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# Contemporary Competencies of Information Systems Alumni

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## Abstract

This article presents the contemporary competencies of Information Systems alumni. It provides guides to improve Information Systems curriculum based on the alumni recommendations. A focal group of eight alumni was conducted. Their enthusiastic participation provided professional competencies and recommendations for the Information Systems curriculum. To discover emerging trends, data analysis was done following the advice of Bhattacharjee (2012), who describes the grounded theory of Straus and Corbin (1990). A number of relevant competencies were found. In addition, creative yet useful recommendations were made to improve the Information Systems curriculum. This article provides adequate guidance to demonstrate the major accreditation agencies Information Systems curriculum is continuously being improved. This article provides direction towards conducting similar studies contributing to the enrichment of the Information Systems curricula worldwide according to new demands in the Information Systems field. It also presents the modern aspects of the Information Systems career and thoughtful reflections on Information Systems curricula, which can be put into practice.

**Keywords:** Information Systems skills, Information Systems curriculum assessment, Information Systems alumni, Information Systems competencies

## 1. INTRODUCTION

This article is about an interview made to alumni of an Information Systems (IS) program. Its purpose was to find out the alumni's competencies and how the IS curriculum could be enriched by their experiences. Alumni collaboration can enhance the IS curricula by providing relevant information about the demands of today's workplace (Grant, Hackney, & Edgar, 2010).

This article is a useful guide for objective assessment performed by alumni as required by prestigious accreditation agencies. Two important similarities between 'Association to Advance Collegiate Schools of Business' (AACSB) and 'Computing Accreditation Commission' of ABET (ABET CAC) are the great emphasis on educational programs having a clear set of objectives and a quality improvement process to

assess those objectives (Reichgelt & Yaverbaum, 2007).

The constituents of an IS curriculum, as ABET (2009) suggests, are the program's alumni, and IS professionals from the industry who are employers or potential employers. Students can also be considered as constituents. Alumni is an important stakeholder for the IS curricula as discussed by Preciado-Ortiz, Zepeda-Ibarra, Castañeda-Palomera, and Ortega-Ojeda (2012). Thus, this article specifically presents the assessment of the program's objectives as performed by alumni.

The development of the study described in this article, is based on the research guides provided by Rosemann and Vessey (2008). Data analysis was done according to Bhattacharjee (2012) who describes the grounded theory of Straus and Corbin (1990) to qualitative data analysis.

Findings and conclusions were written according to the guidelines provided by Chenail, Cooper, and Desir (2010).

## 2. LITERATURE REVIEW

Program objectives need to be aligned with the business environment in such a way that curricula meet their purpose of existence. Topi, Valacich, Wright, Kaiser, Nunamaker Jr, Sipior, and De Vreeda (2010) specify the constant changes in the IS career is causing for tailoring an IS curriculum to become a challenge when examining the local and regional IS needs. Reichgelt and Yaverbaum (2007) recommend to frequently communicate with program's constituents in such a way that the dynamic changes in the business environment are kept.

The program objectives assessment from the industry is essential in the successful preparation of IS students. Alumni are important in the program objective assessment because of their IS curricula knowledge and their industry experience such as De la Torre-Pérez et al. (2012) explained. This article provides strategies to conduct program objectives evaluation specifically performed by alumni, which are required by prestigious accreditation agencies. As explained by Saulnier and White (2011), accreditation is a stamp of education quality for programs.

Information Systems Faculty has a considerable challenge in maintaining a current and value-added curriculum capable of preparing its graduates to become successful in their careers. Plice and Reinig (2009) explain that the integration between alumni and the business community can be beneficial when facing this challenge.

Since business and the IS field are constantly evolving, Lambrecht and Meggison (2007) recommend conducting assessment practices which consider student feedback in order to bring about effective teaching. In this study, feedback to assess the program's objective was obtained by alumni. This study addressed an assessment method, the focus group, to determine the effectiveness of the program's objectives according to its constituents. As the authors suggest, this study constantly strived for excellence since the assessment of the program's objectives impacts directly the quality of IS curriculum.

