Information Technology Strategy and Management Curricula in Public Administration Education in Latin America

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ABSTRACT

Around the world, failures and scandals in government have evidenced the need to improve the information and communication technology (ICT) curriculum of public administration programs. In the United States, since 1986, the Network of Schools of Public Policy, Affairs, and Administration has promoted standards of computer literacy that include ICT skills. Studies of ICT curricula in public administration education focus on the supply side (the opinions of schools and students), neglecting the demand side (the opinions of employers). Programs in Latin America have been poorly studied and there are no clear ICT standards. The present study involved interviewing chief information officers and executives (employers) in the public sector in Mexico in order to identify competencies for ICT curricula. As a result, this study identifies soft and hard competencies and subsequently examines them using an extension of the NASPAA's Annual Data Report survey and reviewing Latin American public administration program websites. In general, this study finds that ICT-related courses in Latin America are more associated with soft competencies than hard competencies.

Bountiful examples illustrate how government professionals at all levels face different types of data and technology issues around the world (Dawes, Helbig & Nampoothiri, 2014; Heeks, 2006; West, 2005). Implementing and managing digital government initiatives are rapidly growing phenomena across countries and governments but a very hazardous investment and risky endeavor for those involved in these tasks (Heeks, 2006). Data and technology issues have key roles in public sector performance, so well-trained professionals are a critical factor in success (Dawes, 2004; Purón-Cid, Gil-Garcia, & Luna-Reyes, 2012; West, 2005). Regarding challenges in this arena, professionals in the public sector face information systems failures and costly investment risks in complex intra- and interorganizational settings characterized by data and privacy leakages, dispersion of information, lack of competent staff, and poor executive leadership. The questions of how public administration education[1] should prepare future government professionals in contexts that are information and technology intensive and the questions of what information technology strategy and management (ITSM)[2] curricula should be integrated into public administration programs are not new, and they transcend borders (Dawes, 2010; Kraemer & King, 1986; NASPAA, 1986; Op de Beeck & Hondeghem, 2010).

The actual curricula and competencies in public administration education lag behind adequate ITSM competencies due to rapid technological changes. Scholars have investigated ITSM standards and competencies in two general ways: (1) from the supply side, mainly through surveys of schools and programs of public administration (Brown & Brudney, 1998) and/or of students and graduates from these programs (Lan & Cayer, 1994); and (2) from the demand side, using questionnaires administered to governments to examine the competencies demanded by public organizations (see Rosenbaum & Kauzya, 2007; UN Department of Economic and Social Affairs [UNDESA], 2008). In general, studies of the supply side dominate the research, resulting in a strategic limitation about our knowledge of proper ITSM curriculum design.

Technological conditions are changing rapidly worldwide. Therefore, public administration education must revise its ICT curricula to include ITSM competencies that meet the expectations and requirements of students, graduate programs, and employers. The United Nations E-Government Survey provides a comparative overview of digital government development across member states. One of the survey's components is its Online Service Index (OSI), which examines the ICT patterns of digital government.[3] Figure 1 compares the OSI of different regions during the period 2003–2014. North America and Europe clearly have advanced digital government. Asia's digital government has markedly improved. Oceania has made significant progress in the last few years of the period.

Africa and Latin America experienced moderate progress during the first half of the period (similar to Asia) but have had subsequent poor advancement during the second half. The reasons for these patterns are complex and exceed the scope of this article. However, it is important to note that adequate ITSM education and training are critical and strategic tools for building competencies and skills among those who are or will be responsible of digital government initiatives, both in general (Dawes, 2004; Rosenbaum & Kauzya, 2007)

and in Africa and Latin America specifically (Al-Wohaibi, Masoud, & Edwards, 2002; Araya Moreno, 2007). Strengthening public administration education by improving ITSM curricula is critical to the success of digital government adoption (Al-Wohaibi et al., 2002; Heeks, 2001, 2006; Rosenbaum & Kauzya, 2007). Conversely, lack of vision, strategy, and competencies and poor project and change management, among other administrative deficiencies, increase the risk of digital government failure (Heeks, 2001, 2006).

Today, public administration education is a necessary ingredient in a complex value chain that facilitates adoption of ICT tools and and advancement in their application. Such education's effect may be indirect but still critical for developing a more democratic and effective state. This study posits that to understand the ICT needs of different world regions, we need to study how public administration education and ITSM curricula perform from the perspective of employers (supply side). This approach in particular may improve our understanding of the needs of Latin America and Africa, where digital government development seems subject to context-specific inhibitors, such as lack of skilled and well-trained staff.

Unfortunately, few international comparative studies of the role of public administration education discuss digital government in Latin America and Africa. Recently, competency models of ICT standards have been revised among developed countries like Australia, Canada, South Korea, the United Kingdom, and the United States (CIO Council, 2012; Op de Beeck & Hondeghem, 2010). This has helped to understand the ICT curriculum for public administration education in theory and practice in these countries (Op de Beeck & Hondeghem, 2010). But there is much more to assess based on other experiences around the world.

This study aims to contribute to this body of research by applying a two-phase research approach in Latin America. The first phase is qualitative and examines the employer's view of ITSM competencies and skills present in public administration education in Mexico.

FIGURE 1.
United Nations Online Service Index (OSI) (2003–2014)
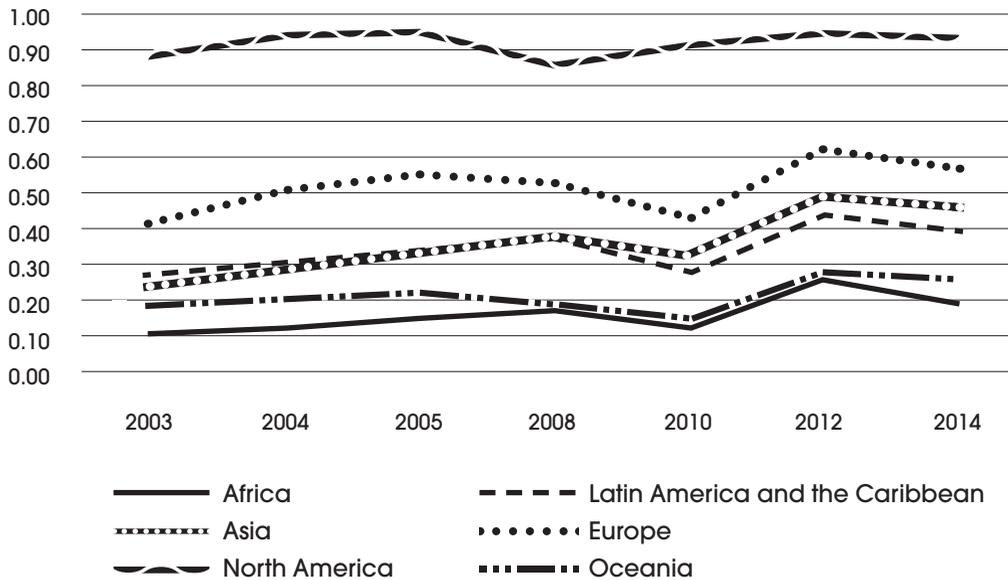
The second phase is quantitative and, using a survey and content analysis of curricular information published on school and program websites, contrasts the competencies identified in the first phase.

EVOLUTION FROM COMPUTER LITERACY AND IT SKILLS TOWARD AN ITSM COMPETENCIES MODEL

ICT curricula in public administration programs first focused on computer literacy and IT skills for critical management processes such as accounting, finance, budgeting, planning, and personnel. In the mid-1980s, the then-named National Association of Schools of Public Affairs and Administration (NASPAA) promulgated general guidelines for a curriculum in computers and information systems in public management. Kraemer and King (1986) examined the opinions of schools about this curriculum, which consisted of a three-course sequence: (a) management of computers and information systems; (b) analysis and design of information systems; and (c) organizational and social impacts.

