

Teaching Informatics in North America: Jugglers Wanted

Bob Travica^{1,2}(✉)

¹ Asper School of Business, University of Manitoba, Winnipeg, Canada
btravica@ms.umanitoba.ca

² School of Computing, University of South Africa, Johannesburg, South Africa

Abstract. Teaching informatics (information systems) at the university level in North America is challenging. The teacher in Canada and the United States can be compared to a juggler performing before many spectators. The juggler strives to keep in the air multiple balls that cross each other's path. A student-learner ball may collide with a student-customer ball, teacher's needs for new technology and better technological support are countered by funding limitations, while attempts for asserting academic self-identity get confronted by incongruent attributions that the spectators create. Opposed balls come even from the field colleagues when the character of the field and teaching prospects are at stake. The article analyses these tensions and outlines prospects of teaching information systems in North America.

Keywords: Management information systems · Informatics · University teaching · Canada · United States of America · *Invited keynote lecture*

1 Introduction

The following discussion will presents my view of teaching issues in the field of informatics, that is, information systems (IS) in Canada and the Unites States. I have taught in the U.S. for 13 years (accounting for five years of my assistantship during my Master's and Doctoral study) and for 16 years in Canada.

I will use a *circus metaphor* featuring an IS professor in the role of *juggler*. The juggler tries to keep in the air balls that cross the path and may collide. The balls represent opposed forces challenging the juggler. His/her spectators are students, administrators, colleagues within and outside the IS field, academia, business, and government. The show's theme is teaching and related management and governance. Teaching involves course selection, execution, and evaluation.

The discussion will first address the organisation of IS programs. Then, opposed forces will be analysed. Finally, prospects of teaching information systems will be outlined.

2 Organisation of IS Programs

It is important to understand how IS programs are organised in order to grasp the context in which IS professors work and the choices they make in the teaching

process. Different organisational properties set both prospects and limitations to teaching IS in North America.

A North American IS program of study is typically situated in a business school (faculty) that is a part of a larger university. While a business school may give IS teaching a clearer focus, such as managerial decision making, it may also limit the scope of IS subject matter. The latter usually surfaces with new technological phenomena residing outside the orthodox management agenda (e.g., the Internet beyond the commercial realm).

An IS program can be organised into a separate department of a business school, IS-exclusive or IS mixed with other areas (e.g., supply chain or decision sciences); please refer to Fig. 1. Optionally, when a business school is centralised and based on study areas rather than departments, an IS program resides within such an area. An area can again be IS-exclusive or IS mixed with other disciplines. The departmentalised model exists in both Canada and the U.S., while the centralised model is deployed only in Canada. In the U.S., there is yet another organisational model in which an IS program resides in a separate school (e.g., Carnegie Mellon University and Syracuse University). A separate pure department model versus a hybrid area model—which make opposed ends on the centralisation continuum—are likely to have implications on the subjects taught.

IS are being taught as a major area of study at the undergraduate level. The number of required (mandatory) courses range from four to over two dozen, Canada being on the lower and the U.S. on the higher. IS are also taught at the graduate level, bestowing the degrees of Master's of Science and Philosophy Doctor (PhD). There is a trend toward specialising graduate degrees in the U.S. (e.g., IS security, or analytics).

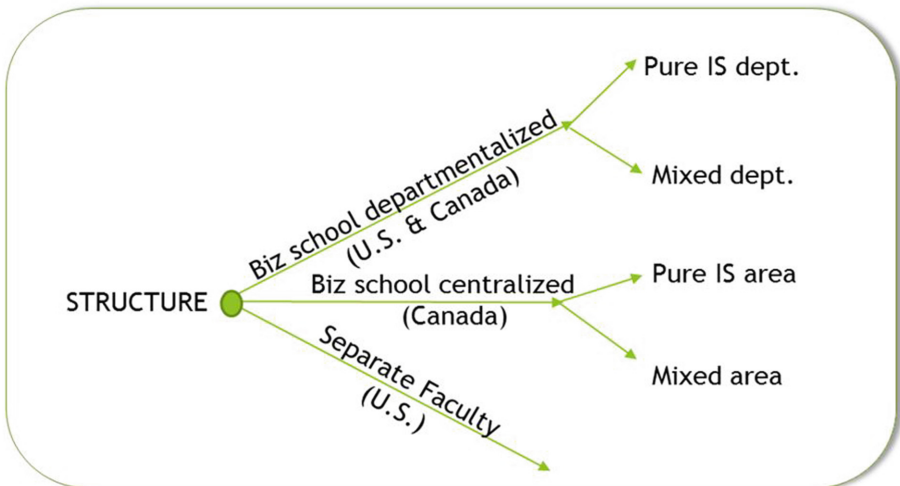


Fig. 1. Organisational models for IS programs

Table 1. IS programs at Canada’s top 15 research public universities. Source of ranking: U15 [7].