Reichgelt and Yaverbaum (2007) explain the role of accreditation in ensuring quality in education. One of the requirements of accreditation agencies is to set up a documented mechanism to determine how successful alumni are in achieving the specific program's objectives. This assessment process needs to be done on a continuous basis to improve the IS curricula. Thus, this article assesses alumni competencies, which are the set of skills established in the program's objectives. At the same time, it provides guides regarding changes that may need to be made.

Saulnier and White (2011) compares and contrasts IS 2010 guidelines (Topi et al., 2010) with ABET Computing Accreditation Commission (CAC) requirements (ABET, 2009). These authors present information systems as a field, which is still an emerging academic discipline. Assessment of alumni competencies is important to continue defining information systems.

Two previous studies are similar to the one presented in this article. Both studies assess alumni opinions regarding IS curricula. Those studies are from Van-Auken, Chrysler, Gricenko-Wells, and Simkin (2011) and De-la-Torre-Pérez, Roa-Rivera, Saldivar-González, Muñoz-del-Real, Roa-Rivera, and García-Cabrales (2012).

Van-Auken et al. (2011) present the set of skills that alumni have and De-la-Torre-Pérez et al. (2012) present alumni recommendations such as is the case in this study.

Alumni feedback is relevant since this group is considered a key stakeholder as Van-Auken et al. (2011) explains. Alumni provide targeted recommendations because this group already knows the IS curriculum. Van Auken et al. (2011) study had a sample of 46 alumni who graduated from three to five years at the time of their study. These authors' work consisted of asking alumni to disclose how much emphasis should be given upon ten IS knowledge and skills areas through a questionnaire. The areas that were pointed out by alumni in their study in order of importance were:

- to improve the ability in the development of workable solutions to information systems problems
- to understand concepts of the functional areas of a business such as marketing, and finances

- to write communications showing an understanding of the functional areas of business in relation to each other
- to have the ability to effectively communicate using business language
- to possess the ability to identify an information systems problem
- to have quantitative skills or the ability to work with numerical data
- to have the ability to effectively work in teams
- to have technical preparation and the ability to use software such as spreadsheets statistical packages, database packages
- to have the necessary oral communication skills.

De-la-Torre-Pérez et al. (2012) describes alumni recommendations for the IS curricula. In their study, alumni gave recommendations based on their job experiences. The recommendations for the IS curriculum were to improve the study plan in the following areas:

- certifications
- management administration
- Cisco certification
- Web ownership
- marketing techniques
- networks
- communications
- Microsoft
- education.

### Definitions

There are two concepts that must be defined in this study. Those two concepts are program's educational objectives and competencies. Both concepts refer to alumni skills.

The *program's educational objectives* as defined in ABET (2009) are the curriculum goals, the set of skills that graduates need to master in approximately three to five years from the completion date of the Baccalaureus. Program's objectives are an integral area of the IS curriculum.

As Preciado-Ortiz, et al. (2012) defines, *competencies* as the alumni aptitudes, skills, and abilities which are demonstrated in the work market.

### 3. RESEARCH OBJECTIVE

The research objective of this study is to answer two questions:

- 1- What do alumni do in their current job positions?
- 2- What are the alumni recommendations to improve the IS curriculum?

### 4. METHODOLOGY

A focus group was conducted to collect data from alumni who graduated from an IS curriculum in a University from a Metropolitan area. This research activity provided a vis-à-vis meeting to address alumni's perspectives concerning the program objectives. Their input is based on their experiences at their current job positions.