NASPAA first published "Curriculum Recommendations for Public Management Education in Computing" in 1986 (Kraemer & King, 1986; NASPAA, 1986). Kraemer and Northrop (1989, p. 448) updated these guidelines, again from schools' point of view, and concluded with four additional management-oriented recommendations: (1) computer appreciation, (2) computer applications for management, (3) computer use and information systems knowledge, and (4) a specific information management concentration for technology assessment, purchasing implementation, and evaluation, among other managerial issues.

In the early 1990s, scholars expanded the curricular managerial focus by incorporating organizational issues and project management of ICT projects (Baker, 1997; Bretschneider, 1990; Cats-Baril & Thompson, 1995; Caudle, 1990), such as interorganizational boundaries, red tape, criteria for IT evaluation, and public sector planning and leadership. Lan and Cayer (1994) found deterioration of the role of

public administration graduates in ICT projects in government, where people from other professional backgrounds (mostly business graduates) have overtaken these functions in the public sector. Interestingly, the authors identified specific competencies demanded by employers: data analysis skills[4] and formulating information policies.

Brown and Brudney (1998) examined legislation[5] that addressed the risks associated with poor IT adoption in US government, looking at 106 MPA programs affiliated with NASPAA. The authors related rising rates of IT failures to lack of skills and knowledge among public administration graduates. Some issues identified were poor ICT investment and integration across organization boundaries, the need for a chief information officer, inadequate ICT policies and evaluation, legal implications, and more active role for graduates in managing ICT. The authors' findings suggest that a limited number of students are exposed to critical areas for advancing ICT in the public sector. They recommended a core curriculum for information resource management specialization in MPA programs, using a three-course sequence and an internship: (1) strategic information resource management, (2) information resource management planning methodologies, and (3) information policy. This IT curriculum became the standard for professional master's degree programs in public administration education.[6]

Other scholars have extended the study of ICT curricula in public administration education but remain biased toward the supply side. Some argue that ICT curricula should move away from a management orientation to be more citizen-centered, adding institutional, organizational, and individual aspects (Scavo & Shi, 2000). Others discuss the challenges of teaching these new topics with existing faculty, resources, and institutional settings and outreach (Jennings, 2002; Northrop, 1999). Still others promote inclusion of contemporary public management issues and information policy in ICT curricula (Brown & Brudney, 1998; Dawes, 2004; Kim & Layne, 2001; Kraemer & King, 1986; Jennings, 2002). During the mid-2000s, discussion of public administration ICT curricula turned on determining competencies for devising strategies and managing ICT projects in government. Dawes (2004) reviewed practical experience and academic research on information systems in government and identified five groups of competencies for IT-savvy public managers: strategic thinking and evaluation, system-oriented analytical skills, information stewardship, technical concepts, and complex project management skills. Each of these five groups involves specific skills and capabilities. Most efforts to date for defining ICT curricula also reflect US cases and experiences (see the appendix).

In 2005, the UN Department of Economic and Social Affairs (UNDESA), in partnership with the International Association of Schools and Institutes of Administration (IASIA), initiated a series of studies in preparation of the volume *Excellence and Leadership in the Public Sector: The Role of Education and Training* (Rosenbaum, 2007; Rosenbaum & Kauzya, 2007; UNDESA, 2008). One of the studies compared international experiences from developed countries to identify critical competencies for the "Information management, new technology applications, and policy" dimension of public service (Rosenbaum & Kauzya, 2007). This effort identified five sets of competencies for public administration curriculum that are widely adopted across programs, schools and countries. In 2006, NASPAA's Commission on Peer Review and Accreditation (COPRA) revised these five competencies. Other international accreditors also revised their guidelines and adopted these five competencies (European Association for Public Administration Accreditation [EAPAA], 2006; European Association for Quality Assurance in Higher Education [ENQA], 2005; European Foundation for Management Development [EFMD], 2006). In 2009, COPRA revised and approved the standards for public administration higher education using this competency model (NASPAA, 2014). These standards were again revised and updated in 2011 and 2012, this time into three categories of competencies: universal required, mission-specific required, and mission-specific elective (last two defined by each institution).

The *Atlas of Public Policy and Management* is a SharePoint platform at the University of Toronto's School of Public Policy and Governance; it is an online database of pedagogy in public administration, public policy, and public affairs higher education (Clark, Eisen, & Pal, 2015). The atlas presents a competencies map[7] that organizes curricular content among master's-level public policy and public administration programs using three combined competency frameworks: that of NASPAA, UNDESA/IASIA, and the Treasury Board of Canada Secretariat (TBS). Table 1 describes the competencies map. The map is aspirational for any program. The spectrum of competencies is wide and varies according to school strategy and mission. Competency models have helped schools and programs define their orientation by aligning curricula with the external needs of employers and the individual career goals and learning opportunities of students (Getha-Taylor, Hummert, Nalbandian, & Silvia, 2013). Recent studies have extended the competencies model perspective and discussed appropriate ICT curricula by including new competencies. Table 2 summarizes the latest literature that focuses on building new ITSM competencies.

According to these studies, the new context in which governments are embedded forces public administration schools and programs to consider the competencies model for building ICT curricula congruent with the needs and perspectives of employers and graduates. Emergent issues in digital government—such as social media, mobile technology, smart cities, big data, and open data—represent challenges in building new competencies for public administration education. Different competencies have been designed and developed across countries to assess and improve public sector competencies in general (CIO Council, 2012; Op de Beeck & Hondeghem, 2010), but few have been designed for regions like Latin America and Africa that have demonstrated context-specific challenges (Al-Wohaibi et al., 2002; Araya Moreno, 2007). The various models have differences and similarities depending on the strategies, missions and specific contexts of each country, but in general the competencies

model provides a useful framework for defining public administration ICT curricula (Op de Beeck & Hondeghem, 2010). Also important, the majority of these studies were conducted with a supply-side bias that may influence how schools and programs are designed. Most of these studies looked at schools, programs, students, and graduates but neglected the practical experience and needs of employers and the learning opportunities for graduates in terms of their professional careers.

RESEARCH DESIGN AND METHODS

This study used a multiple methods design with a qualitative-quantitative sequence. The first phase included 37 unstructured interviews with local and state government officials in Aguascalientes, Mexico, during February and March 2015. The interviewees included chief information officers, ICT staff, finance and budgeting staff, social programs staff, police and security staff, water management staff, environment protection staff, and economic and business development staff. The interviews enabled identification of two groups of competencies: *soft competencies* and *hard competencies*. A list of courses was also codified in two types: *generic courses* and *ICT-related courses*.

The conceptual categories retrieved from the first phase were used for codification in the second phase, involving two methods: (1) a survey of NASPAA members in the region; and (2) content analysis of curricular information published on official program websites. Invitations were sent to 275 programs in 19 countries of Latin America. Table 3 describes survey responses and the number of websites reviewed, by country. The survey included two questions based on a NASPAA's Annual Data Report survey and classified answers into five categories.[8] The instrument was available in three languages: English, Spanish, and Portuguese. The content analysis reviewed 247 official program websites and coded 8,087 courses according to competencies identified in the interviews. Only 3,214 courses were clearly coded as corresponding to one or multiple competencies,[9] resulting in a total of 4,102 answers. The data collected from the survey include 375 answers from 48 participants.

Both instruments capture two types of courses: mandatory and elective. The survey and content analysis were conducted during May–August 2015. The actual data collected represent 15 countries in Latin America. The survey response rate for all levels of education was 17.5%. The coverage of program websites was 89.8%.

RESULTS

The results of the first phase of this investigation reveal two groups of ITSM competencies in public administration programs: soft versus hard ITSM competencies (see Table 4).