Characteristic	Finding
Departmentalised: IS program pure model	5
Departmentalised: IS program mixed model	1 (operations, supply chain, innovation, entrepreneurship, accounting, finance)
Centralised: IS mixed model	3 (same as above)
Centralised: IS pure model	3
No IS program	3
Full time tenure-track faculty	3–18
Standard subjects	Databases, systems analysis and design, data communications, programming, enterprise systems/analytics, IS strategy

I investigated a sample of top universities from each country and tabulated results in Tables 1 and 2.

As Table 1 indicates, standard subjects taught in IS programs in Canada include databases, programming, analytics, and IS strategy. In the U.S., the list also includes decision support, process management, and analytics (Table 2). Some IS programs emphasise particular subjects, judging after the course offerings and directions in faculty research. Examples include health informatics, process management/change/innovation, Web user interface, analytics/Data Science, IS security, and more recently social media. In most cases, the U.S. programs are larger than Canadian, with respect to the number of students and full-time tenure-track faculty.

The institution of tenure (permanent employment conferred after a five-year probationary period and a successful evaluation by peers and administrators) exists in both countries. In the U.S., the tenure is usually bundled with promotion from the Assistant Professor rank to Associate, while this is not the case in Canada. The tenure institution ceased to be untouchable in the U.S., with occurrences of laying off tenured full IS professors. This happened when their departments were closed down upon management decisions that were justified by insufficient student enrolments in the IS programs. The ‘invisible hand of market’ has become quite visible and strong in the period of prolonged recessions since the end of the last millennium. The IS job market in the U.S. is also characterised by a trend of hiring instructors on contract. The hires may fill so-called ‘clinical’ teaching ranks, contracted for a single academic term or longer periods.

Both in the U.S. and Canada, online course delivery has picked up the speed. Online education may meet several goals, such as expanding markets, increasing convenience for students, filling a gap in a faculty’s competences by contracting out. From the perspective of teacher-juggler, however, putting a course online may mean a loss of intellectual property and irreplaceability. An online course

Table 2. IS programs at top 13 universities in the U.S. in 2015. Source of ranking: U.S. News and the World Report [6].

Characteristic	Finding
Departmentalised: IS program pure model	5
Departmentalised: IS program mixed model	5 (decision science, operations, supply chain, management science)
IS College	1
No IS program	2
Full time tenure-track faculty	9–27; trend of contracting teachers
Standard subjects	Databases, systems analysis and design, decision making support (wide range), data communications, programming, enterprise systems, process management, analytics, IS strategy

may be a sag-way to outsourcing educational services and replacing full-time faculty by its part-time counterpart. The tenure and hiring dynamics put pressure on IS professors with regard to what and how to teach.

3 Student-Learner vs. Student-Customer

The drums are beating high, trumpets screaming, the audience's attention is sky-high... The juggler throws up a ball inscribed with 'student-learner' and immediately after a 'student-customer' ball. The balls are flying toward each other and collide. The audience is booing the juggler. What has happened indeed in our metaphorical circus?

An IS teacher faces the situation above every time he/she teaches non-IS major students. Such students are less likely to be motivated for studying topics related to information communication technology (ICT, IT) and its management. And really, why would they? How many drivers in North America have ever opened the hood of a car they drive daily? Do people know how a TV network works or what principles underlie the ubiquitous mobile telephony? Masses of people in North America are consumers interested in using technologies, while caring little about technology principles and workings. Not incidentally did a popular model for studying technology acceptance, which features the ease of use as the key independent variable, come from the U.S. A combination of educational shortcomings and consumerism precludes interest in technology beyond its utility for all but the specialists. Accordingly, non-IS major students in commonly required IS courses often wonder, why do they have to study IS?

Such displeased students tend to turn their customer face toward IS teachers. Strongly encouraged by university administrators, the student-customer role is grounded in notable costs students have to absorb. Study fees in North America range from \$5,000 to \$50,000 a year (the figures do not account for lodging and

other living expenses). American figures are typically two or more times bigger than Canadian equivalents. However, the customer stance can lead the students to a logical impasse: If I am a true customer, why do I have to buy a course I do not want? And they still have to as long as IS courses exist in the required common core.

