Case Study & POC & Demos Information

Type: Case Study

Name: Service Innovation and Analytics for Smart Education

Description:

1. Education Transformation: Digital, Personalized, Driving Better Outcomes

There have been currently identified 5 global trends I higher education (HE):

1. *The Boom in Undergraduate Study*

- The number of adults receiving tertiary education has grown WW from 19% to 29%
- By 2025 the number of University places required for students will have risen from 178m to 262m

2. *The Growth of Private Provision*

- Over the past 20 years, HE provision in many countries has flipped from being predominantly public to mostly private
- Investment from the private sector is the only means by which aggressive enrolment targets can be met with the speed of growth required

3. *Students will have to pay their own way*

- Average state funding for HE hit a 25-yr low in 2011 whilst course fees increased 42% between 2001 and 2010
- Perception has shifted from HE as a public good to HE as a private good

4. *New Regions will drive Global Competition in Research*

- China plans to increase its research spend as a % of GDP from 1.8% to 2.5% by 2020 (equaling the USA)
- India's President, Shri Praneb Mukherjee, has pledged to position India among the top 5 global scientific powers by 2020

5. *Internationalization will grow broader and deeper*

- Every government is making an effort to internationalize higher education
- Traditional patterns of exchange are shifting as Singapore, China, Malaysia etc are seeking to become HE destinations themselves

Considering these trends, 5 drivers of change and transformation (DCT) in higher education institutions have been foreseen:

DCT1. The Democratization of Knowledge

- Universities are no longer the gatekeepers of knowledge, holding tight the combined learning of their Professors
- The University library has ceased to be the sole repository of learning

DCT2. The Digital Age

- Digitization will transform education in the same way that it has transformed the media, retail, banking, and the entertainment industry
- Digital delivery will replace classroom teaching for the overwhelming majority of learning situations

DCT3. A Global Marketplace

- Universities will compete more intensely for students who are now better equipped to choose based on value and quality
- Governments will begin to "outsource" education provision in order to use their resources more effectively in targeted spending

DCT4. Industry Influence

- Industries will negotiate greater influence on research and teaching in order to insure their resource and research requirements are met
- Universities will need to align themselves more strongly with industry if they wish to be drivers of innovation and growth

DCT5. Ubiquitous access and virtual mobility

- Access to any and every university will increase whilst the requirement to be on campus will decrease: global competition will intensify
- Traditional importers of education will seek to become exporters: universities dependent on overseas students will need to re-invent their business model

Education will follow many other industry transformations to become more client, or "student-centric", facilitating better individual services and end-to-end attainment. Universities will move from segment and institutional optimization to an Education Continuum that enables individual and societal success.

Digitization will transform education in the same way that it has transformed the media, retail, banking, and entertainment industries:

- Democratization of knowledge in a globally competitive marketplace
- From the Classroom to the Internet
- More connectivity & sharing
- Ubiquitous access & virtual mobility
- Industry Alignment & Influence
- Cost cutting & less public funding

2. Education services inspired from Service Science

The Service Science concepts implemented in higher education will enable graduates from various disciplines to become T-shaped professionals or adaptive innovators; promote Service Science, Management and Engineering (SSME) education programs and qualifications; develop a modular template-based SSME curriculum in higher education and extend to other levels of education; explore new teaching methods for SSME education.

Four key concepts of Service Science provide a starting point: service system (entity), value proposition (interaction), adaptive innovator (individual trait), and Service Science, Management and Engineering (SSME) graduates (societal education focus) for a smarter planet. These concepts provide a service perspective on the traditional concepts: factory (entity), trade (interaction), problem solver (individual trait), and Science, Technology, Engineering and Mathematics (STEM) graduates (societal education focus) for better products and processes.

2.1. Bridging the knowledge gap in Higher Education

Despite significant progress, achieving the vision of Service Science is perhaps a decade or more away. For one thing, there are still challenges within individual disciplines. For example, operations research and industrial engineering often model people waiting in queues, but the model fails to recognize people as emotional and psychological beings that can learn and adapt over time. Computer science and information science often model information system architectures on the basis of well-understood environmental variations, but the design of governance mechanisms that allow information systems to respond proactively to strategy changes and predictable technological advances is less understood REFERENCE.

In a similar vein, economics and business strategy need to accommodate predictable innovations. Service management and operations need to create a better knowledge of service system scaling and lifecycle. Law and political science need to build a better comprehension of social innovation and the way that legislation can improve service system productivity. Complex systems engineering should provide more specific insights into the robustness of service systems. Of course, integration across all these disciplines and areas of study remains the ultimate challenge.

The current situation stems from the tradition that academic institutions are structured along disciplines and sub-disciplines (or areas of study). Academic silos are created to encourage deeper understanding of a specialized subject. The expectation from institutions and funding bodies is that academics conduct research and provide courses within their disciplines. Although often addressing similar matters, each discipline or department usually has a presumed set of interests, paradigms and methodologies. Over time, academics see interdisciplinary research as being highly risky and potentially career-damaging.