Interview participants said that soft competencies involve the following dimensions: values, individual characteristics, teamwork, general and specific knowledge, leadership, and collaboration. Each of these dimensions involves specific competencies. For example, participants associated leadership, human orientation, building trust, reciprocity, creation of vision, and ethical behavior as necessary for performing any public service or for working in any government agency. These concepts were associated with the soft category of *values*. Participants also agreed that *general knowledge* is essential for carrying

TABLE 1.

Competencies in the *Atlas of Public Policy and Management*

Competency	Analysis and skills	Institutions and context	Management functions	Policy sectors
To lead and manage in public governance	• Policy and management analysis • Leadership skills		• Information and technology management • Local government management	
To participate and contribute to the policy process		• Democratic institutions and the policy process • Global context	• Public financial management • Evaluation and performance measurement • Regulatory policy and management • Nonprofit management and advocacy	
To analyze, synthesize, think critically, solve problems, and make decisions	• Economic analysis • Quantitative methods • Analytic methods	• Socioeconomic and political context	• Public financial management • Human resource management	• Macroeconomic policy • International development • Health • Education • Employment, labor and immigration • Science, technology and innovation • Others
To articulate and apply a public service perspective		• Ethics, rights and accountability	• Public financial management	
To communicate and interact productively with a diverse and changing workforce and citizenry	• Leadership skills • Communication skills			

Note. Adapted from Clark, Eisen, & Pal, 2015. Elements directly related to technology are in italics.

TABLE 2.
Information Technology Strategy and Management (ITSM) Competencies in the Literature

Source(s)	ITSM competencies
Araya Moreno (2007)	Focus on ICT-related competencies (e-competencies) in public administration education should be oriented to the concept of public value creation according to 12 competencies: (1) professional or technical competence; (2) propensity for continual learning to deal with new problems, technological developments, and technical applications; (3) ability to interpret problems presented by stakeholders and the public as a whole and to respond appropriately with technologically enabled measures; (4) ability to innovate in the search for answers, to diagnose entirely new problems, and to move the institutions toward efficacious responses; (5) ability to gather whatever information is needed for such decision making; (6) ability and willingness to undergo professional formation and develop capacities and abilities on a continuing basis; (7) ability or capacity to work with a great deal of independence, and to make decisions autonomously, in response to citizen and stakeholder demand, consistent with the role attributes and expectations of public office; (8) ability to work in teams empowered by the application of new technologies; (9) ability to exercise self-restraint consistent with managerial controls in the use of resources at the public official's disposal, in particular technological resources; (10) ability to understand and apply the concepts and tools of the information society in the process of government reforms and political development; (11) ability to appreciate the importance of e-government for the reform and modernization of the state; and (12) ability to deploy new technologies for electronic governance consistent with new or emergent conceptions of the role of the state and of public administration
Cox et al. (2010)	Focus on ICT curriculum at state and local levels of government
Mergel (2012)	Focus on social media and informal practitioner learning experiences in public affairs programs in higher education according to five competencies: (1) digital literacy and competency by teaching the use of technology to enable complementary learning process of MPA students to mitigate online risks, increase social and technological awareness, and understand online privacy issues; (2) inclusiveness and accessibility through teaching the ability to select the adequate technology that provides equal access or acceptable alternatives; (3) plain writing through teaching government audiences with clear, understandable, and useful information and the effectiveness of citizen communication; (4) records management through teaching what constitutes a government record and the social updates to government records; and (5) collaborative capacity building through teaching change in government information paradigms and cross-boundary collaboration
Dugal (2012)	Focus on program and information management competencies: (1) domain-specific data management, (2) data quality management, (3) customer data information (CDI), (4) master data management, (5) work effort management, and data architecture.
Getha-Taylor et al. (2013)	Focus on three competencies: (1) information system management, (2) continuous technology improvement, and (3) creativity and innovation
Jalocha et al. (2014)	Focus on three categories of competencies of public sector and project managers: (1) contextual (role of systems, production, and technology in public affairs); (2) behavioral (accountability, openness, creativity, efficiency, consultation, among others); and (3) technical (management of projects, processes, information and documentation, communication, technological resources and assets, cross-boundary collaboration, among others)

TABLE 3.
Survey Responses by Country and Program Type

Country	Programs	Survey responses (Websites reviewed)									
		Certificate		Undergrad		Graduate		Doctoral		Total	
Argentina	46	1	(5)	0	(10)	11	(19)	0	(1)	12	(35)
Bolivia	2	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
Brazil	10	0	(0)	0	(1)	0	(3)	0	(1)	0	(5)
Chile	26	0	(1)	1	(14)	4	(5)	0	(0)	5	(19)
Colombia	32	0	(0)	0	(13)	12	(7)	0	(0)	12	(20)
Costa Rica	2	0	(0)	1	(0)	0	(1)	0	(1)	1	(2)
Cuba	1	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
Ecuador	6	0	(0)	0	(1)	0	(2)	0	(0)	0	(3)
Guatemala	5	0	(0)	0	(0)	0	(2)	0	(1)	0	(3)
Jamaica	3	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
México	122	0	(0)	2	(68)	12	(68)	1	(8)	15	(144)
Panamá	1	0	(0)	0	(1)	0	(0)	0	(0)	0	(1)
Paraguay	2	0	(0)	0	(1)	0	(0)	0	(0)	0	(1)
Peru	5	0	(0)	0	(0)	3	(3)	0	(1)	3	(4)
Puerto Rico	1	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
Dominican Republic	3	0	(0)	0	(1)	0	(2)	0	(0)	0	(3)
Surinam	1	0	(0)	0	(1)	0	(0)	0	(0)	0	(1)
Uruguay	2	0	(0)	0	(0)	0	(2)	0	(0)	0	(2)
Venezuela	5	0	(0)	0	(3)	0	(0)	0	(0)	0	(3)
Total	**275**	**1**	**(6)**	**4**	**(114)**	**42**	**(114)**	**1**	**(13)**	**48**	**(247)**

out public service; this category included acquaintance with public administration, public sector law and regulations, ICT applications and new technologies, finance and budgeting, and project management. Interviewees also noted specific competencies for the categories of *individual characteristics*, *teamwork*, *leadership*, and *collaboration*.

Similarly, participants identified these categories of hard competencies: ICT project management; data analysis skills; computing and information systems (IS) basic knowledge; design, ICT infrastructure, and software; and best practices and new ICT tools. As an example, ICT project management involves proficiency in managing ICT projects, implementation expertise, process knowledge, technical knowledge, basic administrative skills, and an understanding of procurement regulations and management. Regarding computing and IS knowledge, participants identified IS project development knowledge, IS strategic planning, and ability to introduce ICT or e-government. In all, participants associate soft and hard competencies with possible curricular content in public administration programs (see Table 5).

TABLE 4.
Soft and Hard Competencies for ITSM in Public Administration Graduate Programs

Soft competencies	Hard competencies
Values	ICT project management
Individual characteristics	Data analysis skills
Teamwork	Computing and IS basic knowledge
General knowledge	Context-specific knowledge
Leadership	Design
Collaboration	ICT infrastructure
	Software
	Best practices and new ICT tools

TABLE 5.
Competencies and Type of Course

	Type of Course	
	Generic	**ICT-related**

Soft Competencies

	Generic	ICT-related
Values	Ethics	
Individual characteristics	Public service values	
General knowledge	Human resources	Transparency and accountability
Specific knowledge	Nonprofit organizations	Knowledge management, managing innovation
Teamwork		Working in groups, social networks
Leadership	Intercultural competencies, emotional intelligence, diversity and equity	Leadership
Collaboration	Intergovernmental relations, public-private partnerships	Collaboration, public and citizen participation

Hard Competencies

	Generic	ICT-related
ICT project management		ICT project management
Data analysis skills	Economics, program evaluation, research methods, statistics and probability, quantitative and qualitative methods, and math	Decision-making methods and models
Computing and IS knowledge		Management of knowledge and IS
Context-specific knowledge	Public policy analysis	Regulations for ICT investment
Design, infrastructure, and software		ICT project management, knowledge management and IS, innovation, computing skills
Best practices and new ICT tools		ICT project management, knowledge management and IS, innovation, computing skills

TABLE 6.

