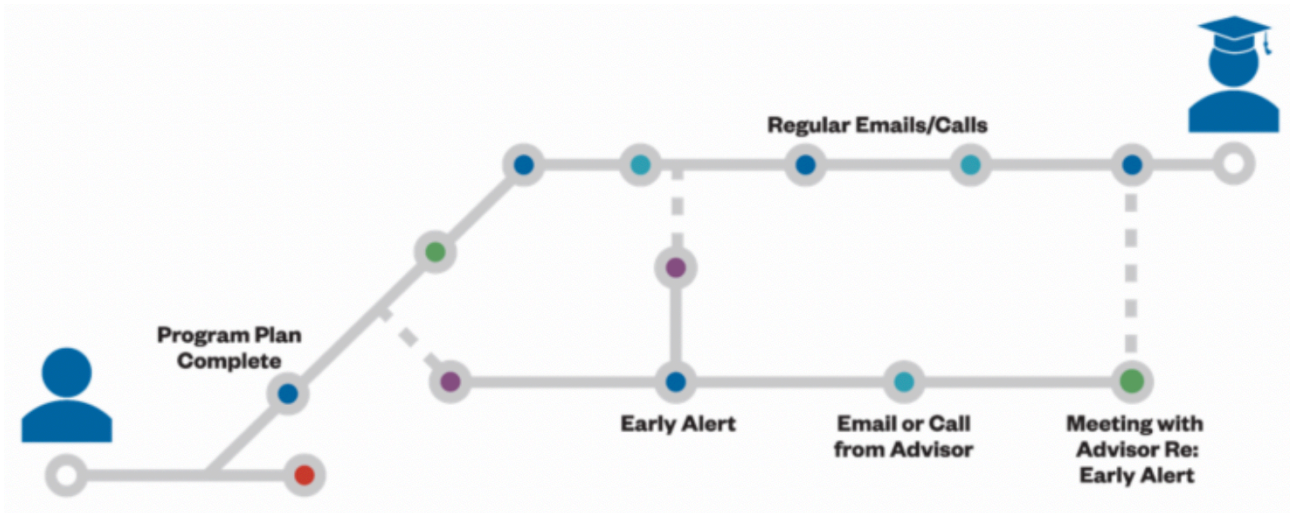


Figure 11: Specific support paths conditioned by IPASS technology alerts (CCRC, 2018)

By way of conclusion

Our choice has been to focus on a theme that has been emerging for the past 3 years, which is "Transforming the student experience". Many experiences exist in universities, whether related to the technology or to the organization of the institution, of the classroom or the campus. This student-centred approach can be polymorphic, through design thinking, by including students in the construction or by focusing several working groups. Finally, the students' contribution can be made in the ergonomics of the application or in the resolution process.

This emerging trend is confirmed today: in the *EDUCAUSE Top 10 IT Issues*, the theme moves from 5th place in 2018 to 4th place in 2019. There is no doubt that there will be even greater interest in this theme next year.

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Serving the student/customer : MOOC & Learning Analytics

Yves Epelboin

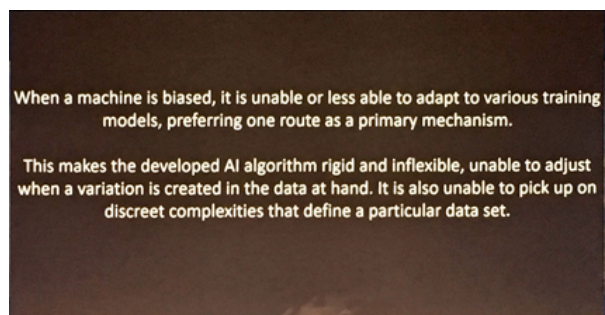
From MOOC to e-Learning

As explained in the introduction, the cost of higher education has become intolerable and universities are constantly looking for ways to reduce it, while maintaining the social and cultural dimensions for which these institutions are renowned.

The first idea was to reduce staff costs. The number of tenures has decreased but this does not bring significant savings. The idea of reusing the same course on a large scale, which was one of the arguments behind the MOOC rush in 2012 when more than 2000 people rushed to listen to Daphne Koller present Coursera at EDUCAUSE, was short-lived. In EDUCAUSE in 2018 the word disappeared and a search made, in the titles of the conferences presented during more than 300 sessions, with this keyword, returns no results!

Contrary to predictions, MOOCs have not killed face-to-face teaching. Better still, where online teaching had replaced many lectures, such as at the University of Central Florida, students are protesting and demanding a step back.

But MOOCs have not disappeared. MOOC and online education converge³⁴ and merge into online education. MOOCs have boosted distance learning, disrupting the teaching methods used and American universities have taken advantage of it to transform their approach to lifelong learning.



Many universities are developing their distance learning departments, either alone or with MOOC, Coursera and EdX providers mainly, in order to expand their clientele, often in the case of public universities with the idea of attracting students from outside their state. These new clients do not require the costly investments required for those studying on campus and this reduces registration fees. At the same time, MOOC platforms are abandoning free

access for a kind of freemium where only those who pay can access all resources, controls in particular, and keep permanent access. New forms of partnership are being established. We were already discussing it last year in the e-learning chapter. Coursera is starting to offer comprehensive health training³⁵ at prices unimaginable until now. Arizona State University offers a first year of general studies in partnership with the same supplier in the form of a series of mandatory MOOCs. If the test results are deemed sufficient, students can convert all these certificates into a first-year equivalency. This approach is a win-win situation for all, for ASU by attracting new students, for them not only at a very low cost of their studies but also by a lower risk because early drop-out only forces them to pay for MOOCs already completed and not for complete semesters. Even a university as prestigious as MIT has converted to it by offering micromasters with a first semester in the form of MOOC, a second semester more classical either at MIT or in one of the partner universities that are among the best in the world³⁶.

³⁴ Campus Technology septembre 2018 <https://bit.ly/2FCpUJau>

³⁵ Inside Higher Ed janvier 2019 <https://bit.ly/2W7cqbv>

³⁶ MIT News septembre 2016 <https://bit.ly/2cF7equ>

The contribution of learning analytics

Learning analytics is one of the hot spots of EDUCAUSE 2018 but in a vision that often differs from that of Europeans. The first reason is that Americans are, so far, much less sensitive than Europeans to the exploitation of personal data, which allows them to consider many more uses of the mass of information that exists in university information systems. The difference in approach between Columbia University's extreme caution and Washington University's enthusiasm, which we noted during our visits this year, is the most obvious example: 200 km away, a much more restrictive law prohibits virtually all use of Learning Analytics in Canada. The second reason is mainly economic and wants to answer the painful financial question: how to better satisfy the student client by improving the productivity of studies.

In Europe, the main focus is on the construction of dashboards to allow students to know at any time where they stand in their semester³⁷ ; in the United States, the first use, already noted at EDUCAUSE 2017³⁸, is to allow students to define their own pace of study according to their objectives and possibilities. The construction of dashboards comes far behind.

The notion of microlearning, i.e. micro-degrees, which lead to a diploma, directly inspired by MOOCs, is becoming widespread at all levels in classroom teaching. Universities divide their courses into micro-courses and increasingly offer students a tailor-made course of study that should lead them to the desired degree by giving them greater freedom in choosing the course and allowing them, for example, to select only those modules directly related to their professional project. The example of the University of Washington, presented in this report, is a telling example.

Contrary to what one might think, relatively few universities use dashboards, but many are considering them. Listening to the discussions during the conference debate of K. Arnold (Wisconsin U.), R. Pappas (Oregon State U.) & S. Teasley (Michigan U.)³⁹ we get the feeling that the sellers are the first ones interested. The idea is to gather as many data sources as possible, more than six on average in the examples mentioned, from institutional databases but also from sources more related to personal life such as participation in various social activities on campus (sports, cultural activities, use of collective facilities... paid for through the student card), and, more generally, grouping under one roof and analyzing all traces left on campus.

These groupings and proposed uses would not be allowed in Europe. It is amazing to see how personal information is used not only for its owner but also to create dashboards for teachers, mentors and even parents (who pay for education)! Americans remain visibly less sensitive than us on this subject.

The analyses presented do not show a significant increase in student results, less than 10% most often. One hypothesis put forward by the speakers is that it is not clear that students understand the meaning of the graphs in their personal dashboard: the effectiveness of a dashboard depends as much on the quality of the presentation as on the analysis of the data. But nothing is said about the relevance of the analyses themselves.

Learning Analytics : relevancy of the algorithms

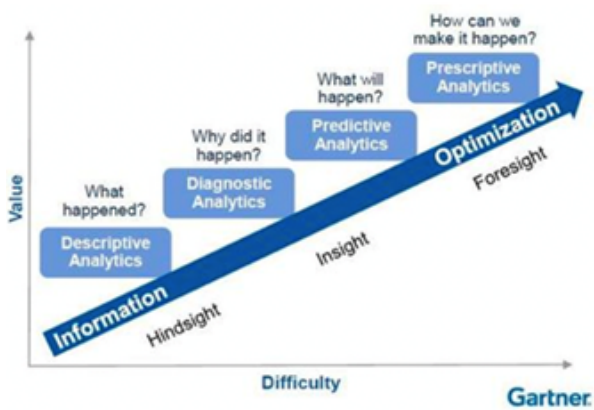
There is very little mention of the analytical methods on which learning analytics is based. Based on the use of artificial intelligence and statistical analysis, their objective is to help students pursue their studies, pass their exams and choose the courses best suited to their objectives, taking into account their desires and financial means.

Little is said about how algorithms work, which is why universities may prefer to use an internally developed solution rather than tools offered by industry. From the beginning of the EDUCAUSE 2018 conference, a panel of experts (K. Arnold Wisconsin U., P. Long Georgetown U., I. Palmer New America Foundation & J.

³⁷ Project SHEILA <https://sheilaproject.eu>

³⁸ EDUCAUSE French Delegation report 2017 <https://bit.ly/2FEyJQR>

³⁹ Learning Analytics Dashboard for Teaching and Learning <https://events.educause.edu/annual-conference/2018/agenda/learning-analytics-dashboards-for-teaching-and-learning>



Gartner cited in Anadiotis (2016)
<https://tinyurl.com/y75advh8>

Whitmer Data Scientific Analytics) demystified the use of predictive learning analytics⁴⁰. They denounce the distance between theory and practice, a mixture of algorithms and manual adjustments that require historical data to constrain the data.

Georgetown's developments are mainly based on statistics and P. Long warns against suppliers' black boxes. His colleagues agree and the conclusion is that if we begin to be able to predict the chances of success of students, it is still difficult to distinguish the reasons for this because the behaviours are varied and difficult to analyze. The difficulties are both technical and cultural and care should be taken not to generalize an algorithm, which seems to work on a sample, to entire communities. There are also ethical issues in data analysis. In short, these experts remain cautious about the reliability of predictions.