Chenail, et al. (2010) suggest to present conceptual areas creating an atmosphere of discussion. The program's objectives, which are the conceptual areas, were presented as open-ended questions. The program's objectives were (Ramos, 2008):

- 1- Professional skills: To implement and manage information systems in an organization.
- 2- Technology skills: To apply technological, analytical, and critical thinking skills in the solution of problems related to information systems in organizations.
- 3- Information Systems context skills: To take into consideration the context in which information systems operate, when being implemented and managed.
- 4- Life-long learning skills: To maintain his/her professional expertise by updating his/her knowledge in technology and information systems.
- 5- Values and Soft skills: To perform his/her functions showing respect and acknowledgement of ethics, interpersonal relationships, communication, and teamwork.

The current Information Systems curriculum courses since 2008 (Ramos, 2008) consists of:

- 1- Fundamentals of Information Systems
- 2- Technological Infrastructure
- 3- Local Area Data Communication Networks
- 4- Wide Area Data Communication Networks (elective)

- 5- Applications Programming
- 6- Seminar on Legal Aspects (elective)
- 7- Systems Analysis and Logical Design
- 8- Physical Design and Systems Implementation using DBMS
- 9- Physical Design and Systems Implementation using Emerging Tools
- 10- Design and Implementation of Electronic Business (elective)
- 11- Decision Making Support and Business Intelligence (elective)
- 12- Project Management and Administrative Aspects (elective)
- 13- Control and Security of Information Systems
- 14- Cooperative Education Experience (elective)

The sample was chosen randomly. Sixty alumni who graduated from 2005 to 2011 were invited to the focus group by electronic mail. An attendance of six to twelve was expected in the focus group. Eight IS professionals participated. One alumnus graduated in 2001, another in 2004, two in 2005, another in 2006, another one graduated in 2010, and two others in 2011.

Roles occupied by the participants include managerial (two) as well as non-managerial positions (one) in IS consulting firms, government agencies (one), universities (one), banking (one), and accounting/auditing (two). The sample obtained included representation from various IS areas and was considered adequately for the study. Its results apply only to the sample; generalizations to the population must be made with caution.

### **Data Collection**

The methodology required the researcher to capture and note each statement discussed by focal group participants. Following the Chenail, et al. (2010) approach, the researcher was required to be knowledgeable in the IS area and be receptive to innovative concepts about the topic when annotating and analyzing data.

### **Limitations of the Study**

The absence of audiotaping in the focus group session did not allow verification of each noted statement in the discussion. Another limitation was data analysis, which was a time consuming

task since there was no support of specialized software.

There were no statements suggesting revision to the program's objectives presented. Perhaps, participants felt awkward suggesting the researcher changes to the objectives. A more sophisticated strategy will need to be used in future studies should change or revisions of objectives come up.

Even though the results of the study were not significantly affected, only three from the eight participants of the study were exposed to the new curriculum (Ramos, 2008).

### **Data Analysis**

Data analysis in this qualitative study was performed by recommendations of Bhattacharjee (2012), who summarized the Straus and Corbin (1990) qualitative data techniques. Data analysis was done categorizing alumni comments into five different skill areas, which were professional, technological, information systems context, life-long learning, as well as values and soft skills. There were some sub-categories identified. For each sub-category, there was a list of competencies alumni suggested.

Data analysis of the alumni recommendations for the improvement of the IS curriculum was done by dividing their comments into two main categories. Those categories are to be considered immediately and in the future.

## **5. RESULTS**

The first research question is about alumni current job positions. According to the results of this study, alumni, who participated, demonstrated to be working successfully as IS professionals. Vast majority of the alumni call themselves as Information Systems (IS) consultants. Twenty-five percent of the alumni indicated to be working for the banking industry. Thirteen percent indicated that they to be working for the state government. Twelve percent work for accounting services. Another twelve percent work in education. Most alumni are currently working for a company that has more than a hundred employees. Thirty-eight percent of the alumni indicated that they are working in a company of eleven to fifty employees. The rest of the participants

indicated to be working for a company of one to ten employees.

The second research question is about alumni recommendations to improve the IS curriculum. The recommendations were based on the competencies alumni understood were reasonable an IS professional must possess. A total of forty competencies were found. Appendix 1 presents the main findings of the study concerning the alumni competencies as well as alumni recommendation for the improvement of IS curriculum.