Soft Competencies across Public Administration Courses in Latin America

Type of Course	Course with soft competencies	Content Analysis						Survey					
		number			percentage			number			percentage		
		Mandatory	Elective	Total	Mandatory	Elective	Total	Mandatory	Elective	Total	Mandatory	Elective	Total
	Total courses with soft competencies	**1245**	**68**	**1313**	**30.4**	**1.7**	**32.0**	**188**	**28**	**216**	**50.1**	**7.5**	**57.6**
Generic	*Total generic courses*	*668*	*46*	*714*	*16.3*	*1.1*	*17.4*	*88*	*14*	*102*	*23.5*	*3.7*	*27.2*
	Ethics	183	3	186	4.5	0.1	4.5	15	1	16	4.0	0.3	4.3
	Human resources	138	4	142	3.4	0.1	3.5	12	2	14	3.2	0.5	3.7
	Intergovernmental relations and public-private partnerships	107	9	116	2.6	0.2	2.8	12	—	12	3.2	—	3.2
	Intercultural competencies	103	12	115	2.5	0.3	2.8	9	3	12	2.4	0.8	3.2
	Diversity and equity	47	11	58	1.1	0.3	1.4	11	3	14	2.9	0.8	3.7
	Public services values	53	4	57	1.3	0.1	1.4	12	1	13	3.2	0.3	3.5
	Nonprofit organizations	23	3	26	0.6	0.1	0.6	11	—	11	2.9	—	2.9
	Emotional intelligence	14	—	14	0.3	—	0.3	6	4	10	1.6	1.1	2.7
ICT-related	*Total ICT-related courses*	*577*	*22*	*599*	*14.1*	*0.5*	*14.6*	*100*	*14*	*114*	*26.7*	*3.7*	*30.4*
	Collaboration	143	4	147	3.5	0.1	3.6	12	1	13	3.2	0.3	3.5
	Transparency and accountability	141	4	145	3.4	0.1	3.5	15	1	16	4.0	0.3	4.3
	Leadership	79	—	79	1.9	—	1.9	14	2	16	3.7	0.5	4.3
	Managing innovation	69	4	73	1.7	0.1	1.8	9	3	12	2.4	0.8	3.2
	Public and citizen participation	67	5	72	1.6	0.1	1.8	16	1	17	4.3	0.3	4.5
	Knowledge management	42	1	43	1.0	0.0	1.0	10	3	13	2.7	0.8	3.5
	Working in groups	33	2	35	0.8	0.0	0.9	12	2	14	3.2	0.5	3.7
	Social networks	3	2	5	0.1	0.0	0.1	12	1	13	3.2	0.3	3.5

TABLE 7.
Hard Competencies across Public Administration Courses in Latin America

| Type of Course | Course with hard competencies | Content Analysis | | | | | | Survey | | | | | |
| | | number | | | percentage | | | number | | | percentage | | |
		Mandatory	Elective	Total	Mandatory	Elective	Total	Mandatory	Elective	Total	Mandatory	Elective	Total
	Total courses with hard competencies	**2694**	**95**	**2789**	**65.7**	**2.3**	**68.0**	**137**	**22**	**159**	**36.5**	**5.9**	**42.4**
Generic	*Total generic courses*	*2182*	*85*	*2267*	*53.2*	*2.1*	*55.3*	*102*	*8*	*110*	*27.2*	*2.1*	*29.3*
	Economics	574	25	599	14.0	0.6	14.6	16	1	17	4.3	0.3	4.5
	Public policy analysis	524	50	574	12.8	1.2	14.0	18	—	18	4.8	—	4.8
	Research methods	383	4	387	9.3	0.1	9.4	15	—	15	4.0	—	4.0
	Quantitative methods	222	2	224	5.4	0.0	5.5	12	1	13	3.2	0.3	3.5
	Statistics and probability	165	1	166	4.0	0.0	4.0	12	1	13	3.2	0.3	3.5
	Program evaluation	137	2	139	3.4	0.0	3.4	16	1	17	4.3	0.3	4.5
	Math (calculus and algebra)	136	1	137	3.3	0.0	3.3	3	2	5	0.8	0.5	1.3
	Qualitative methods	41	—	41	1.0	—	1.0	10	2	12	2.7	0.5	3.2
ICT-related	*Total ICT-related courses*	*512*	*10*	*522*	*12.5*	*0.2*	*12.7*	*35*	*14*	*49*	*9.3*	*3.7*	*13.1*
	Knowledge management, IS, innovation, and computing skills	218	5	223	5.3	0.1	5.4	9	4	13	2.4	1.1	3.5
	ICT project management	137	2	139	3.3	0.0	3.4	10	2	12	2.7	0.5	3.2
	Decision-making methods and models	128	—	128	3.1	—	3.1	10	4	14	2.7	1.1	3.7
	Regulations for ICT investment	29	3	32	0.7	0.1	0.8	6	4	10	1.6	1.1	2.7

Tables 6 and 7 comparatively map the results from the survey and content analyses for soft and hard competencies, respectively, with the aim of analyzing generic and ICT-related courses. According to survey responses, 57.6% of courses are dedicated to soft competencies (50.1% are mandatory courses) and 42.4% to hard competencies (36.5% are mandatory courses). These results contrast with the content analysis, which reveals that courses with hard competencies dominate at 68% (65.7% are mandatory courses) versus courses with soft

competencies at 32% (30.4% are mandatory courses). This finding indicates that the opinions of those who chair and coordinate public administration programs do not correspond to the formal curricular structure published on official websites.

Based on the content analysis, hard competencies dominate the curricular structure at 68% of courses. Within this group, generic courses (55.3%) prevail over ICT-related courses (12.7%). In other words, courses with content dedicated to economics (14.6%), public policy analysis (14%), research methods (9.4%), and quantitative methods (5.5%), among other areas, are more central than ICT-related ones, such as ICT project management (3.4%); and knowledge management, IS innovation, and computing skills (5.4%). In a second tier of competencies, the content analysis identified that 32% of courses are dedicated to soft competencies. Within this group, generic and ICT-related courses have a similar level of importance. Generic courses for soft competencies represent 17.4%; ICT-related courses, 14.6%. Soft competencies in generic courses include ethics (4.5%), human resources (3.5%), intergovernmental relations and public-private partnerships (2.8%), and intercultural competencies (2.8%). Among the soft competencies in ICT-related courses are collaboration (3.6%), transparency and accountability (3.5%), leadership (1.9%), and managing innovation (1.8%).

Based on the survey analysis, soft competencies dominate curricular content at 57.6% of all courses. Within this group, generic and ICT-related courses present similar weights at 27.2% and 30.4%, respectively. Among the generic courses, the most common soft competencies are ethics (4.3%), human resources (3.7%), diversity and equity (3.7%), and public services values (3.5%). Among ICT-related courses, the most present soft competencies are public and citizen participation (4.5%), transparency and accountability (4.3%), leadership (4.3%), working in groups (3.7%), collaboration (3.5%), knowledge management (3.5%), and social networks (3.5%). In a second tier of competencies, the survey analysis identified hard

competencies in 42.4% of all courses. Within this group, generic courses dominate at 29.3%, including competencies for public policy analysis (4.8%), economics (4.5%), program evaluation (4.5%), and research methods (4%). For ICT-related courses, the more frequent hard competencies are decision-making methods and models (3.7%); knowledge management, IS, innovation, and computing skills (3.5%); ICT project management (3.2%); and regulations for ICT investment (2.7%). (See Tables 6 and 7.)