On the other hand, other speakers (A. Chanen Strayer U. & M. Gunkel Indiana U.) are convinced of the contribution of learning analytics⁴¹ and claim to be able to measure student performance using Google tools. But little is said about how this is done and they agree with the previous authors on the difficulty of generalizing the rules to a large community of individuals. They are convinced that this will happen and urge academics to overcome their fears.

The Association for Institutional Research (AIR), NASPA (Association of Student Affairs Administrators) and EDUCAUSE⁴² presented the results of a research project on the use of data and analysis in higher education for student success. 96% of institutions that use Learning Analytics are convinced that it improves student outcomes, 76% believe it results in better quality programs and services, and 39% believe it has enabled them to eliminate or reduce the number of programs that "contribute little or nothing to student success". It remains to be defined what it means to contribute to success in terms of courses.

T. Benson, in a plenary session⁴³, warns against the bias of artificial intelligence. "Any bias in the data and in the models themselves can lead to subtle and unexpected results. "He therefore warns the audience against any blind belief in the tools they would be led to use.

⁴⁰ "Demystifying AI Predictive Analytics" <https://events.educause.edu/annual-conference/2018/agenda/demystifying-ai--predictive-analytics-in-higher-education-practice>

⁴¹ "How Analytics and Machine Learning are transforming Education" <https://events.educause.edu/annual-conference/2018/agenda/how-analytics-and-machine-learning-are-transforming-education>

⁴² NASPA 2018 Institutional use of data and analytics <https://bit.ly/2Mlyef5>

⁴³ <https://events.educause.edu/annual-conference/2018/agenda/featured-session-5>

Learning Analytics and adapted teaching

In 2016 and 2017, we saw the emergence of the use of learning analytics to build in real time the sequence of documents within a course, by analysing student behaviour. The movement continues in 2018 but it is not increasing. The construction of these courses requires adapted pedagogical platforms. Suppliers are divided into two groups: platforms designed for teachers to build their own courses (in the pedagogical vision of their creators) on the one hand, and those of publishers, on the other, which effectively propose a new form of the digital book. Perhaps one of their main motivations is that with the growth in the use of open resources they see the end of their monopoly and therefore a new path where it will be much more difficult to compete with them, given the colossal work required to build these new structures. Thus Dale Johnson of Arizona State U., one of the speakers does not hide from wanting to sell the biology courses that his university is developing to amortize their investments.

A group of universities grouped within the APLU (Personalized Learning Consortium)⁴⁴, the PSL (Personalized Learning Consortium) is experimenting^{45 46} this approach to pedagogy. Two difficulties should be noted: the necessary investment in the construction of these courses is substantial and the need for pedagogical engineers to have a much better understanding of the field than in their current interventions. In fact, a majority of experiences are based on courses provided by publishers.

Progress is being made by students who are doing better. The speakers cited the figure of 2.48%, pointing out that there is little difference between those who worked the entire course and those who only half took it. They also find that there is no significant decrease in the failure rate. This conclusion, in itself, is not new in the use of technologies.

There is also a psychological difficulty: some students feel bad the fact that they have to spend more time in a course than others.

In conclusion, learning analytics is expanding rapidly, mainly as a decision-making tool to enable students to choose the best course according to their objectives and aspirations. This is accompanied by a redrawing of the course modules to allow greater flexibility in the construction of curricula. We are moving from an education where choices are forced to an à la carte education. The dashboards are being set up with a view to helping students but also to support a form of tutoring. Software vendors are beginning to introduce solutions that build on universities' main data sources. With regard to adaptive learning, the movement is much slower due to the complexity of course delivery. Publishers seem to want to invest massively in this field.

⁴⁴ APLU <https://bit.ly/2MncBuN>

⁴⁵ <https://events.educause.edu/annual-conference/2018/agenda/tbd-etrack-bmgf>

⁴⁶ <https://events.educause.edu/annual-conference/2018/agenda/adaptive-learning-courseware-a-case-study-in-improved-learning-outcomes>

3D printers as sketchbooks

Christine Marle

« *If an image is worth a thousand words, a printed object is worth a thousand images.* »

Alex Lobos

Introduction



In Denver, the introduction of an article on 3D printing is self-evident: The giant lapis lazuli-coloured bear created by sculptor Lawrence Argent, camped on his two hind legs, snout glued to the glass facade of the Convention Center, was first a model made by CAD software and a 3D printer before being a giant 40 feet high. Can we dream of a more spectacular illustration of the possibilities of 3D?

The 2018 EDUCAUSE year is not one of those years when a radically new technology emerges, as were the clouds, artificial intelligence and the Blockchain in their time. This is a year in which we look at existing

technologies and question their contribution and applications in the field of education.

Many presentations dealt with the pedagogical uses of virtual or augmented reality. The presentation of a project at the Rochester Institute of Technology involving the use of 3D printers contrasts with this influx of virtual objects and other holograms. Have 3D printers, a relatively old technology, taken their place in higher education? When this is the case, is it just another gadget in the geek teacher's toolbox, or is it an opportunity for real pedagogical innovation?

Projects that involve the partnership of several actors

3D printing involves several technologies: hardware, i.e. the printers themselves and software, with object scanning and modelling software. The project entitled "3D Printers for Sketchbooks: A Guide to Iterative Object Design" presented to EDUCAUSE by Alex Lobos⁴⁷, Director of the Department of Industrial Design at the Rochester Institute of Technology (RIT)⁴⁸ and Stan Rickel⁴⁹, Associate Professor of Industrial Design, is the result of a partnership with giants in their respective fields: the 3D printer manufacturer MakerBot and the publisher Autodesk, with the Fusion 360 solution.

MakerBot⁵⁰, a Brooklyn-based American 3D printing company, is a leader in the field of connected desktop 3D printing. MakerBot is part of the Stratasys group⁵¹, a leader in the field of modelling. MakerBot operates

⁴⁷ https://artdesign.rit.edu/media/uploads/faculty-f-projects/569/documents/386/lobos_cv_042718.pdf

⁴⁸ <http://www.rit.edu>

⁴⁹ <https://artdesign.rit.edu/faculty-staff/153>

⁵⁰ <https://www.makerbot.com>

⁵¹ <https://www.stratasys.com>

Thingiverse⁵², the world's largest 3D printing community. Thingiverse has more than 2 million 3D objects to print and this 3D model bank is growing very fast. MakerBot donated four 3D printers so that students could access them at any time to touch up their prototypes.

Autodesk⁵³ provides teachers and students with free CAD software, including Fusion 360, which allows them to design industrial prototypes and objects of all kinds. There are many 3D modeling software programs, some specialized in architecture, industry, video games... Autodesk has also made some of its products freely available for non-commercial use (ThinkerCad, 123Design). On the open source side, there are also solutions, such as FreeCad.⁵⁴

The objective of the course was to show that the object creation process is not linear but iterative: The use of the 3D printer, when the project is still at an early design stage, allows, through an iterative process of tests, tests and adjustments, to refine or modify the model to achieve an optimal object. The session was held in spring 2018. In addition to the donation of 3D printers (Fusion 360 software is free for education), students received advice and feedback from MakerBot and Autodesk engineers several times during the quarter.

The industrial partners accompanied the students until the end of the project, as the final objects were presented at the NYCxDesign⁵⁵ event held in May 2018 at MakerBot's headquarters in Brooklyn.

3D printing technology studied as an industrial process in the university curriculum

3D printing or additive manufacturing is a process by which a digital object is reconstituted layer by layer, by the successive addition of material (metal, polymers, ceramics...). The 3D printing process has been in existence since the mid-1980s. It was first reserved for the industrial world, then spread to the general public in the 2010's, with the launch of affordable models, some of which are even designed for children, such as the "I DO 3D" pen. So it's not a recent invention. This technology is revolutionizing the way objects are designed and manufactured. It offers unlimited flexibility and customization possibilities, in sectors as varied as medical (especially with bio-printers, but also for the manufacture of custom-made prostheses), aeronautics, transport, fashion, and even construction. Since 2017, it is now possible to print your 3D house in only 24 hours! NASA has even tested 3D printing in space. Almost all industrial manufacturing uses additive manufacturing, whether to develop prototypes or to manufacture the product for the user. This fast-growing market is expected to reach nearly \$14 billion in 2019! Knowledge and mastery of these techniques are clearly valuable assets on the job market. It is estimated, for example, that the bio-printers market is expected to grow by 36% by 2022.

To meet these growing needs, it is therefore essential to include 3D printing as an industrial technique in university curricula, hence the importance of equipping industrial design, architecture and design institutions. An inter-ministry study⁵⁶ published in January 2017 identifies the economic sectors where additive manufacturing is growing most rapidly: aerospace, medical, industry, construction and automotive. These sectors represent more than 60% of the additive manufacturing market, with growth rates of 15 to 25% over the next five years.

At the forefront of this technology, RIT integrates this specific learning into its industrial design courses. All major American universities include additive manufacturing in their industrial manufacturing and object design programs, and have FabLabs that house 3D printers, such as The MILL (McCarty Innovation Learning Lab)⁵⁷

⁵² <https://www.thingiverse.com>

⁵³ <https://www.autodesk.fr/education/free-educational-software>

⁵⁴ <https://www.freecadweb.org>

⁵⁵ <https://www.nycxdesign.com>

⁵⁶ <https://www.entreprises.gouv.fr/etudes-et-statistiques/futur-fabrication-additive-pipame>

⁵⁷ <https://hfs.uw.edu/The-MILL/Maker-Space>

at Washington State University UW where an impressive variety of machines are available to students. One example in France is the « composites and polymers ⁵⁸» of Bretagne Sud University. Manufacturers have understood the strategic importance of the education sector. All of them offer dedicated teaching offers, with a wide range of prices. Some offer education packs⁵⁹, with printer, accessories and polymer material.

3D printing opens the imagination, the iterative process refines it

In the example presented at EDUCAUSE 2018, working in project mode helps to understand the process of designing an object by living it. The creative proposal submitted to this industrial design class is to design an object for the general public that interacts with the wrist and is useful in everyday life.

The infinite possibilities of 3D stimulate the imagination. The idea may come from similar objects, but sometimes it comes from the observation of other structures, from the organic world, the structure of a leaf or that of a molecule. The objects designed in this project illustrate this imaginative abundance. Most of the students worked on the idea of a bracelet.

Here are some of the creations of Alex Lobos' students:

- A sophisticated speaker bracelet with a fashionable design,
- An ergonomic dog leash,
- A very visual shopping list,
- A connected bracelet that reacts when a "match" previously spotted on a dating site is within sight. To the one who wears the bracelet, thus warned, to act accordingly....,
- A bracelet that provides the handyman with all possible and imaginable screwdriver bits,
- Etc.