As a result, there is an imbalance in service research; studies tend to focus on either customers from a marketing perspective or providers from an operations perspective. This is reflected, and indeed reinforced, by top journals, which tend to be highly specialized. In operations management journals, for example, less than 20 per cent of the papers focus on service topics although the majority of the economy is service-based. Moreover, disciplines

also tend to focus on specific sectors; marketing tends to be concerned with business-to-consumer and operations with business-to-business. Gradually, a gap has emerged between academic output and practical interest.

The gaps in knowledge and skills needed to deal with complex service systems indicate that we need to reassess our approach to research and education. There are three possible routes to address the gaps. To some people, Service Science is seen as a multidisciplinary 'superset' embracing all appropriate, but as yet not agreed, disciplines and functions. To others, Service Science is seen as a multidisciplinary 'subset' embracing select elements of the major disciplines and functions. Finally, Service Science can be seen as an interdisciplinary activity which attempts to create an appropriate set of new knowledge to bridge and integrate various areas based on transdisciplinary and crossdisciplinary collaboration.

The interdisciplinary approach was advocated in Service Science summits with the participation of academia, research, government and industry. Since many barriers to integration are well established, attempts to remove them would not only require considerable effort but deflect attention from purposeful bridging activities. Therefore, one way to overcome the barriers is to accept their existence and build bridges over them. This approach will lead to:

"*Curricula, training, and research programs that are designed to teach individuals to apply scientific, engineering, and management disciplines that integrate elements of computer science, operations research, industrial engineering, business strategy, management sciences, and social and legal sciences, in order to encourage innovation in how organizations create value for customers and stakeholders that could not be achieved through such disciplines working in isolation*" (US Congress HR 2272, 2007).

An interdisciplinary approach can yield a rigorous methodology to invest in the areas that need to be bridged, and focus on the areas of research and education to be advanced more rapidly.

2.2. Opportunities to address the knowledge gap and the skill gap

2.2.1. *Opportunities to address the knowledge gap*

Interdisciplinary activities are not new; they are in evidence in many universities and industries. Opportunities exist at all levels to address the barriers between disciplines. Individual Careers: Leaders in academia, business and government are well positioned to highlight the value of interdisciplinary work and to reduce the risks associated with moving outside a specialism or discipline. The potential of service science to improve society, not just business, can attract diverse people to the field.

- Societal Projects: Interdisciplinary interactions happen at a project or activity level. Exemplary service system improvement projects (e.g., design the X of the future, given societal constraints Y) in the form of case studies can stimulate more cooperative behaviors with common purpose across disciplines or functions.
- Business Projects: Business opportunities are often best explored via interdisciplinary and cross-functional teams. Businesses can supply engaging challenges and hard data

for academic research to reach robust and practical conclusions (e.g., design the X of the future, given business reality Y).

- Academic Journals: Leading journals in the field of service research are extremely influential in setting the tone and agenda of academic research. They are uniquely placed to encourage interdisciplinary studies. Major specialised journals should be encouraged to initiate special issues on interdisciplinary topics. One of the tools that can be used is web-based communication.
- Funding Agencies: Except in certain areas of physics and mathematics, little is known about the methods needed to create integrated yet parsimonious theories that span multiple areas. Besides discipline-specific studies, funding should also be provided to support interdisciplinary service research through mechanisms such as dual appointments and shared rewards.

2.2.2 *Opportunities to address the skill gap*

Discipline-based education remains a vital role of modern universities. In order to close the skill gap and create more adaptive innovators, however, universities should also offer students the opportunity to gain qualifications in the interdisciplinary requirements of SSME. Such qualifications would equip graduates with the concepts and vocabulary to discuss the design and improvement of service systems with peers from other disciplines. Industry refers to these people as T-shaped professionals, who are deep problem solvers in their home discipline but also capable of interacting with and understanding specialists from a wide range of disciplines and functional areas.

Widely recognized SSME programs would help ensure the availability of a large population of T-shaped professionals (from many home disciplines) with the ability to collaborate to create service innovations. Graduates with SSME qualifications, including improvement projects across industries and performance measures, would be well prepared to 'hit the ground running' and make significant contributions when joining a service innovation project.

Interdisciplinary course development requires significant effort to develop because different faculty members might find it hard to work together sustainably over time. Educational innovations are vulnerable because they are often reliant on the efforts of one or two people. Interdisciplinary programs are even harder to organize, and more expensive to initiate and maintain, than conventional ones. Rapid progress in the design and delivery of these programs would require support and resources from business and government.