The content analysis indicates that mandatory courses for hard competencies are more numerous than courses for soft competencies (65.7% over 30.4%). Similarly, generic courses dominate over ICT-related courses (72.7% over 27.3%). In contrast, the survey analysis indicates that mandatory courses for soft competencies are more numerous than for hard competencies (50.1% over 36.5%). Clearly, the distribution of soft and hard competencies across mandatory and elective courses indicates different priorities across programs. In general, mandatory courses predominate (elective courses include fewer hard and soft competencies). Mandatory courses with generic competencies have higher levels of offerings (53.2% and 16.3% for hard and soft competencies, respectively) than ICT-related competencies (12.5% and 14.1% for hard and soft competencies, respectively). Courses with hard and soft competencies in ICT-related courses have similar levels of offerings, but they are still lower than generic competencies (16.3% and 14.1%, respectively). This is an indication that ICT-related content in public administration curricula is not a priority, possibly because of lack of faculty and/or adequate pedagogic tools specialized in these areas of knowledge.

These results suggest that programs should look at their curricula and perform a competency analysis with the aim of defining ICT-related competencies. For demonstration purposes and using the competencies found in the content analysis, Figures 2 and 3 present sequences for hard and soft competencies across generic and ICT-related courses. The goal of these sequences

is to synchronize curricular content between generic and ICT-related courses for each set of competencies over time. The proper sequence may depend of the level of the program (undergraduate, master's, or doctoral) and the human and material resources available in the institution. The purpose would be to endow public administration students with these competencies according to the mission and design of a particular program.

Figure 2 shows a possible sequence for hard competencies that may start in the first tier with basic math and computing skills in order to balance introductory generic and ICT-related courses. In the second tier, the program may advance students to statistics and probability and quantitative and qualitative methods as generic competencies; ICT-related competencies for ICT project management and regulations and decision-making methods and models would also be introduced. In the third tier, the curriculum may synchronize more advanced content between generic and ICT-related courses. For generic competencies, the curriculum may include economics, public policy analysis, research methods, and program evaluation; while for ICT-related competencies, the curriculum may include knowledge management, information systems, and innovation.

FIGURE 2.
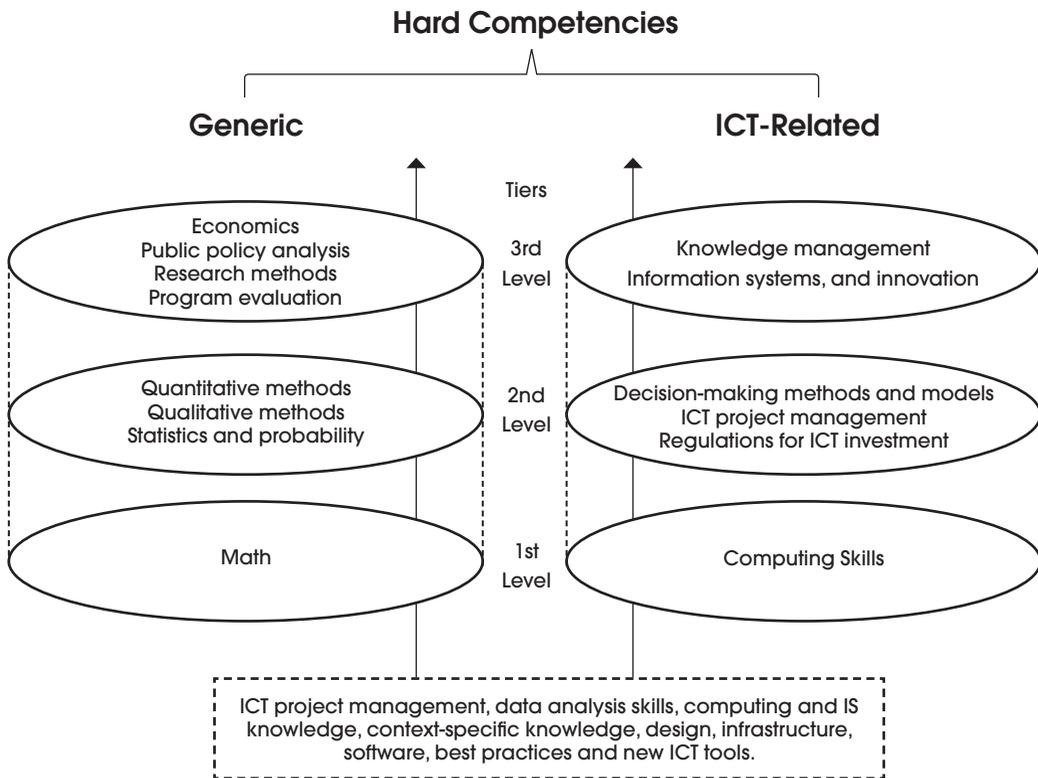**Three Tiers of Hard Competencies for ICT-Related Courses**

Figure 3 shows a possible sequence for soft competencies that may introduce ethics, intercultural competencies, diversity and equity, and emotional intelligence in the first tier. These generic competencies may be matched with ICT-related courses that teach competencies associated with working in groups, leadership, and collaboration. In the second tier, generic courses may include skills and knowledge for human resource management, intergovernmental relations and public-private partnerships, and nonprofit organization management. These generic courses may be accompanied by ICT-related courses that include knowledge management, managing innovation, and social networks. Finally, in the third tier, generic courses focused on public service values may be associated with ICT-related courses in the areas of transparency and accountability and public and citizen participation.

CONCLUSION

A study conducted by the McKinsey Global Institute (Manyika et al., 2011) shows that there will be a shortage of talent necessary for organizations to take advantage of big data and technology known initiatives. By 2018, the United States alone could face a shortage of 140,000 to 190,000 people who have deep data analysis skills and technological competencies,

FIGURE 3.
Soft Competencies for ICT-Related Courses
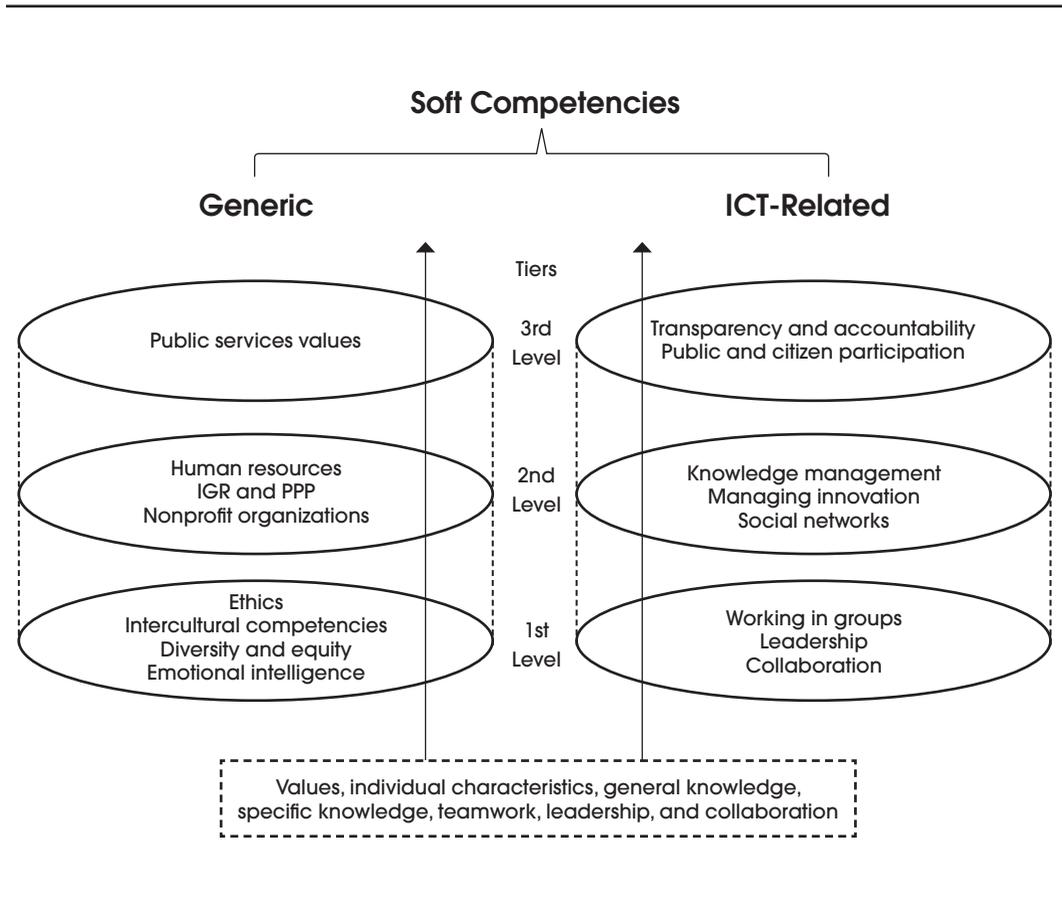
as well as 1.5 million managers and analysts with the know-how to use analytical tools to crunch data in order to make effective decisions. In government, this shortage could be accentuated by the highly competitive wages and benefits that the private sector offers to such talented people (Purón-Cid et al., 2012).