⁵⁸ <http://www-facultesciences.univ-ubs.fr/fr/formations/formations/licence-DC/sciences-technologies-sante-STs/licence-polymeres-et-composites-program-3spi26-217-3spipc/materiaux-et-impression-3-MA1501U/impression-3d-IMS1501T.html>

⁵⁹ <https://www.makershop.fr/imprimantes-3d/2244-pack-education-raise3d-pro2-plus.html>

An iterative process

The process proposed in Alex Lobos' course mixes the different forms of representation of an object, which complement each other without completely replacing each other. The research phase on a whiteboard or sheet of paper is not deleted by software tools or machines. At the beginning of the project, it allows you to set your ideas. It is also an important step if the project is collaborative.



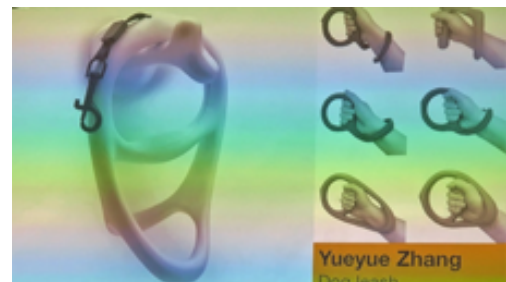
The combined use of modelling software and 3D printing gives speed, accuracy and flexibility.

The 3D modeling of the object makes it possible to understand the volume and proportions of the object quite correctly. But to evaluate the relevance of these parameters, nothing beats the object in hand. It is at this stage that 3D printing becomes very useful and allows corrections to be made early in the design process. Direct access to the 3D printer allows you to consider the object in

volume as a sketch, as a modifiable step. Alex Lobos insists: contrary to what is usual in a linear creation scheme, printing the object should not be the last step. It is a phase that allows us to compare the object we have designed with its real use, and to adjust it. You can file the printed object, modify it, write on it. It is appropriated, knowing that it has cost "only" material. Some programs allow you to print in low quality and save consumables. Handling provides a finer, more "user" understanding of the object. After a "draft" impression, we return to the modeling tool to make adjustments until the optimal design is achieved. Once their prototype was in hand, the students all returned to their CAD files to rectify their model. Some even used clay to readjust their prototype, scan it again and rectify their model with Fusion 360.

The iterative process is illustrated below with the different shapes of the leash handle. The iteration made possible by CAD and 3D printers is beneficial for learning. By repeating a process and improving it, the student becomes more and more familiar with the tools (software and printer). He gains in confidence and autonomy.

The iterative process encourages experimentation and fun. It reduces the drama of mistakes. Failure no longer exists. There are only steps to focusing on the perfect object.



3D printing as a learning support

In addition to courses related to the creation of objects, whether industrial or artistic, a 3D printer also provides many services in other curricula: history, science, physics courses... It allows the teacher to create objects to illustrate his lessons, using 3D object libraries such as Thingiverse⁶⁰ mentioned above or other 3D object banks such as 3D Pinshape⁶¹, X 3D⁶². Articulations, molecules, hieroglyphics, the list of possibilities is endless. These objects, which can be passed from hand to hand, observed and/or used by students, will illustrate a concept and mark the students' minds.

⁶⁰ <https://www.thingiverse.com>

⁶¹ <https://pinshape.com>

⁶² <https://3d.si.edu>

Few downsides

The presentation of the project led by Alex Lobos at the RIT highlighted the very positive aspects of 3D printing for education. Nevertheless, it is necessary to mention the obstacles and more negative aspects of their use.

Cost remains the first barrier, even if the technology has become more democratic. In addition, to carry out a project similar to that of the RIT, the 3D printer used as a sketchbook, several printers (in this case, four for about twenty students) are required. The manufacturer MakerBot has understood the importance of the education sector and is investing heavily in it. This arrangement, which has very positive aspects, since students learn to use this technology in this way, also has the effect of imposing the brand on the market, and making the future user captive.

The cost of printers is not the only one to be considered. There is also the cost of consumables, which varies greatly depending on the material. The most commonly used polymers, PLA or ABS, cost more than \$40 per kilo, which makes it possible to manufacture between 12 and 15 medium-sized parts. It should be noted that the choice of materials is considerably wider, especially with recycled materials, and even paper paste⁶³!

Another issue raised by the use of 3D printers concerns health. These printers emit micro-particles. They also emit chemical vapours, depending on the material used. These risks led the RIT to alert users and publish recommendations⁶⁴ for the user (do not stay in the immediate vicinity of the printer while it is running, do not eat or drink next to it, etc.), and upstream for the choice of printer (choose a closed model when possible).

Conclusion

The use of 3D printers is constantly expanding. It is a technique that is fully in line with our times, when recycling and the fight against programmed obsolescence are becoming survival issues. A private individual can now print spare parts for his household appliances, and even create the objects he needs. It is now possible to subscribe to a FabLab as it is done for a sports hall.

As for the designer whose job it is, with a rough draft object in hand, like a sculptor, he moves from one tool to another, from one technique to another, and his possibilities are multiplied tenfold, and with them, the pleasure of creating. With 3D printing, the student acquires the status of a creator, which is not so common during university studies..

In a world where there is much talk of virtuality, the tangible object retains a reassuring strength and reality. As Alex Lobos so rightly said, if an image is worth a thousand words, then a printed object is worth a thousand images. Our blue bear from the Denver Convention Center is strangely named « *I see what you mean* ». What a happy coincidence !

⁶³ <https://www.3dnatives.com/paper-pulp-printer-3d-09112018/>

⁶⁴ <https://www.rit.edu/fa/grms/ehs/content/3-d-printer-safety>

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<https://www.silicon.fr/impression-3d-14-milliards-dollars-229283.html>

⁶⁵ <https://events.EDUCAUSE.edu/annual-conference/2018/agenda/3d-printers-as-sketchbooks-a-guide-to-tangible-iterative-design>

⁶⁶ https://artdesign.rit.edu/media/uploads/faculty-f-projects/569/documents/386/lobos_cv_042718.pdf

⁶⁷ <http://www.rit.edu>

Learning Spaces

John Augeri

Innovative physical spaces (Learning Spaces) continue to feature prominently in the current and future topics listed by EDUCAUSE, particularly at the EDUCAUSE Learning Initiative level. The 2018 conference dealt with them especially through the following four sessions.

In addition to the traditional annual meeting of the Learning Space Design Community Group, a one-day pre-conference workshop addressed the tooling dimension by presenting cases of use of the Learning Space Rating System and FLEXspace (see below).

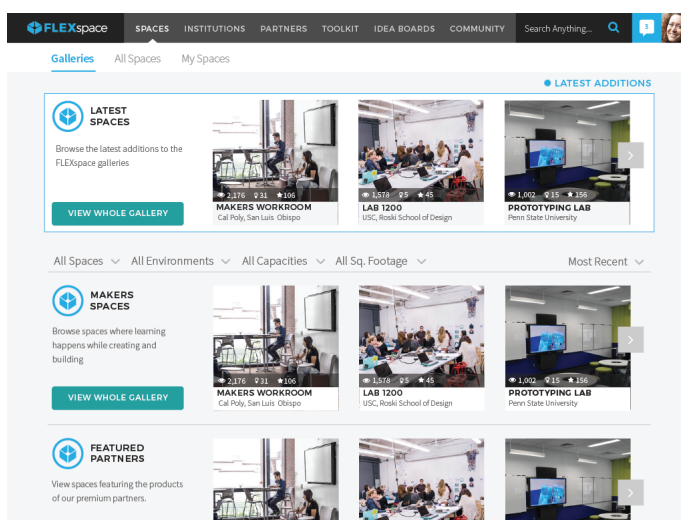
Two other sessions were more oriented towards survey and feedback: the first focused on the rise of the informal spaces and was led by the author of this article, and the second on the collaborative approach in the spaces and services design through the New York University experience.

Tools

The annual EDUCAUSE conference is traditionally an opportunity to raise awareness and review two major design and evaluation tools for Learning Spaces: FLEXspace and the Learning Space Rating System. Already discussed in previous editions of the French delegation's report, these two tools confirm their implantation in the landscape and pursue their respective development while presenting an increasingly marked complementarity.

FLEXspace⁶⁸

The FLEXspace online repository underwent a major evolution in early 2018 with the release of version 2.0, which clearly focused on ergonomics and compliance with mobile devices. In terms of content, FLEXspace now features nearly 1000 spaces of all types (Active Learning Classrooms, Learning Centers, Learning Commons, etc.).



Another new feature: the establishment of a formalized research activity (the FLEXspace Research and Evaluation Working Group⁶⁹), which is connected to the database contents. The topics covered include evaluation criteria for stakeholders, the use of FLEXspace and LSRS (see below), design schemes for use indicators and hybrid virtual and physical spaces. Access to FLEXspace remains open and free of charge to the university community, and the author of this article is in charge of international activities.

⁶⁸ <http://www.flexspace.org>

⁶⁹ <http://flexspace.org/frewg/>

Learning Space Rating System (LSRS)⁷⁰

The LSRS version 2.0, available since 2017 in its original version, has been translated and adapted into French⁷¹ and Japanese⁷² by the author of this article. It is reminded that this system provides a common terminology and evaluation framework, in particular targeted at Active Learning Classrooms.

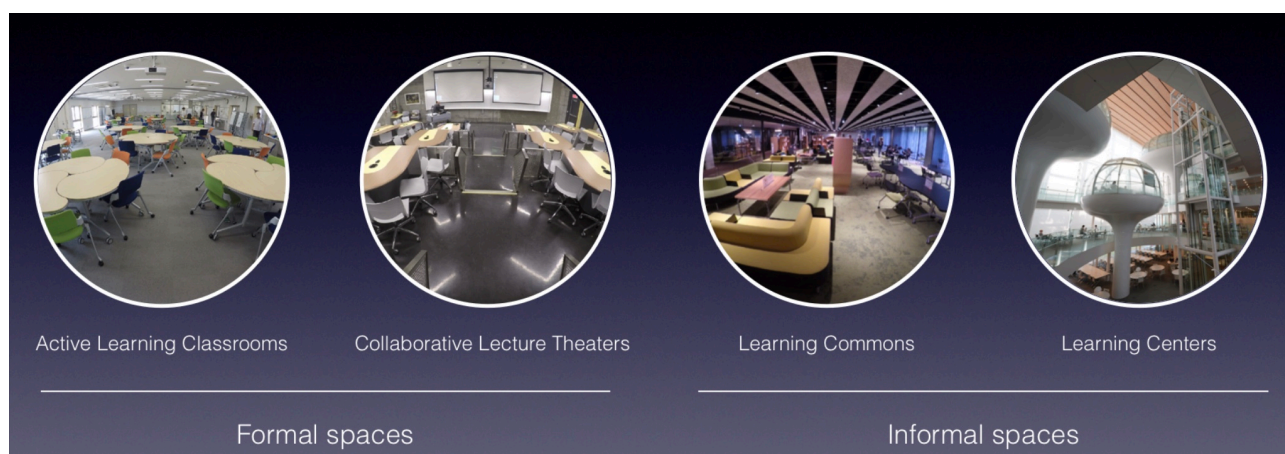
Addressing a broad spectrum of dimensions relating to the settlement of such a space (governance, operations, technological and furnishing, comfort, etc.), the LSRS provides inspiration from the good practices listed in the booklet accompanying the evaluation grid, and allows to use the latter to obtain a qualitative predictive score for a non-existent room and to compare itself with already existing other ones. FLEXspace increasingly features the LSRS scores of the Learning Spaces listed.

