A Review of Business Information Systems Discipline: Still Toddling

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Abstract: Business Information Systems (BIS) is a professional discipline that combines Computer Science, Management, and Business Administration. In this article the researchers evaluate the evolution of BIS curriculum in terms of its past, present and future, considering its historical background, the existing strengths and weaknesses, and how it can be developed to meet market needs. The study reveals the skills required by a BIS graduate and highlights how the existing/existed BIS curricula have made their graduates weaker when compared with Computer Science and Business Administration specialists. The research further compares the existential crisis of BIS with Library and Information Science (LIS) discipline, which have also faced a similar controversial crisis concerning their disciplinary boundaries, whether it belong to Social and Behavioral Sciences or Computer Science and Engineering and yet succeeded in its growth and contributions. This research concludes that the BIS curriculum is still budding and needs to be re-evaluated and updated regularly to meet the changing demands of the market highlighting the need for collaboration between academia and industry to ensure that BIS graduates are equipped with the skills that employers require. The paper finally proposes a balanced model of BIS curriculum that incorporates the latest technology updates. The proposed curriculum model aims to address the current gaps in BIS education and meets the changing demands of the market.

1. Introduction

Higher education from a system perspective consists of input (students), process (teaching and learning), and output (graduates). The process is implemented with the help of some human and non-human elements. Academic staff are responsible for teaching students. Non-academic staff are responsible for supporting the process. Non-human elements, i.e., equipment, make the process possible. Therefore, it is necessary to have laboratories, hardware devices and software packages according to the field of education and research. The optimal performance of a training system provides qualified graduates to the market and industry.

But it is not always easy to achieve this goal. Sometimes the human and non-human elements of higher education are not sufficiently coordinated. Students' motivation to study, the quality of teaching aids (laboratory equipment), and the ability of academic staff are some of the factors affecting the performance of the higher education system. Sometimes the problem is more complicated. In some academic disciplines, the unknown and immature nature of that specialized field creates other problems. In simple words, the transparency, maturity and stability of fields like chemistry and medicine do not exist in all fields. Some fields are young and have not yet been able to clearly define their relationship with neighboring fields. Ambiguity in the nature of a specialized field causes conflicts in the place of establishment (host faculty), curricula (core and optional subjects/modules), dominant discourse (belonging to one of the fields of basic sciences, engineering and social sciences), and the quality of graduates (competence expectations of the market) and stops the maturing process of the same field for several decades. In this article, we study this problem in relation to the field of Business Information Systems and show that this field is still suffering from an identity crisis.

2. BIS: Historical Background (Yesterday)

Business Information Systems (BIS) is an attractive and very challenging specialty that has a life of less than half a century. As its name suggests, BIS is one of the branches and perhaps the most practical branch of Information Systems (IS). BIS degrees are expected to provide a broad business and real-world perspective, strong analytical and critical thinking abilities, interpersonal communication and team skills as well as core knowledge of IS. This fundamental proposition shows that we are facing a new combination of Computer Science and Business topics in the field of BIS. That is, we should evaluate a BIS graduate as an analytical person who is able to prepare computer-based solutions for real issues of the market and industry that can be considered

on a global scale by relying on analytical and critical thinking. Of course, to be successful in his/her career, such an expert must be extroverted enough and consider communicating with his/her clients and colleagues as a way to collect objective and up-to-date data about their daily needs and their level of satisfaction with solutions. These competencies should be combined with a solid methodological foundation in design and implementation of information technology solutions that enhance organizational performance, a solid knowledge and practice in software engineering, networking, programming and computing technology; and at the same time, business and information systems strategy, management and marketing, organizational concepts, modelling and information systems architecture, mathematics, statistics and operations research. Accordingly, BIS appears to be an attractive and exciting multidisciplinary field where a complete set of hard and soft skills can be applied to a wide range of engineering and social issues. But the truth is that BIS is not so lucky in practice.

Helfert (2011) addresses the arguments about the core concepts and characteristics of the BIS as a discipline and a kind of identity crisis among IS specialists ranging from technically focused and intimate relation between information technology and information systems on the one hand to a broad perspective of "systems in organizations" on the other hand. By referring to previous research, he shows that BIS graduates are in a state of disorientation. On the one hand, they should improve their skills in the field of computer systems development; because they are known as computer engineers, and on the other hand, they must have sufficient knowledge of the concept of management and the commercial functions of organizations. However, the crisis resulted in a steep decline in enrollments in the US after 2000 and questions about its future (Fotache, Greavu-Șerban and Dumitriu, 2015).