3. Predictive Analytics in Higher Education

When applied to higher education, predictive analytics can help institutions accurately predict student behaviors – notably in the areas of learning outcomes, recruitment, and retention. For instance, by analyzing historical data, predictive analytics can inform an institution as to which applicants are most likely to enroll and, later in the student life cycle, which are likely to persist and graduate. Armed with these data, institutions can intervene with those who show signs of trouble, in real time, before it is too late to effectively intervene.

For the purposes of this study, we look at predictive analytics as a valuable tool with which to engineer positive change throughout the student life cycle. As the cost to recruit a student rises, it becomes ever more important to retain students until they graduate, which will:

- Improve student learning outcomes.
- Improve retention and graduation rates.
- Improve the institutional return on investment (ROI) on recruitment costs.
- Increase operational efficiency.
- Help the institution demonstrate success in a key area of focus for accrediting agencies and the Federal government.
- Demonstrate positive efforts to other important entities (e.g., state legislatures that allocate funding to public colleges and universities).

Transforming universities for Smart Education can be realized using IBM's Business Analytics technology and software tool in integrated information systems that allow:

- Delivering an exceptional student experience and outstanding outcomes
- Accelerate research discovery and innovation capabilities
- Improving Back Office Operations is key to sustainability, and to enable investment in Front Office Transformation

Delivering smarter education means:

1. Quality education is delivered effectively, efficiently and at lower costs.
2. The future needs of students are anticipated and planned.
3. Programs and resources are matched to the learning styles of students.
4. Technology builds compelling engagement across the student life-cycle.
5. Curriculum is built for the needs of students and the requirements of employers.
6. Services and learning opportunities are delivered to students flexibly and easily.

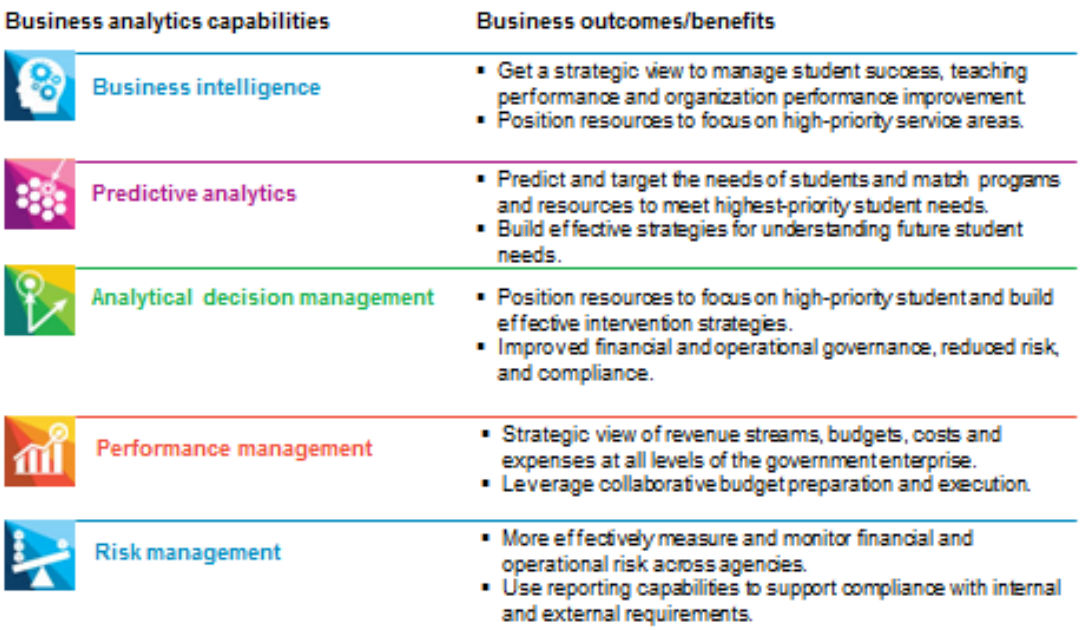
Smarter research means:

1. Aligning researchers and topics with critical requirements from government and industry.
2. Connecting researchers to potential collaborators based profiles, published articles and research activities
3. Tracking all research projects with real-time analysis of status.
4. Predicting the possible outcomes of research initiatives.

Managing resources effectively and efficiently means:

1. Budgets are prepared and executed against program goals.
2. Tuition and other revenue is collected.
3. Institutional advancement strategies are long-term versus short-term
4. Top performers are retained and salaries and benefits competitive and aligned.
5. Outages in key services are prevented.
6. Operational costs are lowered.
7. Physical assets are maintained and aligned to teaching goals.

Beyond the student life cycle, predictive analytics can be used across the academic enterprise – from advancement ("What's the likelihood of an alumni subset making planned gifts or attending homecoming?"), to residential life ("If we make $x investment in dorm upgrades, will we recoup this through longer stays and higher rates?"), and to academic affairs ("Assuming current recruitment and retention rates, how many adjunct faculty members will we need in the Technical University of … in 2020?").



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