The pre-conference workshop entitled “Tools, Traits, and Teams: Planning and Assessing Effective Learning Spaces⁷³” proposed to use these two tools as part of an overall approach to designing and evaluating Learning Spaces.

The documents and guides used during this day are freely downloadable.

The rise of informal spaces

For the second consecutive year, the author of this article led a session on Learning Spaces at the EDUCAUSE conference, this time focusing on the development of informal spaces⁷⁴ (Learning Centers and Learning Commons in particular).



The international comparative study carried out, and already the subject of last year's session⁷⁵, confirms a significant shift in the thinking and projects carried out by governances in favour of integrated informal spaces, on the four continents observed.

⁷⁰ www.learningspaceratingsystem.org

⁷¹ <https://www.educause.edu/~media/files/educause/eli/initiatives/lrs-v2-french-translation.zip?la=en>

⁷² <https://www.educause.edu/~media/files/educause/eli/initiatives/lrs-v2-japanese-translation.zip?la=en>

⁷³ <https://events.educause.edu/annual-conference/2018/agenda/tools-traits-and-teams-planning-and-assessing-effective-learning-spaces-separate-registration-is-required>

⁷⁴ <https://events.educause.edu/annual-conference/2018/agenda/the-rise-of-informal-learning-spaces-design-challenges-assessment>

⁷⁵ <https://events.educause.edu/annual-conference/2017/agenda/learning-spaces-around-the-world-an-international-comparative-study>

The Learning Commons and Learning Centers thus benefit from a very special consideration in strategic decisions, whereas only a few years ago the majority of them were in favour of Active Learning Classrooms. The study also shows that a very significant proportion of the latter remain confined to the experimental level, despite the diversity and quality of practices that can be observed in some cases. An Australian study also illustrated this change by citing the time spent by students in informal spaces as three times more important than in formal spaces (and particularly in Active Learning Classrooms).

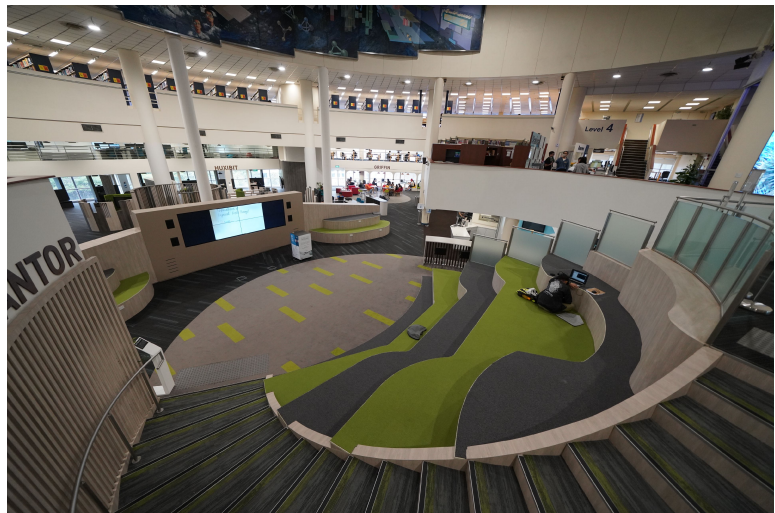
The furniture and technological equipment of these informal spaces was also discussed, highlighting an analog/digital mix as the users' favourite, and even a trend towards "low-tech on purpose" in some Learning Centers that rely more on human support. Examples of new services implemented were also mentioned, demonstrating in particular their diversity and their focus on users.

Still concerning the design of the premises, the notion of zoning has been identified as a major component. This physical and functional subdivision of spaces aims in particular to respond to a diversity in the typologies of uses. The timelapse video technique used by the author allows to highlight the dynamics of the spaces as well as the attractiveness of the different zones composing it.

The discussion also focused on the phenomenon of increasing concentration on campuses concerning Learning Spaces, which consists in locating all or most of them in an iconic building that holds innovation for the institution.

Finally, the integration of informal Learning Spaces within their campuses and territories has been illustrated through the competitive dimensions they may face. First, university libraries, which are particularly affected by these changes, since a large majority of Learning Commons are indeed hosted within them. When a synergy exists between these two places, a leverage effect is clearly and effectively observed in terms of attendance.

Also mentioned is the potential competition with non-university actors capable of providing informal spaces, such as coffee shops in Japan for example, which are part of a clear response to the basic desires expressed by users for informal spaces (WiFi & power supply, possibility of drinking and eating, "cozy" space), and in students' lifestyles, which may however differ significantly according to the territories observed.



Lee Wee Nam Library
Nanyang Technological University, Singapore

The collaborative approach in the design of spaces and services: the examples of NYU

New York University (NYU) had the opportunity to present⁷⁶ the collaborative approach to space redesign that was implemented in *LaGuardia Co-op and Studio* during the session “*Redesigning Spaces, Services, and Training for Creative, Collaborative Student Experiences*”⁷⁷.

The choice of this collaborative approach was motivated by the desire to identify and capitalize on:

- what students want
- what keeps students involved
- what keeps employees involved
- what employers want

The project involved the transformation of pre-existing *labs* of traditional design. In this context, surveys, studies, observations and interviews have identified typologies of uses, particularly based on the individual use of PCs made available.

These very same consultations also highlighted priorities for transformation: support, technology, and space quality in particular. Beyond the material and physical redesign, it was therefore a question of rethinking the service model as a whole.

The university has therefore developed *Blueprints Services*, synthetic documents integrating for each user action the repercussions on staff and support services.

Taking advantage of the flexibility provided for the arrangements, different spatial configurations were tested, here again to better match the different types of uses that had been anticipated.

As part of this extension of the service portfolio, staff members received specific support, based on processes established for each type of situation.

Finally, the technological component was addressed by conducting interviews, workshops and online surveys that identified the relationships between the type of space, use, and digital equipment.

The renovation being completed, NUY conducted further consultations with students to highlight areas that have been improved. All of them have indeed shown a significant increase in student satisfaction, and in particular the atmosphere (91% compared to 70% previously), the availability of spaces (82% compared to 63%), the variety of spaces (85% compared to 60%) or even specialized technology (78% compared to 45%). This was also true with regard to the appreciation of staff, in particular with regard to their courtesy (81% compared to 63%) and their level of knowledge (76% compared to 62%), and more generally at the help desk level (79% compared to 62%).

The NYU case and the collaborative approach used revealed several lessons regarding the success factors of such a project:

- use space as a showcase for the university, which reflects the tendency of concentration of Learning Spaces mentioned above
- conduct a rigorous needs assessment, and compare the before and after to assess the success of the project in all its dimensions
- design the place in its physical and digital components in synergy

⁷⁶ <https://fr.slideshare.net/brightspot/educause-annual-meeting-2018-redesigning-spaces-services-and-training-for-creative-collaborative-student-experiences-121575117>

⁷⁷ <http://www.nyu.edu/life/information-technology/locations-and-facilities/student-technology-centers/laguardia-co-op.html>

2018: the importance of dealing with everything that is not strictly technical

Reminders about last year

Reference will be made to last year's EDUCAUSE French Delegation Report⁷⁸ to understand that the Cloud is present through many strategies illustrated by rich and varied denominations. Moving to the cloud starts with the choice of the migration level, the first step, the IaaS where we simply rent machines hosted at Faas/Serverless, via PaaS (1). The last level, SaaS is the most successful level in the Cloud. Full services are rented/subcontracted. And no service is immune to this trend. For example, in SaaS, we now find tools as central as the triptych Identification, authentication and authorization.

The Cloud vs. Top 10 IT issues 2019⁷⁹

The Cloud can be found in at least 3 of the Top 10 issues. These issues are more generally grouped under the "Data Enabled Institution" topic of the Top 10.

In the cloud, the data sublimate themselves.

- 1) In first position, "**Information Security Strategy**". Whatever the level of migration to the Cloud, one of the working hypotheses is that the provider will provide a level of security at least similar to or higher than that offered internally. This must be part of the contract clauses.

It should be noted that many platforms offer cloud services around security. SpyCloud⁸⁰, for example, present in the startup alley, offers a service to monitor the distribution of pirated personal data. It notifies you as soon as hackers distribute personal data associated with your domain names on the dark web. This is still oriented towards the login and password hack, but it is always good to be notified of this kind of disappointment before your own users. In addition, with the duty to report at the first suspicion of piracy related to the GDPR, all possible signals must be carefully monitored.

- 3) In third position, "**Privacy**". Translation into European, it reads "GDPR". Intrinsicly, any transfer of personal data entrusted to an external service provider must be contractualized by including specific legal clauses, constrained by the GDPR. This implies any use of the Cloud.

- 5) In fifth position, "**Digital Integrations**": "Ensuring system interoperability, scalability, and extensibility, as well as data integrity, security, standards, and governance, across multiple applications and platforms"

This fifth element of the top 10 is undoubtedly the most representative of the Cloud theme. With more and more services delegated to external platforms, one of the major elements of IS success is the integration of these different platforms as seamlessly as possible. Many topics are involved in this integration and should be

⁷⁸ Rapport de la delegation EDUCAUSE 2017: <https://cems.box.com/s/zv335tvd8olgaj8mhmxtzy0r876c1uwf>

⁷⁹ Top 10 IT issue 2019 : <https://events.educause.edu/annual-conference/2018/agenda/educause-top-10-it-issues>

⁸⁰ SpyCloud Inc : <http://www.spycloud.com>

considered when choosing a Cloud solution. API, Security, Privacy, Scalability. This begins with the compatibility of all IS tools with a single identity management system.

We come back to the first example mentioned in the introduction, because Federated Identity Management's products were indeed present at EDUCAUSE.

Okta⁸¹, OneLogin⁸², Iltantus⁸³, Identity Automation⁸⁴ are part of the identity management offers on the Exhibit Hall.