IS teachers face a permanent challenge of motivating the non-major student-customer. Methods of teaching have to be thought through over and over again. For example, simplifying complex technology topics and spoon feeding students with use procedures may help to get more students to complete planned class activities. Furthermore, teachers may incorporate humor and fun in teaching. (At some universities, course evaluations ask for such a rating.) Next, a popular teacher masters techniques of rewards and gratifications. To satisfy student expectations, everything they do must be scored in some way and built into students' marks (grades). This starts with class attendance and involves the participation in class discussion and other study activities. Applying precisely quantified marking keys against student assignments is also a way of warding off customers' dissatisfaction. These methods make a necessary toolkit for a teacher of less popular subjects, such as IS.

More flexible students may concede to the learner role and get engaged beyond consumerist bounds. Still, their customer face surfaces in a request for 'getting value-for-money'. What more precisely may that value be, remains a question open to subjective assessments. For example, if a teacher instructs students on using some software by the spoon feeding methods cited above, some students may devalue such education ("why come to class when this is so easy?"). At a deeper level, the nature of any knowledge is such that a more objective grasping of its value cannot be assessed up front. New knowledge demonstrates a value only post factum, when integrated with other knowledge or put at practical test. These effects can rarely happen within a single semester. Thus, the request of value-for-money is an empty shell to be filled arbitrarily by each student.

IS teachers are compelled to get good students' evaluations of the courses taught in spite of all these challenges pertinent to teaching technology related subject matter. At the end of every course, these anonymous evaluations are regularly performed. They vary in content, from a few general questions to lengthier surveys with questions grouped and backed by Likert-type scales and possibly open-ended questions. The teacher gets results of course evaluations without knowing who stands behind each – the student-learner or the student-customer. The evaluations have been criticised for subjectivity and even for some statistical problems. Still, they stick as no feasible alternative is available. Mass processing of numerical evaluations is a superb time-saver.

To make things worse, administrators (department heads, deans, and study area directors) take liberty to use these evaluations arbitrarily (e.g., focusing just on some questions, such as those comparing the given course and instructor with all other courses and instructors the student know; or taking rating percentages rather than standard statistical indications of central tendency). Valuing of speed

over quality, which characterises North American culture in general, precipitates such quick and dirty measurement. In effect, students' voice is essentially filtered, while teachers may get hurt and left to agonise over achieving what administrators deem good evaluations.

What do students, when planning to take an IS course, look at in course evaluations (provided they can access them)? Only students know that, and variation on the individual basis is plausible. The word of mouth undoubtedly works. The Website 'Rate My Professors'¹ is a side venue that some students embrace. A student can log into it, and after submitting some details rate any course and instructor at a particular university. A quick look at 'Rate My Professors' shows a variety of evaluations from low to high, based on a five point-scale. A professor's name is associated with an average of all evaluations, and individual student comments and evaluations are displayed. There are images of thumb up and down, smiling and sad faces, and of chillies for 'overall hotness'. Clustering of comments around particular courses may indicate the courses that everybody loves or that everybody loves to hate. While the validity of these evaluations is dubious, they can influence the word of mouth. Sometimes, these ratings can even serve as the exclusive informing source on courses and teachers. In reaction to these evaluations, some professors have tried to fight back this method by running Websites for rating students.²

4 Technology Wishes vs. Funding Limitations

The IS field is by definition dynamic and innovative. To remain relevant, IS teachers need to keep current their technological knowledge and teaching. New software requires investment and possibly savvy practices of attracting sponsors from the IT industry. Therefore, the teacher-juggler throws up a ball of technology wishes/wants. But its path crosses with a ball of limited funding. Funding for computer laboratories and individual software needs can be random, on a case-to-case basis. The path to money allocations is further complicated by competing software priorities that other business disciplines bring to the table. Altogether, they compete for attention of the Dean's Office that could make allocation decisions on criteria favoring business logic (e.g., student enrolments) rather than technology progress.

Another angle on technology wishes has to do with expert support. It is needed for teaching labs, using third-party systems deployed in courses, running course servers as well as course management systems, content management systems, and communication systems. While efficiency and quality are required, expert support can be suboptimal.

Technological support at North American universities is usually organised by combining a central IS department, which serves both business and teaching needs, and an IS unit internal to a school/faculty. Governance issues are not always clearly defined between these two. Consequently, it may be unclear who

¹ <http://www.ratemyprofessors.com/>.

² <http://www.rateyourstudent.com/>.

is in charge of particular software updates, security, and reliability. In addition, both these organisational levels are often understaffed and overworked. They experience specialisation gaps, which may leave an IS teacher with no option but self-reliance. In the ultimate analysis, deep roots of a sub-optimal technological support are in budget limitations.