Previous studies concentrated on the supply side of defining ITSM competencies. The present study aims to understand the supply side as well as the demand side of ITSM in public administration graduate programs in Latin America. This research used a two-phase strategy of qualitative and quantitative methods. This research design was useful because the first phase (qualitative) revealed a set of categories for different competencies from chief information officers and executives in the public sector that the second phase (quantitative) subsequently explored. Although results of the first phase are not representative, they are still useful for building a framework for further assessment. The second phase involved a survey and a content analysis. Although the response rate was low, the results are useful for examining the competencies framework built in the previous phase. Limited familiarity with NASPAA possibly contributed to the low response rate. The content analysis was more representative of programs and countries and resulted in a useful technique for assessing curricular content of public administration programs.

The results of the first phase revealed soft and hard competencies for ITSM curricula relevant to the demand side (employers). These competencies were assessed using a survey of chairs and representatives of Latin American public administration programs and content analysis of official websites. The first finding suggests that the opinions of these representatives do not correspond to the curricular structure of their programs. The second finding of the content analysis is that ICT-related courses represent 12.7% of hard competencies and 14.6% of soft competencies. This indicates that ITSM is a moderate priority in the region. The survey analysis confirmed this finding.

The survey analysis found that ICT-related courses represent 13.1% of hard competencies and 30.4% for soft competencies. In other words, for both analyses, hard competencies dominate over soft competencies in ICT-related courses. This is a critical limitation to building strong ITSM curricula in the region and eventually preparing well-trained professionals for managing government ICT projects in an era of smart innovations, open platforms, and potential big data initiatives.

Among ICT-related courses, the most critical hard competencies are management of knowledge and information systems, ICT project management, and decision-making methods and models. Regarding ICT-related courses, the most critical soft competencies are collaboration, transparency and accountability, leadership, managing innovation, and public and citizen participation. Those responsible for designing public administration curricula should balance hard and soft competencies across generic and ICT-related courses in order to endow students with the proper skills, knowledge, and experience. Thus study suggests a set of hard and soft competencies for ITSM that may be useful curriculum design. The goal of any competencies model in public administration higher education should be to balance adequate specialized competencies—like ITSM—with generic competencies necessary in the field.

Future studies may want to further investigate competencies in public administration higher education as well as how ICT-related curricula align with real-life duties and responsibilities in government. The aim is to devise instruments that improve the alignment among public sector needs, graduates' professional careers, and program curricula. NASPAA may replicate this study for graduate programs in the United States, Asia, and Europe. However, Latin America and Africa present distinctive paths for digital government development that may require specific attention in order to improve our understanding of what inhibits and facilitates ITSM education in these regions.

NOTES

1 Schools of public policy, public administration, and public affairs vary depending on their core fields, such as political science and economics, or on their level of interdisciplinarity. This article examines general aspects of ICT standards and competencies across all types of public administration education. For discussion of the various differences in such education, see De Soto, Opheim, & Tajalli (1999); Elmore (1986); Hur & Hackbart (2015); Lowery & Whitaker (1994); Stokes (1986).

2 Some authors and organizations refer to ICT or information systems (IS) standards. This study refers all such standards under the rubric of ITSM.

3 The dimensions assessed by OSI are: whole-of-government approach, online service delivery, multi-channel service delivery, bridging digital divide, increasing usage, open government, and e-participation.

4 Data-analysis skills include word processing, using financial calculation software, database designing, using records retrieval software, use of networks, using statistical analysis packages, using geographic information systems (GIS), programming abilities, and data-sharing capability.

5 US laws enacted include Additional Responsibilities of Chief Information Officers of 1998, the Clinger-Cohen Act (CCA) of 1996 (formerly the Information Technology Management Reform Act), the Paperwork Reduction Act of 1995, the Federal Acquisition Streamlining Act of 1994, the Government Performance and Results Act of 1993, and the Chief Financial Officers Act of 1990. Other regulations were enacted after the CCA: the E-Government Act of 2002 and the Open Government Directive in 2011.

6 NASPAA issued this standard, numbered 4.2, at its 2002 annual business meeting. It was revised in 2004 and described as the standard for information management, technology applications, and policy.

7 For more detail, see https://portal.publicpolicy.utoronto.ca/en/Maps/CompetenciesMap/Pages/default.aspx.

8 The five categories are (1) content covered in complete mandatory class, (2) significant content covered in mandatory class, (3) content covered in optional class, (4) significant content covered in optional class, and (5) no content covered. For NASPAA's Annual Data Report survey, see http://naspaa.org/DataCenter/index.asp.

9 Of the courses, 4,267 were discipline-related—finance, management, law, history, political science, sociology, among others; and 606 were not identified because the title was general—for example, seminar, workshop, or elective.

REFERENCES

Alles, M. (2003). *Gestión por competencias: El diccionario.* Buenos Aires, Argentina: Ediciones Granica S.A.

Al-Wohaibi, M. A., Masoud, F. A., & Edwards, H. M. (2002). Fundamental risk factors in deploying IT/IS projects in Omani government organizations. *Journal of Global Information Management, 10*(4), 1–22.

Araya Moreno, E. (2007). Competency-based educational models for electronic governance: Implications for inclusion and responsiveness in the public service. *Journal of Public Affairs Education, 13*(1), 79–86.

Australian Government. (2007). *Meeting the demand for ICT skills in the Australian public service: Today and for the future* (Report of the ICT Professional and Skills Development Taskforce). Sydney, Australia: Department of Finance and Administration, Australian Government Information Management Office.

Baker, K. G. (1997). The role of liberal arts, technology, and specialization in American public affairs education. *Journal of Public Administration Education, 3*(1), 105–117.

Bretschneider, S. (1990). Management information systems in public and private organizations: An empirical test. *Public Administration Review, 50*(5), 536–545.

Brown, M. M., & Brudney, J. L. (1998). Public sector information technology initiatives: Implications for programs of public administration. *Administration and Society, 30*(4), 421–442.

Cats-Baril, W., & Thompson, R. (1995). Managing information technology projects in the public sector. *Public Administration Review, 55*(6), 559–566.