Beyond these suppliers, and in order to better understand the issues surrounding identity management, it is interesting to explore the standards around this issue. SAML and Shibboleth, OAuth and OpenID^{85 86}

The Cloud in figures at EDUCAUSE

Out of 333 exposants (all categories combined) on the exhibition

- 84 exhibitors presented "Cloud Computing and Services" products (25% of exhibitors)
- 36 exhibitors offered "Identity and Access Management" solutions
- 8 exhibitors were interested in "Intrusion Detection and Prevention"

On the conference side, 20 presentations explicitly used the term Cloud in their title.

The Cloud in the rest of the conference

A recurring theme during the presentations was reflection and exchange of experience on the best ways to move to the Cloud.

During the presentation **"Innovate and Differentiate with Enterprise Cloud Services"**⁸⁷ the "Moody Bible Institute" offers some testimonies of their own migration:

+ *"We decided to stop trying to change the code (negotiation for the evolution of SaaS): we would change our operating modes and simply configure the available software".*

We often find this testimony: It is always a question of acceptance within the IT services but also of making internal customers understand and accept one of the fundamentals of SaaS projects: unless you are a first-class university with a certain degree of negotiating power, you must remember that the product roadmap is first and foremost in the hands of suppliers. The customer is at best consulted to express simple preferences between the multiple suggestions of all other customers of the platform. We will generally remember the

⁸¹ Okta : <https://www.okta.com/fr>

⁸² OneLogin : <https://www.onelogin.com>

⁸³ Iltantus : <https://www.iltantus.com/>

⁸⁴ Identity Automation <https://www.identityautomation.com/>

⁸⁵ Demystifying OAuth 2.0 and OpenId Connect (and SAML) : <https://hackernoon.com/demystifying-oauth-2-0-and-openid-connect-and-saml-12aa4cf9fdb8>

⁸⁶ Choosing an SSO Strategy: SAML vs OAuth2 : <https://www.mutuallyhuman.com/blog/2013/05/09/choosing-an-sso-strategy-saml-vs-oauth2/>

⁸⁷ Innovate and Differentiate with Enterprise Cloud Services : <https://events.educause.edu/annual-conference/2018/agenda/innovate-and-differentiate-with-enterprise-cloud-services>

message to be conveyed to internal customers: the switch from "Specifications" or "customization" mode to "Configuration" mode.

+ Another recurring theme is the importance of including all levels of the institution in the digital transformation. Moving to the cloud is a migration of such a scale that the transition from an internally developed ERP or SIS to a SaaS solution has a significant impact on the entire institution. It is an element of digital transformation that does not go unnoticed.

Successful migration requires numerous upstream consultations, agile deployment (regular progress reports during deployment) and downstream change management (use of **change ambassadors** who relay messages by being part of the same group as the recipients of the messages).

+ This was one of the main topics of the presentation "Gaining Clarity by Moving to the Cloud" of University of Tampa⁸⁸.

The adoption of Cloud solutions in the institutions visited

UBC University of British Columbia

Three years ago, UBC simply did not have the approval to use cloud solutions. Canadian private data protection laws (FIPPA)⁸⁹ are close (if not stricter) to the GDPR and did not allow UBC to use solutions with data hosted outside Canada.

Since then, AWS, Microsoft and Google have opened data centers in Canada. UBC's Canvas platform is hosted on AWS, the university is preparing to migrate to Workdays for the SIS, and many conversations are underway to prepare for further migrations.

Interestingly, when cloud providers such as AWS set up in a country (or region), they do not systematically land with their entire service offer.

The migration to Canvas (from Blackboard) was the result of a long consultation process, involving academics (recruited and paid specifically to lead the consultation) and student representatives. At UBC, we also find this notion of ambassador accompanying change. Included from the tool selection process and belonging to the same category of staff as the end users, these ambassadors convinced of the chosen solution are the best salespersons/promoters for their colleagues.

University of Washington

Beyond the weather, Seattle has been nicknamed in the IT world as "The Cloud City" due to the presence of Amazon (AWS) and Microsoft headquarters⁹⁰. The UW's strategy is very advanced in the field of the cloud (Priority to the Cloud, in SaaS mode by default) and details of the intervention of CTO IT and Infrastructure, Brad Greer, can be read in the "Visits" chapter of this report.

The following are a few points among the many arguments in favor of, and reflections on, the Cloud.

The Cloud brings agility. When a project is being set up, resources are being allocated. Another project is stopped, resources are released, and no longer generate costs.

⁸⁸ Gaining Clarity by Moving to the Cloud : <https://events.educause.edu/annual-conference/2018/agenda/gaining-clarity-by-moving-to-the-cloud>

⁸⁹ FIPPA: Freedom of Information and Protection of Privacy : <https://www.ontario.ca/laws/statute/90f31>

⁹⁰ How Seattle became 'Cloud City': Amazon and Microsoft are leading a tech revolution : <https://www.seattletimes.com/business/technology/how-seattle-became-cloud-computing-city-amazon-microsoft-are-leading-tech-revolution/>

Importance of the contract. The transition to SaaS is first and foremost a supplier management problem. UW does not want to depend on a single supplier.

In the context of PaaS operation, the main risk is the risk of being locked in a Platform. The fact that the platform is in the clouds does not change the risk of being locked up and dependent on a solution. To address this risk, UW is considering two possible paths that could join forces:

- Develop internally an abstraction layer on top of the API proposed by the vendors, in order not to develop projects dependent on the APIs of the chosen supplier (possibility to move)
- Force vendors to adopt and provide standard interfaces and encourage them to develop these open standards together.

Importance of an identification system compatible with all tools and efficient (in the sense of resilience).

For example, UW performs crash tests to verify that in the event of a failure of the central identification management system (UW NetID), the off-site backup system takes over in a transparent way⁹¹.

In practice, UW is involved in Internet2 and the TIER (Trust and Identity in Education and Research) identification solution⁹². The project includes many elements, from Shibboleth packages (distributed as a Docker) to the deployment of Eduroam in the USA, under the patronage of the InCommon organization⁹³.

Colorado School of Mines

Colorado School of Mines is in the cloud with more than 50 SaaS services. It includes Canvas, Zoom, Workday, PageUP, Gmail for students and Alumni, Office 365 for academics.

Like UW, CSM is also part of the TIER programme of the Internet2.

⁹¹ The biggest disaster recovery exercise you never noticed : <https://www.washington.edu/uwit/about-us/stories/the-biggest-disaster-recovery-exercise-you-never-noticed/>

⁹² Trust and Identity in Education and Research (TIER) program : <https://www.internet2.edu/vision-initiatives/initiatives/trust-identity-education-research/>

⁹³ InCommon : <https://www.incommon.org/>

Immersive Learning: promises kept ?

Thierry Koscielniak

This article is the follow-up of the 2017 article "Teaching with Virtual Reality" (page 46) and 2016 article "Learning with Virtual Reality" (page 44).

The evolution of communications on the theme of extended reality uses (XR Extended Reality which covers the fields of virtual reality, augmented reality AR and mixed reality MR) shows a significant increase in communications in oral sessions this year.

2016 - A pre-conference seminar / 4 sessions / 1 poster

2017 - A pre-conference seminar / 2 oral sessions / 3 posters

2018 - A pre-conference seminar / 9 oral sessions / 3 posters

Here are the references of all these communications. The author of the article was able to attend those in bold.

Pre-conference seminar (separate registration required) :

Creating Immersive Storytelling Learning Experiences in 360° Video⁹⁴

Oral sessions:

1. eXtended Reality (XR): The New World of Human/Machine Interaction⁹⁵
2. **Step Out of Your Head(set): Better Approaches for Collaborative Learning in Virtual Environments⁹⁶**
3. **Applying Mixed Reality to the Classroom of the Future⁹⁷**
4. **Holograms in Learning: What the Real World Is Telling Us⁹⁸**
5. **Virtual Reality: Advancing the Pedagogical Toolkit⁹⁹**
6. Ethics and Digital Fluency in VR and Immersive Learning Environments¹⁰⁰
7. Developing Library Strategy for 3D and VR Collections¹⁰¹
8. **Virtual Holographic Simulation: Measuring Nursing Student Outcomes from Immersive Technology¹⁰²**
9. Mixed Reality Technology Innovation Case Studies in Higher Ed¹⁰³

⁹⁴ <https://events.educause.edu/annual-conference/2018/agenda/creating-immersive-storytelling-learning-experiences-in-360-video-separate-registration-is-required>

⁹⁵ <https://events.educause.edu/annual-conference/2018/agenda/extended-reality-xr-the-new-world-of-humanmachine-interaction>

⁹⁶ <https://events.educause.edu/annual-conference/2018/agenda/step-out-of-your-headset-better-approaches-for-collaborative-learning-in-virtual-environments>

⁹⁷ <https://events.educause.edu/annual-conference/2018/agenda/applying-mixed-reality-to-the-classroom-of-the-future>

⁹⁸ <https://events.educause.edu/annual-conference/2018/agenda/holograms-in-learning-what-the-real-world-is-telling-us>

⁹⁹ <https://events.educause.edu/annual-conference/2018/agenda/virtual-reality-advancing-the-pedagogical-toolkit>

¹⁰⁰ <https://events.educause.edu/annual-conference/2018/agenda/ethics-and-digital-fluency-in-vr-and-immersive-learning-environments>

¹⁰¹ <https://events.educause.edu/annual-conference/2018/agenda/developing-library-strategy-for-3d-and-virtual-reality-collections>

¹⁰² <https://events.educause.edu/annual-conference/2018/agenda/virtual-holographic-simulation-measuring-nursing-student-outcomes-from-immersive-technology>

¹⁰³ <https://events.educause.edu/annual-conference/2018/agenda/mixed-reality-technology-innovation-case-studies-in-higher-education>

Posters :

1. Bringing the Natural Sciences Online¹⁰⁴
2. Bringing Virtual Reality into Higher Ed Communication¹⁰⁵
3. The Reality of VR: Classrooms for Student and Community Engagement¹⁰⁶

In 2018 a meeting was also held¹⁰⁷ to establish the *Extended Reality (XR) Community Group*¹⁰⁸ to identify those interested in participating.