5 Self-identity vs. Attributions

The juggler tosses balls inscribed with ‘Next-big-thing’, ‘Visionary’, and ‘Explorer’. The audience immediately responds by tossing balls that read ‘Programmers’, ‘Techno-freaks’, ‘Aliens’, and just a ‘?’. This part of the juggling show involves colleagues from other business disciplines, administrators, and the business community. It exposes a remarkable gap between the identity assumptions held by the insiders to the IS field and the attributions made by outsiders. Put another way, the identity of IS programs struggles with misunderstandings that other management disciplines have about it.

Outsiders to the IS field often see the insiders as technology promoters who know little about organisation and management. IS teachers are branded as narrow specialists who can see barely anything beyond computers. It is interesting that even when IT is directly involved in their preoccupations (e.g., digital marketing, supply chain, high-tech innovation, strategy, and entrepreneurship), the colleagues from other management disciplines may view IS teachers almost as some sort of aliens who are unsuitable for collaborative research or graduate student advising.

Inside the IS field, this misunderstanding is sometimes explained by the field’s age. But this thesis is rather tenuous. If the IS field is a teenager in comparison with physics or law, it can hardly claim such a status compared with marketing or supply chain management. And yet, hardly would anyone question the identity of these disciplines. Therefore, the problems may be elsewhere, perhaps in the very foundations of the field.

The IS field descended from several parents. Figure 2 depicts relationships between the IS field and subject areas that belong to computer science, operations research, general and special systems theory, and others (the upper left and the middle box). The field has another strong link to organisational and management theory, and weaker links to social and behavioral sciences and some humanities (the upper right box). This complex background enables broad horizons for research and teaching. However, it has some disadvantages, one being incomplete differentiation.

The IS field has never differentiated itself clearly from computer science. Some teaching subjects are simply duplicated and tweaked to a management perspective. Also, the field borrows from the associated disciplines rather arbitrarily and mechanically (for example, from telecommunications and psychology). The field has never defined a basic vocabulary. Thus, the agreement on core concepts stops with their selection (information, data, information system, information technology), while definitions are formally weak and undifferentiated from the

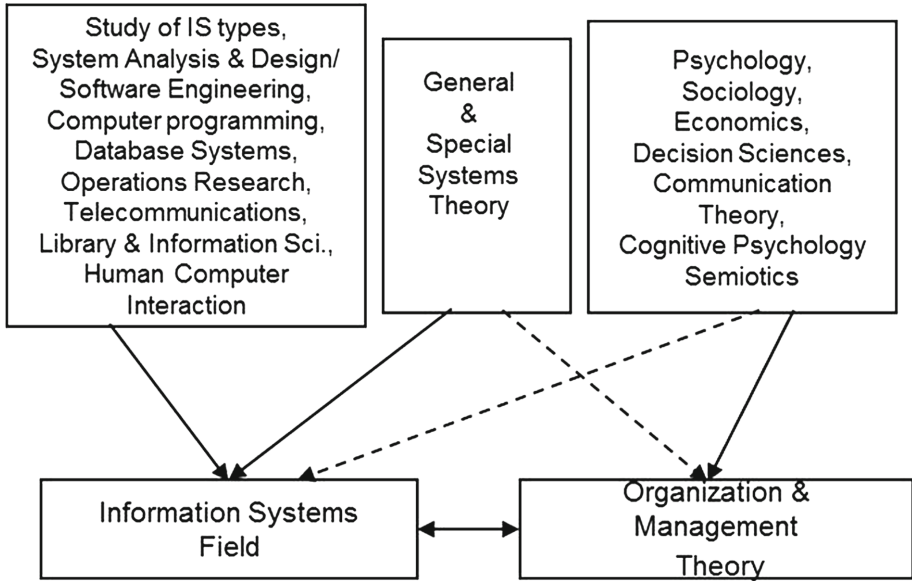


Fig. 2. Relationship between IS field and cognate disciplines (Adapted from Travica [5])

jargon of the IT industry or even everyday talk. Contrary to the thesis that such an openness creates opportunity for an open minded inquiry, the fact is that the field operates with a fuzzy subject of research. This aggravates communication with and recognition by other disciplines.

The shaky foundations influence a lack of development directions in both research and teaching. Running after the next-big-thing confines the field to a stand-by, reactive mode. The field is incapable of marking its targets unless the IT industry rolls out a new product. Sometimes, a new technological development extends an existing subject; an example is Big Data that adds to the Analytics topic and the broader decision making subject. At other times, such a smooth transition is missing; an example is the social media topic that initially appears disconnected from traditional management study, except in the area of marketing. At any rate, the lack of focus influences prospects of teaching IS in North America.