Caudle, S. L. (1990). Managing information resources in state government. *Public Administration Review, 50*(5), 515–524.

CIO Council. (2012). *2012 Clinger-Cohen Core Competencies and Learning Objectives*. Washington, DC: CIO Council.

Clark, I. D., Eisen, B., & Pal, L. A. (Eds.). (2015). *The atlas of public policy and management: An online database of pedagogy and advice*. Retrieved from http://portal.publicpolicy.utoronto.ca.

Clinger-Cohen Act. (1996). 40 U.S.C. §11101 et seq.

Cox, R., Gabris, G. T., & Levin, M. M. (2010). Educating local government managers for the twenty-first century: A preface to the symposium. *Journal of Public Affairs Education, 16*(3), 325–336.

Dawes, S. S. (2004). Training the IT-savvy public manager: Priorities and strategies for public management education. *Journal of Public Affairs Education, 10*(1), 5–17.

Dawes, S. S. (2010). Stewardship and usefulness: Policy principles for information-based transparency. *Government Information Quarterly, 27*(4), 377–383.

Dawes, S. S., Helbig, N., & Nampoothiri, S. (2014). *Workshop report: Exploring the integration of data-intensive analytical skills in public affairs education*. Albany: Research Foundation of the State University of New York and Center for Technology in Government.

De Soto, W., Opheim, C., & Tajalli, H. (1999). Apples and oranges? Comparing the attitudes of public policy versus public administration students. *American Review of Public Administration, 29*(1), 77–91.

Dugal, S. (2012). Developing global "core competencies" within public administration: The convergence of program and information management. *PA Times Online*. Retrieved from http://patimes.org/developing-global-core-competencies-public-administration-convergence-program-information-management.

Elmore, R. F. (1986). Graduate education in public management: Working the seams of government. *Journal of Policy Analysis and Management, 6*(1), 69–83.

European Association for Public Administration Accreditation (EAPAA). (2006). Accreditation criteria. Retrieved from http://www.eapaa.eu/process.

European Association for Quality Assurance in Higher Education (ENQA). (2005). *Standards and guidelines for quality assurance in the European higher education area*. Helsinki, Finland: ENQA.

European Foundation for Management Development (EFMD). (2006). EFMD programme accreditation system: Standards and criteria (version 7). Retrieved from http://www.efmd.org/what-is-efmd.

Eyde, L. D., Gregory, D. J., Muldrow, T. W., & Mergen, P. K. (1999). *High-performance leaders: A competency model*. Washington, DC: U.S. Office of Personnel Management.

Feeny, D. F., & Willcocks, L. P. (1998). Core IS capabilities for exploiting information technology. *Sloan Management Review, 39*(3), 9–21.

Getha-Taylor, H., Hummert, R., Nalbandian, J., & Silvia, Ch. (2013). Competency model design and assessment: Findings and future directions. *Journal of Public Affairs Education, 19*(1), 141–171.

Government of Canada. (2007). *Key leadership competencies*. Ottawa, ON: Canada Public Service Agency and the Public Service Commission.

Government of the United Kingdom. (2009). The civil service. Retrieved from http://www.civilservice.gov.uk.

Heeks, R. (2001). *Reinventing government in the information age*. London, UK: Routledge.

Heeks, R. (2006). *Implementing and managing egovernment: An international text*. London, UK: Sage.

Horton, S. (2002). The competency movement. In S. Horton, A. Hondeghem, & D. Farnham (Eds.), *Competency management in the public sector: European variations on a theme* (pp. 3–16). Amsterdam, Netherlands: IOS Press.

Horton, S., Hondeghem, A., & Farnham, D. (Eds.). (2002). *Competency management in the public sector*. Amsterdam, Netherlands: IOS Press.

Hur, Y., & Hackbart, M. (2015). MPA vs. MPP: A distinction without a difference? *Journal of Public Affairs Education*, *15*(4), 397–424.

Jalocha, B., Petter Krane, H., Ekambaram, A., & Prawelska-Skrzypek, G. (2014). Key competencies of public sector project managers. *Procedia: Social and Behavioral Sciences*, *119*(2014), 247–256.

Jennings, E., Jr. (2002). E-government and public affairs education. *Chinese Public Administration Review*, *1*(3/4), 230–238.

Kim, S., & Layne, K. (2001). Making the connection: E-government and public administration education. *Journal of Public Affairs Education*, *7*(4), 229–240.

Klein, H. K. (2000). System development in the federal government: How technology influences outcomes. *Policy Studies Journal*, 28(2), 313–328.

Kraemer, K. L., & King, J. L. (1986). Computing and public organizations. *Public Administration Review*, *46*(Special issue), 488–496.

Kraemer, K. L., & Northrop, A. (1989). Curriculum recommendations for public management education in computing: An update. *Public Administration Review*, *49*(5), 447–453.

Lan, Z., & Cayer, N. J. (1994). The challenges of teaching information technology use and management in a time of information revolution. *American Review of Public Administration*, *24*, 207–222.

Lowery, D., & Whitaker, G. P. (1994). Comparing public administration and policy analysis approaches to public service education. *American Review of Public Administration*, *24*(1), 25–41.

Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, Ch., & Byers, A. H. (2011). *Big data: The next frontier for innovation, competition, and productivity*. Washington, DC: McKinsey Global Institute.

Mergel, I. (2012). The public manager 2.0: Preparing the social media generation for a networked workplace. *Journal of Public Affairs Education*, *18*(3), 467–492.

Ministry of Public Administration and Security (MOPAS). (2008). *Assessment center manual*. Seoul, South Korea: MOPAS.

National Association of Schools of Public Policy and Administration (NASPAA). (1986). Curriculum recommendations for public management education in computing. *Public Administration Review*, *46*(Special issue), 595–602.

National Association of Schools of Public Policy and Administration (NASPAA), Commission on Peer Review and Accreditation (COPRA). (2006). *General information and standards for professional masters degree programs*. Retrieved from http://chrysalis-advertising.co.za/Portals/5/Documents/Intranet/NASPAA_2006_standards_183.pdf.

Network of Schools of Public Policy, Affairs, and Administration (NASPAA), Commission on Peer Review and Accreditation (COPRA). (2014). *NASPAA standards: Accreditation standards for master's degree programs*. Retrieved from https://naspaaaccreditation.files.wordpress.com/2015/02/naspaa-accreditation-standards.pdf.

Northrop, A. (1999). The challenge of teaching information technology in public administration graduate programs. In G. Garson (Ed.), *Information technology and computer applications in public administration: Issues and trends* (pp. 1–22). Hershey, PA: Information Science Reference.

Op de Beeck, S., & Hondeghem, A. (2010). *Managing competencies in government: State of the art practices and issues at stake for the future*. Paper presented at the Annual Meeting of the Public Employment and Management Working Party, Organisation for Economic Cooperation And Development (OECD), Paris.

Park, H. M., & Park, H. (2006). Diffusing information technology education in Korean undergraduate public affairs and administration programs: Driving forces and challenging issues. *Journal of Public Affairs Education*, *12*(4), 537–555.

Purón-Cid, G., Gil-Garcia, J. R., & Luna-Reyes, L. F. (2012, June 4–7). *IT-enabled policy analysis: New technologies, sophisticated analysis and open data for better government decisions*. Paper presented at the 13th Annual International Conference on DG Research (dg.o 2012), Bridging Research and Practice, University of Maryland, College Park.

Rodriguez, D., Patel, R., Bright, A., Gregory, D., & Gowing, M. K. (2002). Developing competency models to promote integrated human resource practices. *Human Resource Management*, *41*(3), 309–324.

Rosenbaum, A. (2007). Excellence in public administration education: Preparing the next generation of public administrators. In A. Rosenbaum & J.-M. Kauzya (Eds.), *Excellence and leadership in the public sector: the role of education and training* (pp. 11–24). New York, NY: UN Department of Economic and Social Affairs and International Association of Schools and Institutes of Administration.