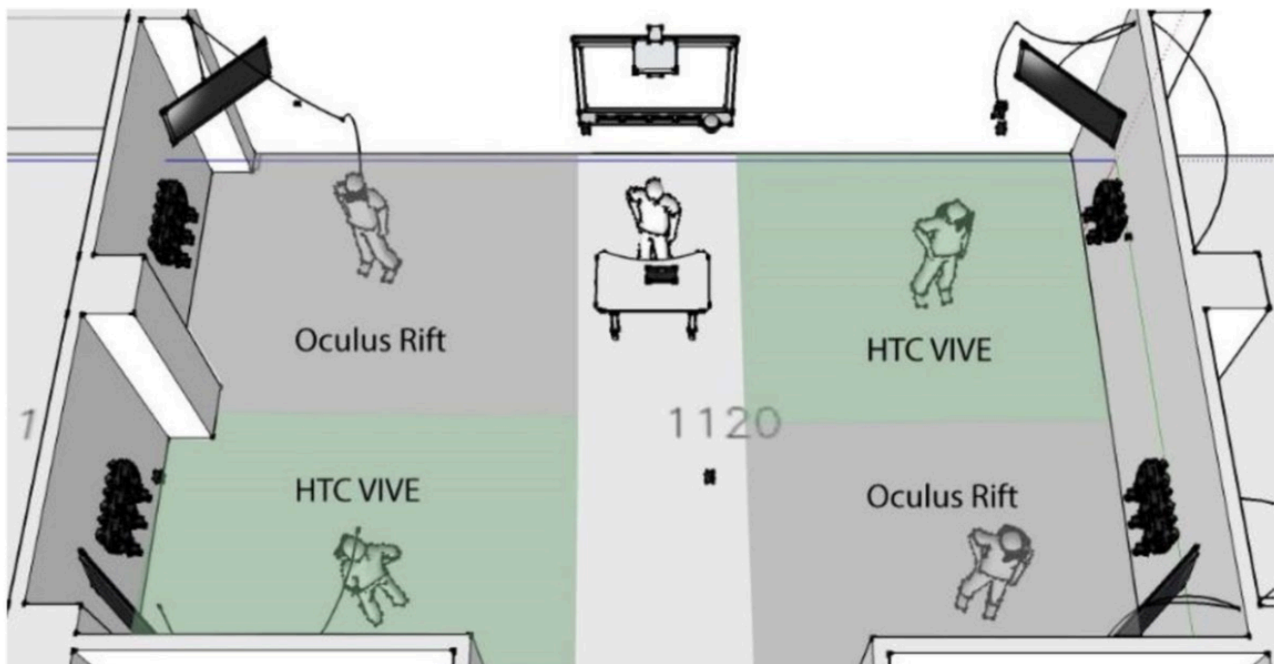
In presentations 4 and 8 it is worth noting an abuse of language on the terms hologram or holographic because they refer to Hololens augmented reality glasses created by Microsoft and not to the holographic technology itself.

Session N°2, led by the initial designer of the virtual reality spaces Cave, saw the announcement of a concept of Cave in the box at a reduced cost thanks to mobile equipment. The concept of the Cave corresponds to a room where 3D video projections are made on three out of four walls and the floor / ceiling. A group of people equipped with 3D glasses with plotters can move around virtually while one of the participants has the controllers to interact with the virtual environment.

Cost reduction is achieved by using mobile elements (folding stand walls) and by lowering the price of electronic devices.

A clear trend towards the use of 360° shooting technology is noticeable since the cost of equipment is low.

The use of more expensive computer-connected VR helmet equipment results in a modelling of training spaces (session N°8).



The answer to the question asked in the title, it is possible to answer that the promises of the uses of XR (better memorization, total involvement, complete simulations of learning situations) are explored by increasing number of experiences. The first results on significant numbers of learners will be available soon.

¹⁰⁴ <https://events.educause.edu/annual-conference/2018/agenda/bringing-the-natural-sciences-online>

¹⁰⁵ <https://events.educause.edu/annual-conference/2018/agenda/bringing-virtual-reality-into-higher-ed-communication>

¹⁰⁶ <https://events.educause.edu/annual-conference/2018/agenda/the-reality-of-vr-classrooms-for-student-and-community-engagement>

¹⁰⁷ <https://events.educause.edu/annual-conference/2018/agenda/extended-reality-xr-community-group-session-open-to-all>

¹⁰⁸ <https://www.educause.edu/community/xr-extended-reality-community-group>

How Machine Learning is transforming education

Dominique Verez

The topic of Machine Learning is a broad subject already covered in previous reports. This new article obviously does not intend to cover it in its entirety. It takes up the reflections discussed at two conferences with similar themes:

1. *Beyond the Buzz: How Machine Learning is Changing Education*¹⁰⁹
2. *How Analytics and Machine Learning are Transforming Education*¹¹⁰

Indeed, the question is no longer whether Machine Learning will transform the way we do education or not, it is now how we do it.

“ The combined use of massive amounts of information and relatively simple learning algorithms makes it possible to solve problems that were previously considered inaccessible ”

Artificial Intelligence

Artificial Intelligence (AI) is « *the set of theories and techniques used to produce machines capable of simulating intelligence* »¹¹¹. The underlying concept is that « any intellectual activity can be described with enough precision to be simulated by a machine » John MacCarthy¹¹².

There are many examples of MLs that shed some light on how the principle works. The easiest to understand, while being one of the most amazing, is the automatic learning system that allows a robot with the ability to move its limbs - but initially unaware of the coordination of movements allowing walking - to learn to walk. The robot starts by making random movements, then, by selecting and favouring movements that allow it to move forward, gradually sets up an increasingly efficient walk.

¹⁰⁹ Beyond the Buzz: How Machine Learning is Changing Education - Mercredi 31 octobre 2018 - 10h45-11h30

¹¹⁰ How Analytics and Machine Learning are Transforming Education - Mercredi 31 octobre 2018 - 13h30-14h15

¹¹¹ AI definition translated from French : www.larousse.fr/encyclopedie

¹¹² John MacCarthy is the main pioneer of artificial intelligence with Marvin Lee Minsky; he embodies the current emphasizing symbolic logic

The sessions

The sessions were mainly held around 4 presentations:

- Perry Samson¹¹³ - Educational use of the AWS Echo360 video platform and its associated AI and ML technologies;
- Markku Hakkinen¹¹⁴ - How do AI and ML facilitate the consideration of accessibility issues for different forms of disability;
- Matthew Gunkel¹¹⁵ - Experiments around ML to quantify what is really learned and retained;
- Ari Channen¹¹⁶ - How does Strayer University use AI to transform learning.

Educational use of the Echo360 platform

Perry Samson uses in his climate courses (which are given in person, and widely used online), different facets of AI and ML:

1. Image recognition and automatic metadata association (tagging);
2. Object detection (clouds for example), tracking and navigation;
3. Voice recognition and transcription;
4. Pattern recognition and pattern search in images;
5. Sentiment Analysis.

He sees various advantages to using the Echo360 platform¹¹⁷, which is totally cloud-based, in order to:

- Have a scalable, flexible and efficient infrastructure to support growing and rapid demand;
- Provide the platform with data so that Artificial Intelligence can improve learning.

The idea is to automate, during the recording of each of its courses, the detection of the topics covered, the extraction of the subjects (what are we talking about?), the recognition of the concepts that are presented, the analysis of the listener's feelings, the automatic production of metadata, the transcription of voice and manual writing, the audio and video analyses...

“ Technologies using Artificial Intelligence will be present in almost all software solutions developed in 2020 ” - Gartner

¹¹³ Perry Samson - Arthur Thurnau Professor, Climate and Space Sciences and Engineering, College of Engineering, University of Michigan Ann Arbor

¹¹⁴ Markku Hakkinen - Research Scientist, Director of Digital Accessibility, Educational Testing Service

¹¹⁵ Matthew Gunkel - Director of Teaching and Learning Technology, Indiana University Bloomington

¹¹⁶ Ari Channen - Vice-President of Artificial Intelligence, Strayer University

¹¹⁷ Echo360 : echo360.com

Once again, the contribution of AI and ML means that the accuracy improves as the analyses are performed. The more it is done, the more this accuracy improves....

Perry uses the platform to :

- Record courses and stream them ;
- Manage, edit, set up courses ;
- Adapt pedagogy to students who are not in class (Video Learning) ;
- Measure the participation (commitment) of its students;
- To have measurements (analytics) on all these points.

He was able to measure a 7-fold improvement in student participation/interaction between the passive video streaming platform he used in the past and the current one.

Perry showed, through short films, that they were both the experiences of the teacher and of the student during the recording of a course, with in particular the possibility of annotating and editing, by each of them, in real time or on a delayed basis, in order to increase the quality of the recording.

The treatment of disability

Markku Hakkinen shows how the perspectives opened by AI and ML can be used to best respect what he sees as the essential principle of education : « *Designing learning environments that ensure equal opportunities for all learners.* »

To achieve this, it is first necessary to analyse what is happening in the learning process using both science and tools:

- *Learning Science* : to measure how students learn and how they can learn better ;
- *Data Science* : what are the factors that increase the chances of success ?
- *AI and ML* : develop and use tools, including those developed by ETS.

One of the goals of ETS¹¹⁸ (*Educational Testing Service*) is to comply as closely as possible with standards, such as the WCAG¹¹⁹ (*Web Content Accessibility Guideline*) of the W3C¹²⁰.

But it must "work" for students, be measurable and concrete:

- Accessibility is about making content and tasks perceptible, understandable and usable by students who may have sensory, physical or learning disabilities ;
- The content should be transformed into a modality adapted to the student's context and needs;

And for this reason, speech, via TTS (*Text to Speech*), is one of the most appropriate modalities :

- **Screen Readers** allow blind students to access text content and turn it into words;
- **Read Aloud Tools** help students with learning disabilities, as well as language learners, by allowing them to have texts read to them.

¹¹⁸ ETS - Educational Testing Service : www.ets.org

¹¹⁹ WCAG - French translation : www.w3.org/Translations/WCAG20-fr

¹²⁰ W3C - World Wide Web Consortium : www.w3.org

However, the spoken text must be pronounced correctly, and that's where the AI and ML come in!

- Amazon's *Polly*¹²¹ tool is a speech synthesis service that uses advanced *Deep Learning* technologies to synthesize speech in a natural way;
- Polly supports SSML¹²² (*Speech Synthesis Markup Language*) which improves the quality of the oral presentation by including, if necessary, phonetic pronunciation, identification of how numbers should be read, insertion of pauses, etc.

We then had many demonstrations, very varied: pronunciation of proper names (especially foreign ones), complex mathematical expressions, chemical formulas, voice recognition of images (description of the scene), etc.

The conference ended with a call for assistance to join the newly created W3C group, the *Spoken Presentation Task Force*¹²³.

Experiments around the ML to quantify what is really learned and retained

Matthew Gunkel's presentation focuses mainly on *Analytics* and *Learning Systems* (LMS) issues, to analyze and improve student engagement.

Indiana University uses a wide range of data sources to create the clearest possible overview of a student's environment: enrolment, attendance lists, university commitments, specific applications related to the courses followed, data from the LMS Canvas¹²⁴, activity reports, test and examination results, student profiles, Internet and Wifi data, use of resources made available, library, university web pages visited...

This data is analyzed, cleaned, reunited, reconciled, quality adjusted and then injected into the cloud (Google in this case) in order to use *Machine Learning* resources (*Compute Engine, Cloud Storage, BigQuery, Cloud Functions, Cloud Pub/Sub*) and retrieve the results.