IS as an academic field has many similarities with Computer Science (CS). Jobs held by IS/BIS and CS graduates fall into one job category. In other words, a CS graduate applies for the same jobs as someone with a degree in IS/BIS applies. Therefore, in the software packages and system design industries people with both degrees and expertise can be found. The reason for this similarity is the common job competencies and skills that both groups have; and of course, the main source of this resemblance capability is the similarity of the curricula of these fields. Almost any knowledgeable person can compare the BIS curriculum with the CS curriculum to arrive at a common list of subjects that develop the same skills in the learners and allow them to work and conduct projects collaboratively in what is now known as the data industry.

Of course, the BIS curriculum has some differences with the CS curriculum. A CS major performs the analysis, design and development, and evaluation of information systems with almost no industry or service focus. In other words, a CS expert must be ready to provide services related to the design of computer systems and networks in all environments and according to the needs of all

customers. In contrast, a BIS student gets acquainted with the business developments and financial needs of the market in some subjects and learns how to use his/her expertise in system design in the best way to meet the needs of a given business practitioners and customers. According to Helfert (2007) BIS graduates seem to be more prepared to join the industry and market; as they focus on explaining real world scenarios.

3. BIS: Strengths and Weaknesses (Today)

Information Technology (IT) is generally accepted as a major element in IS. But there are some arguments that IS is fundamentally rooted more in Management than in Computing or IT. Helfert (2011) claims that Computing/[Computer Science] graduates are better qualified for technical-oriented jobs, with IS graduates often lacking essential technical and programming capabilities; and even worse, they find it difficult to compete with the high number of Business graduates. However, the most important goal of the BIS curriculum has historically been to educate students better than the previous generations (who were mostly CS or Business students); so that they design and operate organizational information systems more successfully by understanding their technical and social complexities. In recent years, a similar statement has been popularized about Data Science graduates. According to this statement, a data scientist is someone who is better at statistics than any software engineer and better at software engineering than any statistician.

Up to now, [BIS] has noted the rise and constant positive moves and changes, in accordance with the dynamic changes of IT development (Sedlak, Tumbas and Matković, 2007). It has already become one of the key drivers for success in the global economy (Caputo, 2010). IS, as its root, experienced *Connection*, *Immersion*, and *Fusion* interactions with the Business. In the *Connection* view, they were viewed as separable artifacts. In the *Immersion* view, they were immersed as part of the business environment and commercial interactions; and could not be separated from work and the systemic properties of intra- and inter-organizational processes and relationships. In the *Fusion* view, they were fused within the business environment, such that Business and Information Systems are indistinguishable to standard time-space perception and form a unified fabric (Carlsson, Hedman and Steen, 2010).

Recent changes such as the "Bologna Declaration" in Europe, globalization and technological innovation can also be considered as influencing factors on the revision of IS study programs (Helfert, 2007). An Associate's degree in BIS program at Eastern Kentucky University, for example, was designed to prepare students for positions in office management, computer applications, desktop publishing, technical writing, communication, and training. Business Communication, Office Procedures and Administration, Office Computer Applications, Keyboarding, Desktop Publishing, Word Processing, and Project Management were included as required subjects for this major. These subjects allowed students to enhance their skills in writing and oral communication,

following directions, preparing business documents, using office technology and software applications, and developing management and leadership qualities (Carnes, Awang and Robles, 2004). In another research report, Ethics, Professionalism, Teamwork, Interpersonal Communication, Societal and Legal Issues, as well as, History were also recommended as required subjects (Cybulski and Nguyen, 2012). There are same reports of undergraduate BIS curricula indicating that both hard and soft skills have been covered (Kraft, Kakish and Steenkamp, 2009; Seruga, 2009; Schreurs and Al-huneidi, 2011), Big Data and Cloud Computing topics have been included (Sarnovsky and Paralic, 2015; Sarnovsky and Bednar, 2019), and the curriculum has been compared against the market needs through examination of job postings (Scott-Bracey, 2011). Integrating critical thinking concept in the BIS curriculum and empowering BIS graduates with this skill (Robles, 2011) and inclusion of E-Simulations and Blended Learning in teaching BIS curriculum were reported too (Cybulski and Nguyen, 2012).