## 6. DISCUSSION

This article presents alumni competences while providing alumni recommendations for the improvement of IS curriculum. After a careful analysis of the results, there were many desirable competencies shown by alumni. The emphasis given by participants regarding relevant competencies at their respective works were:

1. Alumni show complex management competencies while demonstrating strong technology skills.
2. Alumni are leaders in the management of IS projects.
3. Alumni are actively participating in the consultancy of IS solutions.
4. Alumni excel the required competencies as system auditors.
5. Alumni adequately meet the necessary qualities working in cloud computing environments.
6. Alumni possess keen awareness of business culture and environment when providing IS solutions.
7. Alumni have done extensive independent study activities in order to be knowledgeable of updated technology solutions.
8. Alumni successfully communicate when negotiating technological solutions.

According to these competencies, there is a possibility IS curriculum prepares alumni well for the achievement of their professional careers. Most likely, alumni possess a strong willingness to succeed in their careers since they perform independent study activities (life long learning). By sharing their work experiences with academia, they are contributing to the advances of the IS field for they are unveiling the real job

activities an IS professional is required to perform in order to be successful.

After analyzing the results concerning the alumni recommendations for the improvement of IS curriculum, alumni provided creative yet important direction for the IS curriculum according to contemporary facts in the IS field. The main alumni recommendations were:

- 1- To continue encouraging student participation in job internships.
- 2- To teach open-source coding.
- 3- To continue focusing on project-based learning while exploring other learning methods such as undergraduate research-based approaches.
- 4- To develop keen negotiating and entrepreneurial skills while students are still at the university.
- 5- To emphasize on the ethical aspects in the management of IS projects.
- 6- To add a course in healthcare management to address the emerging needs of that industry.

Some of their recommendations were reasonable. Others were relevant yet unexpected such as the use of research-based learning, to develop negotiating and entrepreneurial skills, and to add a healthcare management course. The IS security area was not mentioned during the discussion. It is interesting that alumni did not recommend new course work in this area. Perhaps, it is because that aspect was emphasized during academic studies or they have not faced it in their IS career as of yet.

When comparing the results of this study with previously published material, similarities and differences arise. When studies are conducted in different scenarios, this is normally expected. Similarities imply IS abilities predominate in the international IS field as well as regionally. Differences may be due to the specific necessities of the region where the study is conducted.

This study and Van Auken et al. (2011), emphasize on the information systems skills alumni must possess to be successful. However, five variables were identified in this study whereas Van Auken et al. (2011) used ten, which did not include life long learning skills.

The ten different variables used in the Van Auken et al. (2011) study correspond to the five variables used in this study. Their study emphasized the gap between what the curriculum offers and the real demands of the information systems field, while this study focus on whether alumni comply with the information systems skills presented to them. Appendix 2 shows the correspondence.

The results of this study concerning alumni competencies have similarities and differences to the in Van-Auken et al. (2011) study, which are presented in Table 1.

**Table 1: Comparison of the results of this study to Van-Auken et al. (2011) study.**

Similarities	Differences
The ability to identify workable solutions.	The ability to understand functional business areas.
The ability to effectively communicate in both the written and spoken language.	The ability to identify an information systems problem.
The ability to apply technical knowledge in the solution of business issues.	The ability to work with quantitative data.
The ability to work effectively in teams.	The ability to perform life long learning activities (continued education).

The results of this study, concerning alumni recommendations to improve IS curricula, are significantly different from those suggested in the De-la-Torre-Pérez et al. (2012) study. Table 2 shows a comparison between the two studies.

**Table 2: Comparison of the results of this study to De-la-Torre-Pérez et al. (2012) study.**

Similarities	Differences
Management administration	Certifications
Marketing techniques	Cisco certification
	Web ownership
	Networks
	Communications
	Microsoft Teaching

Regardless of the differences expressed in both studies, a combination of alumni recommendations from the two is advised to obtain an optimized improvement of IS curricula.