It shows that the best way to evaluate a student's engagement is through 9 entries:

1. Ongoing engagement ;
2. Carrying out the requested tasks (homework, reading,...) ;
3. Commitments in the life of the university (clubs, associations) ;
4. Writing skills ;
5. Ability to work independently and in a group ;
6. Participation in various questionnaires and exams sent by their teachers, faculty, university;
7. Charisma and Leadership ;
8. Areas of concern.

¹²¹ Polly d'Amazon : aws.amazon.com/fr/polly

¹²² SSML - Speech Synthesis Markup Language : www.w3.org/TR/speech-synthesis11

¹²³ Spoken Presentation Task Force : www.w3.org/WAI/APA/task-forces/pronunciation/work-statement

¹²⁴ LMS Canvas : www.canvaslms.com

However, the teaching teams still have some unresolved questions:

- Can the online activity on social networks indicate a withdrawal of the current commitment?
- Is it possible that the use of the LMS could fill the gaps in the current commitment?

Indiana University has developed an application for smartphones: Boost¹²⁵ to improve student engagement by playing on the previous 9 points. It is based on the data from the *Machine Learning* process, it knows where the student is in difficulty compared to the average of his class and regularly pushes him (*boost*) on these weak points, for example on the fact of systematically making late the requested work.

How does Strayer University use AI to transform learning ?

Ari Channen starts from one observation: Strayer University welcomes around 50,000 students each year, it is spread over 78 campuses in 15 states, 30,000 students take 100% of their courses online (and 80% of the others take at least one online course). The university is certified as an "*Accredited Online University*". By taking their courses online, students produce a rich set of data (*Analytics*) every year, a real gold mine.

With his data, Strayer was one of the pioneers in using AI to improve student success with specific recommendations for awareness.

The outcome of the work, called Irving¹²⁶, is a particularly sharp virtual assistant, which we have seen at work, is very well designed and can answer very specific questions.

Strayer now thinks they may use AI to help with his students' admissions and has been thinking about how to proceed to do so. Eight points of attention have been identified to carry out this project:

1. Acquire knowledge in the field of admission process ;
2. Identify all relevant sources ;
3. Design ML functions ;
4. Choose the ML algorithm ;
5. Implement on premise ;
6. Move to the cloud (they have chosen the Google platform) ;
7. Use ML to help recruiters make their choices ;
8. Analyze the choices actually made, the reasons for this choice and iterate the process.

To get there :

- The university put three people on the project, including one *data scientist* ;
- The first sources of data are: transcriptions of telephone calls, emails exchanged, possible chat, university data warehouse ;

¹²⁵ Indiana University's IU Boost application : kb.iu.edu/d/atud

¹²⁶ Irving, in honour of the university's founder, Dr. Irving Strayer

- The types of functionalities studied are: the candidate's behaviour, the way the contact was made, the analysis of the documents transmitted (including the transcription of voice exchanges), campus visits or not, school data, interview data, the mass of communication exchanged on both sides and the proportion that belongs to the candidate's initiative, communication statistics, the time elapsed since the last contact made, the subjects mentioned during the conversations, the words (vocabulary) that appear in the exchanges (in the broad sense).

We will notice the subjective and approximate sides of some points, but as Ari Channen says, the goal is not to let an Artificial Intelligence do the recruitment alone, but simply to help a human to do it.

The first tests have been done on previous admissions and they seem excellent.

We may also note, and we will welcome, the great transparency and the fact of providing, without restraint, the types of functionalities that are being studied, which is typically an element of the mentality of our American colleagues.

References

Session - *Beyond the Buzz: How Machine Learning is Changing Education*

Wednesday October 31st 2018 - 10h45 to 11h30

Melissa Donovan - Executive Director - Data Science, The College Board¹²⁷

Markku Hakkinen - Research Scientist, Director of Digital Accessibility, Educational Testing Service¹²⁸

Perry Samson - Arthur Thurnau Professor, Climate and Space Sciences and Engineering, College of Engineering, University of Michigan¹²⁹

Kam Syed - Senior Manager, EdTech, Amazon Web Services¹³⁰

Session - *How Analytics and Machine Learning are Transforming Education*

Wednesday October 31st 2018 - 13h30 to 14h15

Ari Channen - Vice-President of Artificial Intelligence, Strayer University¹³¹

Matthew Gunkel - Director of Teaching and Learning Technology, Indiana University¹³²

Jonathan Rochelle - Director of Product Management, Google

¹²⁷ The College Board : www.collegeboard.org

¹²⁸ ETS - Educational Testing Service : www.ets.org

¹²⁹ University of Michigan - Ann Arbor : umich.edu

¹³⁰ Amazon Web Services : aws.amazon.com/fr

¹³¹ Strayer University : www.strayer.edu

¹³² Indiana University - Bloomington : www.indiana.edu

Blockchain, real uses

Dominique Verez

At EDUCAUSE 2016, MIT's Media Lab¹³³ and Learning Machine¹³⁴ jointly announced the creation of Blockcerts¹³⁵, « The Open Standard For Blockchain Credentials ».

Blockcerts is an open standard for creating, issuing, viewing and verifying certificates based on a block chain. Digital documents are recorded on a chain, signed and encrypted, inviolable and shareable. The objective is to allow the spread of a wave of innovations that gives individuals the ability to own and share their own official documents with confidence.

“Using the blockchain and strong cryptography, it is possible to create a certification infrastructure that puts us in control of the full record of our achievements and accomplishments” Philipp Schmidt, MIT Media Lab

Since this announcement, more and more American schools (but not only) are publishing digital documents based on a chain, in a secure format, that belong to students, and that are immediately verifiable anywhere in the world. The purpose of the conference is to present the progress in the issuance of Blockchain-based documents over the past year.

The theme of the Blockchain is a vast subject, already covered in former reports¹³⁶. This new article obviously does not intend to cover the entire spectrum. The title of the conference is: *Verifiable Digital Records and the Blockchain: Case Study*.

The initial observation is that traditional media are losing credibility in the USA:

- 50% of the PhD diplomas are fake ;
- Pharmacies treat 2 million false prescriptions per year ;
- The fake diploma industry generates a business of 1 billion dollars a year worldwide.

For Chris Jagers¹³⁷, it is imperative to give back "credit" to the documents that are generated and the best way to do this is to create "a Global Verification Network", a global verification network, based on the Blockchain. The "social credibility" (social currency) of individuals is at stake.

This notion of "social credibility", which is a very strong concept, makes it possible to change paradigm, to move our society from traditional documents to "credible documents":

- Traditional document: physical, slow, expensive, easy to counterfeit;
- Document Credible document: digital, owned by the recipient, independent of any vendor, guaranteed inviolable, easily shared, inexpensive, fully interoperable, instantly verifiable, capable of containing rich information, human readable, machine readable, allowing data analysis (Analytics).

¹³³ MIT's Media Lab : learn.media.mit.edu

¹³⁴ Learning Machine : www.learningmachine.com

¹³⁵ Blockcerts : www.blockcerts.org

¹³⁶ Refer to my article "Towards an Education Blockchain?" published in the restitution of EDUCAUSE 2016

¹³⁷ Chris Jagers - CEO, Learning Machine

Chris Jagers and Mary Callahan present 6 concrete uses of the Blockchain to provide credible documents:

1. SNHU¹³⁸ (Southern New Hampshire University). Since this year 2018, graduates of SNHU's College for America have been receiving their bachelor's degrees and associated degrees, both in the form of paper diplomas and Blockcerts digital certificates;
2. CNM¹³⁹ (Central New Mexico Community College) becomes the first Community College in the United States to award digital degrees to its students;
3. MIT¹⁴⁰ (Massachusetts Institute of Technology) offers credible degrees to all its students since June 2018 ;
4. FSMB¹⁴¹ (Federation of State Medical Board) supports state medical boards in the United States in the accreditation, discipline and regulation of physicians and other health professionals through digital certificates to reassure and ensure patient safety;
5. The Commonwealth of the Bahamas is the first country in Latin America and the Caribbean to implement a national credentialing system based on a Blockchain, known as the Bahamas Blockcerts. Through these nationally accredited digital certificates, the government aims to improve the way in which national educational qualifications, including certificates, diplomas and degrees, are created, issued, visualized and verified;
6. The Government of the Republic of Malta is doing the same and is committed to becoming the "Blockchain Island". To achieve this, it puts in place legislation based on credible documents that are at the very least avant-garde.

It is worth noting the desire to empower students by giving them ownership of their documents since they are at the heart of the process. They own their documents, provide them to whomever they want, publish them where they want (LinkedIn for example).

The session ends with the concrete implementation of apostilles¹⁴² between MIT (USA), University of Cambridge¹⁴³ (UK) and CFA Institute¹⁴⁴ (USA, UK, Hong Kong, India) in order to meet the legal requirements of the different countries. We are in the field of trust between credible documents issued by different countries.

The session was very interesting, it allowed us to:

- Understand how the verification of digital documents, based on a Blockchain, really benefits all concerned;
- Show concrete examples of university documents (diplomas, degrees, badges) that use the chain as a secure anchor of trust;
- Understand the concepts of "credible documents" (document currency) and "social credibility" (social currency) of individuals.

Looking forward to discovering the 2019 applications, which will be presented to us at EDUCAUSE 2019 in Chicago.

¹³⁸ SNHU - Southern New Hampshire University : www.snhu.edu

¹³⁹ CNM - Central New Mexico Community College : www.cnm.edu

¹⁴⁰ MIT - Massachusetts Institute of Technology : www.mit.edu

¹⁴¹ FSMB - Federation of State Medical Board : www.fsmb.org

¹⁴² Apostille : For Hague Convention countries, the apostille substitutes a single formality for the requirement of legalisation of an official document from another country, where necessary (examples: notarial documents, civil status, etc.), in the form of a stamp bearing the words Apostille

¹⁴³ University of Cambridge : www.cam.ac.uk

¹⁴⁴ CFA Institute (Chartered Financial Analyst Institute) : www.cfainstitute.org

References

Session - *Verifiable Digital Records and the Blockchain: Case Study*

Friday November 2nd - 08h00 to 08h45

Mary Callahan - Senior Associate Dean and Registrar, MIT¹⁴⁵

Chris Jagers - CEO, Learning Machine¹⁴⁶

¹⁴⁵ MIT - Massachusetts Institute of Technology: www.mit.edu

¹⁴⁶ Learning Machine : www.learningmachine.com

Exhibit Hall

Dominique Verez & Christine Marle

In 2018, 333 companies, 20 more than in 2017, were present in the very impressive Exhibit Hall.