In another study to teach object-oriented concepts to Business students, Towel (2000) argued that complexities of business information systems will continue; and hence, teaching technological topics to these students will absolutely be required. Perhaps he can be considered as one of the first researchers who clearly pointed out the lack of IT expertise among Business graduates and their weak skills in the field of designing and developing information systems. Twenty years later, Chimgee and et al (2020) were still disappointingly trying to justify teaching Enterprise Resource Planning (ERP) to Business students. ERP is a successful example of sophisticated corporate information systems development projects. Schwald (2010) states that the basic concept of teaching Business students the principals of corporate information systems rests on the following main qualifications and skills the student should have at the time s/he graduates from the university:

- Obtaining in-depth working knowledge of information systems (e.g., how they work, how they are structured and so on); because the graduate as an operator is expected to accomplish daily tasks by using a given ERP system.
- Acquiring decision making skills (e.g., which system to choose based on requirements analysis); because the graduate as a middle admin is expected to offer acquiring a given version of an ERP system to the top managers of company.
- Gaining method competence (e.g., learning how to complete a sales transaction in an ERP); because the graduate as a business developer is expected to maximize the revenue to the benefits of company.
- Learning social skills (e.g., working on a fictitious major ERP project as part of a project team); because the graduate as an inter-disciplinary expert is expected to play the role of a translator/an interpreter among members of project team.

A few months after the Towel's contribution, Adelsberger and et al (2001) declared that due to the dramatic underestimating of the need for ICT specialists

in the 1990s, the capacities of information systems-oriented courses of studies were increased on a medium- and long-term basis starting in 2000s. In general, Computing/Computer Science (e.g., basic Informatics) addresses technical and theoretical bases of information technology and software systems; and in contrast, Business and Management provide knowledge of the principal functions of management and focus on business operations and decision-making (behavioral and organizational components). The combination of both disciplines, which includes technical and social components, is generally described as Information Systems (Helfert, 2007). BIS as an academic discipline spent a lot of energy to fill this gap in the past years. In general, BIS graduates were and still are expected to pay special attention to the specific needs of customers and their proficiency and skills in using systems and popular devices; and at the same time, to use analytical and technical skills to identify and solve information problems in an organization (Elmaleh, Miller and Goodman, 2008). They acquire technical skills in subjects such as Programming and Database Design and analytical skills in subjects such as Information Systems Management, Business Administration and Developing Digital Enterprises. Forty years ago, Cassel (1983) stated that in all cases, the concepts [should be] presented in general terms for the sake of the broadest applicability and then [should be adapted] to the specific application needs of systems; because [BIS] students tend to be very pragmatic and demand to know what can be done with anything. As a successful experiment, Sousa and et al (2005) covered successfully Information Security as a highly technical issue in BIS curriculum. As a kind of curriculum development, one can find the following list of topics inclusive enough; as that all engineering, administrative, social, and financial aspects of information security issues have been accumulated in one module.

Security Threats
> Hacking
> Denial of Service
> Malicious Code
> Social Engineering
> Spoofing
> Trojan Horse
> Viruses
> Worms

Risk Management
> Continuity Planning
> Disaster Recovery
> Incident Response Team
> Security Planning
> Security Vulnerabilities
> Data Integrity

Risk Assessment

Security Education
Security Awareness
Security Procedures
Security Training
Computer Threats

Security Technology
Cryptography
Firewall
Network Security
Password Management
Virus Scanning