Each study has limitations, but when grouping the results of recent studies, an in-depth knowledge of the IS field can be unveiled. Thus, as IS field is best described, IS curricula can be enriched and properly improved.

## 7. CONCLUSIONS

This article presents alumni competencies while it also provides alumni recommendations for the improvement of IS curriculum. A clear perspective of alumni competences is established. Consequently, modern aspects of the IS career demands are presented, which contributes to information systems as a field. In addition, a specific list of alumni recommendations is presented. Thus, reflections on IS curriculum can be done more assertively by academics.

This article is a useful guide to demonstrate prestigious accreditation agencies IS curriculum is continuously being improved according to its main stakeholder who is alumni (Van-Auken et al., 2011, De la Torre-Pérez et al., 2012 and Preciado-Ortiz, et al., 2012). This article provides complete guidance since it presents alumni competencies while providing their own recommendations for the improvement of IS curriculum.

Furthermore, this article provides relevant knowledge to the IS field since it examines the expected and unexpected alumni competencies. The expected alumni competencies confirm what it is already known about the IS field. The unexpected yet important aspects may correspond only to the particular sample used in this study.

Future studies in this area are recommended to further examine the unpredictable alumni competencies and determine if, indeed, those are new IS field areas that need to be implemented in IS curricula.

### Future Direction

As Downey, McMurtrey, and Zeltmann (2008) states: "because of the rapid change in the Information Systems field, the critical skills for the profession must be reassessed on a continuous basis". This study addresses the issue quite well and only from an alumni perspective. Similar studies can contribute to the IS field in enriching the IS curricula.

In addition, more studies can be conducted in order to assess the program's objectives. An integral area of the IS curriculum from employers' perspective is in order. By conducting similar studies, the interactions between academics and program stakeholders is promoted and enriched resulting in IS curriculum continuous improvement.

Conducting studies similar to Van-Auken et al. (2012) study which suggest finding the gaps between what alumni learned during their years of study versus what they are actually required to do is an important area for the continuous improvement of the IS curricula. Moreover, it is important to find priority in the solution of those gaps and address them in the IS curricula.

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## Appendix 1: Results presentation

A total of forty alumni competencies were found. Figure 1 to 5 present the main findings of the study concerning the alumni competencies.

**Figure 1: Alumni competencies in relation to professional skills**

Professional Skills	Alumni Competencies
consultancy	performs activities IS consultancy
project management	executes management of IS projects
development	demonstrates knowledge of the business processes
	indicates knowledge of data structure
	meets successfully the challenge of agreeing on a IS solution with the clients
	displays flexibility when identifying technical solutions
	provides creative and innovative technical solutions to business processes
maintenance	evaluates information systems processes in their maintenance phase
	demonstrates that IS professional is more qualified to conduct IS maintenance
auditing	assures that processes are done as expected by top management
<i>Total</i>	<i>10</i>

**Figure 2: Alumni competencies in relation to technological skills**

Technological Skills	Alumni Competencies
development	denotes the ability of developing applications for database solutions
programming tools	demonstrates the ability to work with Visual Basic Programming
application tools	exemplifies the ability of working with SAP and Outlook
networking tools	illustrates the ability of working with Cisco, Linux, AD (active directory), Microsoft Exchange, PHP, and html
	assures to have the knowledge of working with mainframe AS 400, Unix, and IBM AIX
operating systems tools	exhibits the ability of working with Access, my SQL, and Oracle
cloud tools	demonstrates the ability of working CRM (customer relationship management)
other tools	denotes to have the necessary knowledge to work with Visio and Adobe Photoshop Creative Suite 3
<i>Total</i>	<i>8</i>