To simplify the journey, the organizers had the good idea to describe each company present by 1 to 4 fields of activity, in a total list of 54 themes (4 less than in 2017), as follows:

Academic Information Systems - Accessibility - Analytics - Assistive Technology (Captioning) - Audio and Video Conferencing - Augmented, Extended, Virtual Reality - Blockchain - Business Continuity, Disaster Recovery, Emergency Planning - Business Intelligence (BI) - BYOD - Captioning - Classroom Control Systems - Cloud Computing and Services - Compliance - Consulting - Content Management Systems - CRM - Data Security - Data Warehousing - Digital Publishing - Digital Signage - Document Management - Enterprise Information Systems - Enterprise Resource Planning (ERP) - Furniture - GDPR - Hardware - Help Desk - Identity and Access Management - Intrusion Detection and Prevention - IT Governance - Learning Analytics - Learning Management Systems (LMS) - Learning Space - Lecture Capture - Media Production, Preservation, and Storage - Mobile Apps - Mobile Learning - Network Architecture and Infrastructure - Network Security - Online Learning - Open Source - Portfolio and Project Management - Productivity Applications and Systems (Email) - Risk Management - Security Management - Social Media - Storage - Student Information Systems - Student Retention - Training - Virtualization - Webcasting - Wireless

The following 6 areas of activity have disappeared: Clickers, E-Commerce, E-Mail Management, E-Portfolios, Financing, Privacy.

There have been 2 new entries for the fields :

- « Blockchain » with 2 companies : Trusted Key¹⁴⁷ and Learning Machine¹⁴⁸,
- « GDPR » with 3 companies : BerryDunn¹⁴⁹, ManageEngine¹⁵⁰ and Squiz, Inc¹⁵¹.

Compared to previous editions from 2014 to 2017, the 2018 edition shows clear trends, all in line with current events. In the lounge, we find very reactive answers to the immediate concerns of Universities and Colleges.

¹⁴⁷ Trusted Key : www.trustedkey.com

¹⁴⁸ Learning Machine : www.learningmachine.com

¹⁴⁹ BerryDunn : www.berrydunn.com/industries/education-1

¹⁵⁰ ManageEngine : www.manageengine.com

¹⁵¹ Squiz, Inc. : www.squiz.net

This is mainly the case for Open Source and Help Desk :

| Topic | 2015 | 2016 | 2017 | 2018 | % |
|-----------------|------|------|------|------|------|
| Open Source | 12 | 12 | 7 | 13 | 86 % |
| Help Desk | 9 | 12 | 9 | 16 | 78 % |
| Accessibility | 0 | 13 | 13 | 18 | 38 % |
| Lecture Capture | 16 | 16 | 17 | 22 | 29 % |
| IT Governance | 13 | 13 | 18 | 23 | 28 % |

All the tables in this article indicate the number of companies working on the topics indicated. For example, in 2018, 13 out of 333 companies presented solutions on the topic of *Open Source*

Open Source reflects a desire to move away from commercial publishers and rely on open source solutions. It is not so much the cost-free aspect that interests American universities (many of the solutions presented are indeed *freemiums*¹⁵²), it is more a strategic long-term approach. These include Odigia's tutorial solution¹⁵³ that provides immersive teaching and a personalized learning experience for students.

The Help Desk is reviving, after a few years of stagnation. It must be said that solutions are evolving rapidly with the promises of Artificial Intelligence and the multiplication of *chatbots*¹⁵⁴. For example, TechReady.io¹⁵⁵, a company specializing in LMS support, analyzes devices, browsers, security settings and bandwidth to enable helpers to quickly diagnose problems, saving time with each Help Desk call.

Accessibility refers to everything that promotes accessibility, particularly for people with disabilities. An example is TesselLearn¹⁵⁶, which helps to structure the elements right from the start, because access to information for all is essential in a digital world. There are many software and hardware modifications that allow individual access to digital information. However, just as a wheelchair can only provide access to a building if it has accessible features such as access ramps, digital information requires a proper structure for software and hardware modifications to work.

Lecture Capture theme covers the more or less complex and intelligent acquisition of a course, and a great deal of progress has been made in this field. One example of this is Otter.ai¹⁵⁷, which is an innovative example. Otter is an Artificial Intelligence web and mobile application that aims to change the way students participate in a classroom, with smarter notes that incorporate transcribed text, synchronized audio, speaker identification and images that can be shared and searched. Otter's natural language processing technologies are optimized for long conversations.

IT Governance theme is constantly progressing, as institutions have understood that this is a major area of concern that they have too often abandoned. It highlights the need to control your IT centrally, using dashboards for example. One example is Code42¹⁵⁸ which enables IT teams and CISOs to centrally manage and protect critical data, from monitoring its movement to its use, while ensuring compliance with data privacy regulations and simple and rapid recovery after an incident.

¹⁵² *Freemium* is a commercial strategy by which a publisher offers a free, open access product (or more often a service) that is designed to attract a large number of users. The publisher then seeks to convert these users, into customers, for a version, or complementary services, *premium* of the more advanced product or service, high-end but paying.

¹⁵³ Odigia : www.odigia.com

¹⁵⁴ A *chatbot* is a conversational agent, or virtual assistant, that communicates with a user. The idea is to give the illusion that a program thinks through a meaningful dialogue when a user is invited to formulate his request in natural language. In fact, the software only interprets a request in its information system.

¹⁵⁵ TechReady.io : techready.io

¹⁵⁶ TesselLearn : tessellearn.com

¹⁵⁷ Otter.ai : otter.ai/login

¹⁵⁸ Code42 : www.code42.com

Analytics in general, and Learning Analytics in particular, continue to be on the rise. Big Data and its statistical and analytical processing, increasingly through Artificial Intelligence and Machine Learning, are confirmed stars of the various EDUCAUSE editions.

| Topic | 2015 | 2016 | 2017 | 2018 |
|--------------------|------|------|------|------|
| Analytics | 47 | 49 | 40 | 46 |
| Learning Analytics | 21 | 26 | 25 | 29 |

The Top 10 of the most represented sectors of activity hardly changes, it remains stable over the years. The strongest increases are those related to identity and access management and network security, which gained 3 and 2 places respectively.

| Topic | 2015 | 2016 | 2017 | 2018 | Evol. |
|--------------------------------|------|------|------|------|-------|
| Cloud Computing and Services | 115 | 96 | 70 | 84 | — |
| Online Learning | 555 | 51 | 53 | 58 | — |
| Student Retention | 43 | 48 | 39 | 47 | +1 |
| Analytics | 47 | 49 | 40 | 46 | -1 |
| Mobile Apps | 46 | 41 | 36 | 42 | +1 |
| Security Management | 30 | 35 | 37 | 42 | -1 |
| Data Security | 29 | 25 | 35 | 38 | — |
| Identity and Access Management | 15 | 24 | 29 | 36 | +3 |
| Mobile Learning | 28 | 26 | 33 | 35 | -1 |
| Network Security | 19 | 22 | 29 | 31 | +2 |

Top 10 of the most frequently encountered themes in the exhibition

If you want to know which companies are working on which themes, please visit the EDUCAUSE website: events.educause.edu. In case of concern, do not hesitate to come back to us, we have all the contacts at our disposal.

Our selection of companies

We chose companies that offer an alternative to certain publishers with whom we have signed a protocol (Yuja and Examsoft). In addition, there is a company clearly missing from the "Software Group Catalog" (Grammarly), and three startups, two of which are exploring the capabilities of AI (Near3 and Sense).

We first identified five companies, which we reviewed for a mini-presentation filmed for a few minutes. A sixth company, Sense, met at the end of the congress, imposed itself by the way it concretizes the promises of Artificial Intelligence.

Yuja¹⁵⁹

Yuja is an American company headquartered in Delaware. It offers a complete video platform. The SaaS solution allows automatic course capture, video conferencing, video content management, streaming to film and retransmit events, video and quiz insertion in teaching... The solution has been designed for teaching, interfaces with the LMS and has advanced features, including data production and analysis (learning analytics).

Yuja provides a unique platform. Students and teachers do not have to get used to multiple software, they have a complete solution with Yuja.

ExamSoft¹⁶⁰

ExamSoft, is a company founded in Dallas in 2010. The company has 1500 customers and has already passed 20 million tests.

ExamSoft offers a SaaS solution that allows you to design exams, run them on a computer or tablet in offline mode, in total security, automatically correct them and produce reports that allow you to follow a student's progress over several years.

The company has a retention rate of 98%.

Grammarly¹⁶¹

Grammarly is a Californian company created in 2009 that offers SaaS (online) solutions to help you write in English. It is automatically downloaded and added to Office, messaging and Windows, IOs browsers.

There is a free version, widely used. This version corrects spelling and grammatical errors, but does not provide any help in writing when a sentence is meaningless.

The premium paid version, designed for teaching (from primary to higher education), uses artificial intelligence. It offers two major functionalities: the improvement of written skills on the one hand, and anti-plagiarism on the other. The anti-plagiarism platform is integrated and compares the text to a huge database of 16 billion websites.

Grammarly distinguishes between 4 types of English (British, American, Canadian and Australian).

Grammarly has developed plugins for all browsers, as well as for all Os (Windows, iOS...). Grammarly integrates with LMS (Canvas, Moodle...), as well as with messaging and Office suite.

¹⁵⁹ Yuja : <https://www.yuja.com>

¹⁶⁰ ExamSoft : <https://learn.examssoft.com>

¹⁶¹ Grammarly : <https://www.grammarly.com/e>

Our choice of Start-ups

Near3¹⁶²

Near3 has created Rodney, a chatbot with artificial intelligence, which will take care of visitors and introduce them to the campus. He understands natural language, and answers all kinds of questions, as varied as "where can I park? "What's left on my multi-service card? ", thanks to an interface linked to the other applications of the establishment.

Rodney was created especially for students, teachers and university staff. It significantly reduces the burden on the service desk, the "tutors" and offers the comfort of a single entry point.

NoteAffect¹⁶³

NoteAffect is a startup that explores the possibilities of digital learning. This solution allows students to interact with the teacher: the teacher shares his presentation (a PowerPoint for example) on the NoteAffect platform. Students can follow the course on their laptop, annotate the PowerPoint individually, ask a question per chat. The solution even classifies the questions by frequency.

Sense¹⁶⁴

Finally, there is the winner of the best startup pitch competition: Sense, an Israeli startup that also won the prestigious competition for the best ed-tech startup in the world at the South Summit 2018, as well as other competitions.

This young company, created in 2016, is the first to use artificial intelligence to model learner profiles and offer feedback adapted to these profiles. Sense analyses how students answer open-ended questions in the following areas: finance, engineering, accounting, science and technology. Based on the answers, Sense determines profiles. Thus, a teacher who analyses the results of his 300 students using the Sense tool will obtain 6 or 8 groups of students whose answers show similarities. He will be able to propose one answer key per profile identified by Sense. Sense provides an intelligent balance between a single response for the entire promotion and individualized answers.

¹⁶² Near3 : <https://near3.com>

¹⁶³ NoteAffect : <https://www.noteaffect.com>

¹⁶⁴ Sense : <https://www.sense.education>

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