Furthermore, the ease and anonymity with which information can be communicated, copied and manipulated in online environments is challenging the traditional rules of right and wrong behaviors. This challenge has caused many problems in recent years. In parallel with the development of computer networks and increasing the speed and ease of access to information, the risk of abuse has also increased. The new challenge is also complex; because users are not sufficiently educated about the ethical and legal considerations of using information. In the most optimistic case, due to ignorance, they are not able to recognize wrong behaviors and commit ethical mistakes in reporting and using information. But unfortunately, in most cases, users are aware of the wrongness of what they are doing, and for immediate and cheap benefits, they try to anonymously ignore legal and ethical standards, and in order to do things faster and easier, they use and manipulate the data and information produced by other people and organizations regardless of copyright and confidentiality restrictions. In order to decrease the negative impact of misbehaviors and misuses, viruses, cracking (sometimes called hacking), computer fraud, illegal software copying, and corporate sabotage using a computer, as examples of unethical behaviors among expert and non-expert end-users of information systems have also been included in professional training of BIS specialists. BIS graduates were empowered through creating ethical competence as the ability to act self-confidently, autonomously and with a high degree of responsibility (Halawi and Karkoulian, 2006).

However, besides the traditional (face to face) education in universities, online education in BIS has also been reported as a mechanism to support continuing educational programs and life-long learning and to cope with the challenges of permanent enrichment and enlargement of skill requirements, and the dissolution of fixed career profiles. Recently, focus on the continuing education/life-long learning resulted in developing an online Master's program

for those who had full-time jobs and enough professional motivation for promotion (Adelsberger and et al., 2001; Das and et al., 2019).

4. BIS: Concluding Remarks (Tomorrow)

The multidisciplinary character of BIS, and simultaneously, the lack of concrete theoretical foundations, theories or concepts that are accepted by the majority of researchers have been criticized (Helfert, 2011). BIS curricula were historically expected to include, for example, business applications of system design and development. That was why Cassel (1983) stated that BIS [professionals] should be considered as a group of pragmati[st and] career-oriented business applications programmers. It seems that this goal has not yet been achieved. The curricula of this field have undergone many changes in the last forty years. Countless controversies have arisen to determine how much of the curriculum should be devoted to Computer Science and how much to the Business. These arguments have unfortunately not yet reached a single conclusion. Some BIS departments can still be found with the roots of Computer Science whose main orientation/concentration is the training of programmers, and on the opposite side, some other BIS departments can be found that focus on Management and Economics whose main qualification of their graduates is business modeling. The differences in the curricula are obvious and the distinctions in the abilities of students can be easily recognized. For this reason, a group of BIS graduates is still weak in competition with Computer Science experts and another group in competition with Business Management specialists. As a matter of fact, Sousa and et al (2005) stated that the fast-paced changes in technology require similar changes to the delivery of academic instruction in technology-based subjects. Perhaps the best investigation towards developing a unique list of competencies expected from BIS graduates is that of the Carnes, Awang and Robles (2004) research report in which they made the most balanced tabulation that has ever been provided (Table 1).

Table 1. Competencies Expected from BIS graduates

Communication Skills	Technology Skills	Problem Solving Skills
Written	Computer Applications	Critical Thinking
Oral	Web Design	Decision Making
Listening	Internet	Situational Analysis
Effective Questioning	Telecommunications	Synthesis of Data
Presentation	Multimedia	
Informing	Technical Support	
Grammar Proofreading		
Organizational Skills	**Interpersonal Skills**	**Management Skills**
Prioritize	Negotiation	Planning
Delegate	Diplomacy	Leading Projects
Time Management	Team Building	Staffing
	Networking	Conducting Meetings

	Resolving Conflict Collegiality Customer Service	
Qualitative Abilities	**Professionalism Indicators**	**Global Awareness**
Accounting Math Budgets Spreadsheets	Confidentiality Punctuality Business Appearance Business Etiquette Ethics	International Communication Diversity Understanding Cultural Appreciation

Soft and hard skills, professional behaviors, perspectives, and career-relevant knowledge of BIS graduates should be assessed to guide continuous improvement of the program [and] to help ensure students' employability and success (Carnes, Awang and Robles, 2004). Under the conditions that the controversy about the content and the best method of providing BIS education still continues after forty years, perhaps the best way to solve the problem is to continuously evaluate the professional qualifications of BIS graduates. Various methods can be used for this purpose. For example, one can study the perspectives of stakeholders group. Stakeholders include employed and unemployed graduates, employers and academics. Graduates can present their perception of success or failure in employment (lived experience). Industry and market managers can tell us about their bitter and sweet experiences related to the qualifications that graduates have or lack. The academics can also describe their assessment of the students' competencies based on the desired academic and professional ideals in the curricula. Another suitable method, for example, is to study employees in the workplace. Observing their professional behavior and contribution can be the best evaluation criterion.