**Figure 3: Alumni competencies in relation to information systems context skills**

Information Systems Context Skills	Alumni Competencies
business processes	observe how the actual processes are done in order to provide a better IS recommendation for improvement
business environment	knows business well in order to implement practical solutions for its processes
	possesses keen awareness of business culture when developing a new system
	possesses vast knowledge of the law that applies to the specific business in order to provide appropriate solutions
	requests new legislations for technical provisions, when necessary
	develops IS solutions which can easily integrate with suppliers and customers
	is proactive in suggesting better business processes in order for technical solutions to be implemented successfully
	performs project management tasks while working in technical aspects
<i>Total</i>	<i>8</i>

**Figure 4: Alumni competencies in relation to life-long learning skills**

Life-long learning Skills	Alumni Competencies
independent study	learns independently by reading technical manuals for six months in order to install an new accounting system
	is active in professional associations in order to make business contacts for his/her consultancy business
	participates in Internet forums to become aware of technological issues
	studies continuously about new technologies and their constant evolution
<i>Total</i>	<i>4</i>

**Figure 5: Alumni competencies in relation to values and soft skills**

Values and Soft Skills	Alumni Competencies
communication skills	translates accounting language to technical language when developing a new business system
	is creative to identify real client necessities
	negotiates in the Spanish language
	writes most business reports in English
	teaches clients about IS being an important investment, and not a business expense
	listens to client necessities, not just does the talking
	negotiates what the client want in accordance with technology
	recognizes communication skills are as being essential as technical skills
	convinces client on the precision and care required for manifestation of technical solutions to their business issues
	speaks to clients in a clear fashion
<i>Total</i>	<i>10</i>

The main findings of the study concerning the alumni recommendations are presented in Figures 6 and 7.

**Figure 6: Alumni recommendations for immediate consideration**

Classification	Specific recommendation to the IS curriculum
Immediate consideration	to continue encouraging students to participate in IS job internships
	to continue focusing on project-based learning
	to teach open-source coding, not only Microsoft and Oracle tools
<i>Total</i>	3

**Figure 7: Alumni recommendations for the future**

Classification	Specific recommendation to the IS curriculum
Considerations for the future	to encourage employers to pay students for their effort and interest on the internship jobs
	to teach negotiating techniques in business language
	to require course which clearly explains patents, copyrights, and the like
	to revise the project management course assuring the inclusion of ethical aspects in IS projects
	to add a healthcare management systems course to address the emerging needs in the healthcare industry
	to consider a research-based learning approach for discovery of new solutions to business problems
	to add an entrepreneurship course
	to develop a course which emphasizes on the research of the best IS solutions
<i>Total</i>	8

## Appendix 2: Correspondence between this study and Van Auken et al. (2011)

There are five information systems skills (Ramos, 2008) evaluated in this study, while there are ten information systems skills in the Van Auken et al. (2011) study. Figure 6 presents the correspondence between both studies.

**Figure 6: A correspondence between this study and Van Auken et al. (2011) study.**

	<b>Ramos (2008) information systems skills variables, which were used in this study.</b>	<b>Van-Auken et al. (2011) information systems skills variables, which this study is compare to.</b>
1	Professional skills: To implement and manage information systems in an organization.	2. Ability to identify a problem. 3. Ability to develop a workable solution.
2	Technology skills: To apply technological, analytical, and critical thinking skills in the solution of problems related to information systems in organizations.	1. Technical preparation. 7. Quantitative skills.
3	Information Systems context skills: To take into consideration the context in which information systems operate, when being implemented and managed.	8. Ability to communicate effectively using the language of business. 9. Understanding concepts of the functional areas of business. 10. Understanding how the functional areas of business relate to each other.
4	Life-long learning skills: To maintain his/her professional expertise by updating his/her knowledge in technology and information systems.	Not applicable
5	Values and Soft skills: To perform his/her functions showing respect and acknowledgement of ethics, interpersonal relationships, communication, and teamwork.	4. Ability to work effectively in teams. 5. Oral communication skills. 6. Written communication skills.