Rosenbaum, A., & Kauzya, J.-M. (Eds.) (2007). *Excellence and leadership in the public sector: The role of education and training.* New York, NY: UN Department of Economic and Social Affairs and International Association of Schools and Institutes of Administration.

Scavo, C., & Shi, Y. (2000). Public administration: The role of information technology in the reinventing government paradigm; Normative predicates and practical challenges. *Social Science Computer Review, 18*(2) 166–178.

Stokes, D. E. (1986). Political and organizational analysis in the policy curriculum. *Journal of Policy Analysis and Management, 6*, 45–55.

UN Department of Economic and Social Affairs (UNDESA). (2008). *Standards of excellence for public administration education and training* (Final Report). New York, NY: UNDESA and International Association of Schools and Institutes of Administration Task Force on Standards of Excellence for Public Administration Education and Training.

United Nations (2003–2014). United Nations e-government surveys: *E-government for the future we want* (2014), *E-government for the people* (2012), *Leveraging e-government at a time of financial and economic crisis* (2010), *From e-government to connected governance* (2008), *From e-government to e-inclusion* (2005), *Towards access for opportunity* (2004), *World public sector report: E-government at the crossroads* (2003*)*. All retrieved from http://unpan3.un.org/egovkb.

Virtanen, T. (2000). Changing competences of public managers: Tensions in commitment. *International Journal of Public Sector Management, 13*(4), 333–341.

West, D. (2005). *Digital government: Technology and public sector performance.* Princeton, NJ: Princeton University Press.

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APPENDIX

ICT Curriculum Over Time in the United States

CURRICULUM RECOMMENDATIONS IN NASPAA (1986)

Basic course in management of computers and information systems with the following content:

- Centralization vs. decentralization
- Charging policy
- User involvement
- Technology transfer
- Sources of computing services
- Social and economic effects

Course in analysis and design of information systems with the following content:

- Formal tools for analyzing and designing information systems

Laboratory cases and field projects

Course in organizational and social impacts with the following content:

- Computing's broad effects
- Practical skills in assessing impacts during design and throughout operations

Practical course: Information Systems Projects

- Other specialized courses

CURRICULUM RECOMMENDATIONS IN BROWN & BRUDNEY (1998)

Basic course for strategic information resource management with the following content:

- Role of information in strategic planning and goal attainment: technology transfer, knowledge diffusion, business model
- Capitalizing on information resources
- Understanding the role of information in government operations: productivity and performance, decision making, customer service
- Analytical tools for aligning technology with government operations
- The role of information in process improvement and reorganization
- New technology directions: technological innovations
- Minimizing risk and maximizing benefits: selecting technology and evaluating its effects

Courses in information resource management planning methodologies with the following content:

- Information system analysis and design: local-area networks, wide-area networks, software applications
- Alternative implementation strategies: joint ventures and partnerships
- Privatizing and outsourcing
- Financing technology projects
- Minimizing risk and maximizing benefits: project planning and implementation methodologies

Course in information policy with the following content:

- Organizational policies affecting work operations and data sharing and ownership rights
- State and local mandates
- Federal mandates: privacy protection, freedom of information, data sharing, ownership, liability
- Internship: to obtain firsthand knowledge of the interrelationships between IT and government operations

CURRICULUM RECOMMENDATIONS IN DAWES (2004)

Foundational course in the strategic value of IT in government and the dynamic interplay among policy, management, and technology, with the following topics:

- IT uses
- Information policies,
- Management strategies
- How to align IT use with mission goals
- Importance of focusing on needs and abilities of system users
- How to assess and improve business processes
- Ways to recognize and manage interagency and intergovernmental considerations
- What to look for in a business case for IT spending
- How to recognize policy tensions in information-related decisions

Multiple courses in a specialty ITSM concentration with the following content:

- IT strategies for public services
- Making a case for government IT investments
- Government information policy
- Government information resource management concepts
- Specialized courses in other departments
- Planned field experiences, internships, and research opportunities

Related topics across existing MPA courses, such as:

- Policy analysis courses that cover information policy issues pertaining to privacy, access, and free expression
- Budgeting courses focused on factors that influence funding for IT initiatives
- Various courses focused on federalism topics that look at information systems, processes, and data flow that link multiple organizations and jurisdictions together
- Program evaluation courses that consider how technology decisions and system designs affect program performance
- Courses in specific policy domains (e.g., health care, education, environment) that examine IT topics
- Courses in particular policy domains or within a certain program that examine any policy, technology, or management topic in the context of that domain or program

Practical learning in field projects with the following content:

- Students' designing and building systems through faculty-led projects or internships, to learn lessons of design, project management, contracting, user involvement, change, and complexity
- Sharing courses or entire programs with other departments, whether in traditional MPA format or as certificates, to gain a multidisciplinary perspective and integrate various theories and frameworks. For example:
- Project management training offered by professional adjuncts or a through shared course with a business administration program
- Information policy courses offered in public administration or in an information science or library school
- Fundamentals of IT and networking taught in business schools and information science or computer science programs

CURRICULUM RECOMMENDATIONS IN CIO COUNCIL (2012)

Basic courses:

- Policy and Organization: mission, organization, functions, policies, and procedures; governing laws and authorities; decision- and policy-making processes; linkages and interrelationships between agency heads and chief executive officers; intergovernmental programs, policies, and processes; IT governance
- Leadership and Human Capital Management: key leadership attributes; professional development and career planning; competency performance and management; partnerships and team building; personnel performance management; attracting, motivating, and retaining IT personnel
- Process and Change Management: organizational development; process management and control; quality improvement models and methods; business process redesign, reengineering models and methods; cross-boundary process collaboration
- Capital Planning and Investment Control (CPIC): CPIC best practices; cost-benefit, economic, and risk analysis; risk management models and methods; weighting benefits of alternative IT investments; capital investment analysis models and methods; business case analysis; investment review process; IT portfolio management

- Acquisition: acquisition strategy, models, and methodologies; post-award IT contract management; IT acquisition best practices; software acquisition management; supply chain management in acquisition

Advanced courses:

- Information Resources Strategy and Planning: information resources management baseline assessment analysis; interdepartmental and interagency IT functional analysis; IT planning methodologies; contingency and continuity of operations planning (COOP); monitoring and evaluation methods and techniques

- IT Performance Assessment (Models and Methods): Government Performance and Results Act (GPRA) and IT; system development decision making; measuring IT success; defining and selecting effective performance measures; evaluating system performance; managing system performance; managing IT reviews and oversight processes

- Technology Management and Assessment: network, telecommunications, and mobile device technology; spectrum management; computer systems; Web technology; data management technology; software development technology; cloud computing; special use technology; emerging technology

- Enterprise Architecture: enterprise architecture functions and governance; key enterprise architecture concepts; enterprise architecture interpretation, development, and maintenance; use of enterprise architecture in IT investment decision making; enterprise data management; performance measurement for enterprise architecture

Specialized courses:

- Cybersecurity and Information Assurance: CIO roles and responsibilities; legislation, policies, and procedures; strategies and plans; information and information systems threats and vulnerabilities; risk management; enterprise-wide program management; information security reporting compliance; critical infrastructure protection and disaster recovery planning

- Information and Knowledge Management: privacy, personally identifiable and protected information; information accessibility; records and information management; knowledge management; social media; Web development and maintenance strategy; open government; information collection

Courses in IT project and program management with the following content:

- Project scope and requirements management
- Project integration management
- Project time, cost, and performance management
- Project quality management
- Project risk management
- System life-cycle management
- Software development, testing, and implementation
- Vendor management
- IT program management leadership