More than a decade ago, due to the relative immaturity of the discipline and the lack of a clear identity, an ongoing discussion about the essential foundations and concepts of BIS was required (Helfert, 2011). Reviewing the literature shows that it is unfortunately still needed. Of course, BIS is not the only specialty that is under the pressure of academia and the market. The identity crisis can also be found in some other areas of human knowledge. As an understandable example, one can mention the identity crisis in Library and Information Science (LIS) field. LIS professionals have been under criticism for decades; because of their immersion from the Social and Behavioral Sciences to the Computer Science and Engineering. During the past hundred years, LIS curricula were transformed for many times. A lot of subjects were included in and then excluded from the LIS curricula from time to time. That was specifically the result of continuous changes in the market and the consequence of expectations appeared in the real scene. LIS pioneers have contributed in educational planning and curriculum development to create a new and empowering context for training information professionals considering the demands in the job market. Many surveys of job postings and content analysis of vacancies can be found in the LIS field. Therefore, the rich tradition is

available over there; and fortunately, the chance to adapt the lived experiences of a group of academics is available to take. BIS academics are expected to adopt past experiences and models in revising and renewing the curricula and methods to help students gain a better quality of teaching and become more proficient in responding to the needs of the market. Helfert (2011) mentions the need to increase the capacity of BIS to acquire adequate funding and resources to design attractive study programs. It can become true through the endeavors aiming to match the discipline with the market more and more. As the final remark, authors would like to develop a balanced conceptual model of BIS curriculum in which the latest updates in science and technology have been represented (Figure 1).
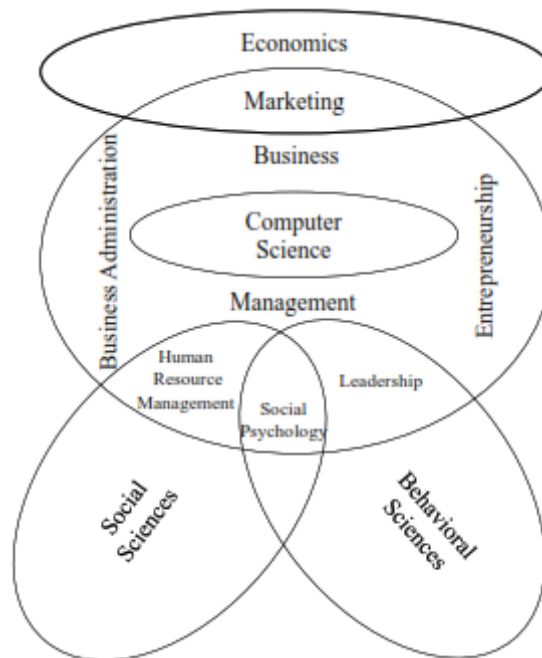

Figure 1. The Balanced Conceptual Model of BIS Curriculum

It illustrates how core (Computer Science) and secondary (Business, Economics, Management, and Social and Behavioral Sciences) subjects/modules shape the structure of a given BIS curriculum. This model advocates placing Computer Science subjects/modules in the Business Information Systems curriculum as the core of this discipline. We believe that the core of BIS curriculum should be strengthened with some core courses of Management and Business. As the first

layer of support for the new curriculum and considering the current changes in higher education that make Entrepreneurship training inevitable, we also consider it necessary to include discussions of Business Administration and Entrepreneurship. The overlap between Economics and BIS is undeniable, and therefore BIS students need to gain enough knowledge and experience about Marketing. On the contrary, Social Sciences and Behavioral Sciences also have a very good capacity to strengthen the curriculum of BIS. The soft skills needed by BIS graduates including Leadership, Human Resource Management and Social Psychology are taught right here. We think this conceptual model sufficiently supports the central idea of this research, which is to create balance in the BIS curriculum; in such a way that hard skills such as programming and system development along with soft skills such as analytical/critical thinking and effective communication can be understood and transferred through the development of a program developed based on this model. We hope that this model can attract the attention of interested researchers and cause serious and wide-ranging discussions to modify the BIS curriculum.

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