The lacking focus may have to do with the evolution of IT role in North American society. About five decades ago, IT was envisioned as a ‘strategic weapon’ and a main lever for development and success. Today, IT is increasingly treated as a commodity that does not necessarily bring strategic advantages. The trend of expanding rental solutions, such as Cloud Computing and particularly Software as a Service, reinforces this trend in the business domain. After the glorious start, IT has been tested in the economic and social turmoil, and practitioners treated it consistently just as a cost centre rather than a productivity and development engine. During a recession, IT spending gets quickly onto the chop-

ping board. IT purchases slow down. A decreasing demand for IT professionals follows the suit. Finally, academia gets hit as well, and student enrolments into IS programs go down. This is business reality.

From the theoretical perspective, IT ceased to be scarce or prohibitively expensive any longer, thus resembling any other commodity [2]. According to theory of competition, these properties define a precious asset whose possession brings a strategic competitive advantage. Contributions of IT to the macro-economic productivity in the U.S. have also been questioned in the literature focused on ‘IT productivity paradox’ [1,4]. All these developments suggest that IT has lost the capabilities of strategic weapon in a developed economy. However, this change should not obscure the fact that new IT-related jobs and even larger scale IT-related economic developments have emerged (think of e-commerce and electronic supply chains). One should also acknowledge the vitality of IT in enhancing the management and professional work (think of advances in analytics for decision making, which currently are expanding into the domain of Big Data). IT is (and will be) necessary for doing successful and sustainable business. This premise creates a realistic platform for prospects of the IS education in North America.

6 Teaching Prospects

The discord among IS scholars regarding the subject of study has a complement in differing development visions. From time to time, these surface in discussions within the field [3]. In my own phrasing, there is a *next-big-thing* approach that is a legacy of independent IS departments in the U.S. It still has a strong following. As noted above, this in fact is a reactive rather than proactive approach. The IS field is not more than a wagon attached to the locomotive of IT industry. In other words, it does not have its own research agenda but depends on the IT industry for it. Although this approach carries benefits of autonomous building of a teaching (and research) agenda, it deepens the gap between IS and academia.

The alternative is an *integrationist* approach that looks for multiple and stronger relationships with cognate disciplines. This approach also has a following in the IS field and it is encouraged by university administrators who expect bigger student enrolments. If properly based on a lasting interest fit and methodological congruence, the integrationist approach may engender durable partnerships, and expand the teaching subject and proactive capability.

Although there may always be a ‘*next-big-thing*’, this does not mean that the survival of an academic field is assured by claiming allegiance to this notion. Theoretical and practical relevance of an academic field matter. If the integrationist approach has a better chance of achieving these, this thesis brings us back to the question of appropriate organisational models. It stands the reason that models that mix IS with other disciplines offer more nurturing conditions for development than pure IS department models. This model does not imply that juggling disappears. It just introduces new balls.

7 Conclusion

I argued that teaching IS in Canada and the U.S. resembles juggling with multiple balls that move along collision paths. The balls symbolise opposed forces related to students, technology and support for teaching, identify of the IS field, and development directions. Different organisational models for IS programs provide the context, opportunities and limitations to the subject matter taught. The models are evolving. Prospects of teaching IS will also depend on the interplay between market forces and resolutions in the IS field's search for self-identity and development directions.

References

1. Attewell, P.: Information technology and the productivity paradox. In: *Organizational Linkages: Understanding the Productivity Paradox*, pp. 13–53 (1994)
2. Carr, N.G.: IT doesn't matter. *Educause Rev.* **38**, 24–38 (2003)
3. Looney, C.A., Firth, D., Koch, H., Cecez-Kecmanovic, D., Hsieh, J.P.A., Soh, C., Valacich, J.S., Whitley, E.A.: The credibility crisis in IS: a global stakeholder perspective. *Commun. Assoc. Inf. Syst.* **34**(1), 1175–1189 (2014)
4. Roach, S.: No productivity boom for workers. *Issues Sci. Technol.* **14**(4), 49–56 (1998)
5. Travica, B.: *Examining the Informing View of Organization: Applying Theoretical and Managerial Approaches*. IGI Global, Hershey (2014)
6. U.S. News, the World Report: Management information systems rankings (2016). <http://colleges.usnews.rankingsandreviews.com/best-colleges/rankings/business-management-information-systems>
7. U15: Group of Canadian research universities (2016). <http://u15.ca/>

ICT Education

45th Annual Conference of the Southern African
Computer Lecturers' Association, SACLA 2016, Cullinan,
South Africa, July 5-6, 2016, Revised Selected Papers
Gruner, S. (Ed.)

2016, XVI, 195 p. 28 illus., Softcover

ISBN: 978-3-319-47679-7