Challenges and Opportunities in e-Government Education

e-Government Programs Curriculum

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***Abstract*— Public administration and information technology university departments worldwide have responded to the explosion in e-Government by offering related programs or courses. In this study, the authors investigated education programs in e-Government by reviewing the curriculum and course descriptions of 70 programs that had web listings of their programs. Findings suggest that 64 institutions, from 32 countries worldwide, offer e-Government related programs. The programs are classified into four types based on their education level. Offered courses have been classified in 15 clusters. The majority of the proposed courses belong to the areas of Information Systems (20,7%), e-Governance (17,8%), Management (12,9%) and Public Administration (8,4%) clusters.**

Keywords-component; e-Government; Education; Training; Program; Course; Digital Transformation.

I. INTRODUCTION

Although e-Government is a relatively young subfield of the public administration discipline, it has gained significant academic and practical popularity during the last decade. This popularity is mainly due to the increasing and ubiquitous use of various information and communication technologies (ICTs) by citizens, businesses and by all types of public institutions.

The relevance of information and communication technology (ICT) in public sector research and education has markedly increased. Thanks to the practical and academic interest in e-Government, its teaching as an academic subject has also attracted some scholarly attention [1]. That is also reflected in public administration and information systems scientific conferences and journals, which pick up the issue more often within distinct tracks and special issues (e.g. ICDS [2], ICEGOV [3], HICSS [4], GIQ [5] etc.). Even though there are master programs with e-Government at their core, it is not clear how universities take up the topic, what is taught, and how the programs can be classified. This question seems highly relevant, considering how multidisciplinary the e-Government research community is [6]. Nevertheless, there are still relatively fewer studies on e-Government teaching compared to other kinds of e-Government research.

The contribution of this article is twofold: First, despite many publications on e-Government theory and practice, few exclusively examine e-Government education. Second, while the state of information systems and public administration education is soundly documented, the relevant literature in e-Government field is limited. Therefore, this article aims to explore the supply-side in e-Government education from an international point of view. At the core is the question, in which type of programs e-Government is addressed in which manner and what are the course types that are provided.

The rest of this paper is organized as follows. Section II describes the background of our study concerning the needs for e-Government education, as well as existing educational activities for fulfilling these needs. Section III describes the research method. Section IV presents the findings. Section V discusses the results and conclusions close the article.

II. DEMAND AND RESPONSE

During the last two decades, there has been a continuous growth of the e-Government initiatives, as government agencies are increasingly using (and relying on) various types of ICTs for supporting innovations in essential internal functions as well as in their transaction and consultation with citizens [7]. This trend is exponentially increasing, as governments are investing significant financial resources in various kinds of innovation promoting digitization projects. According to Ganapati and Reddick [8] in the U.S.A. the annual federal government ICT budget is over $86 billion, while the state and local government ICT market is valued at over $70 billion. A recent study by Grand View Research

(2017) estimated the global government ICT investment in 2015 at 431.15 billion USD, expected to reach USD 654.73 billion by 2025. At the same time, not only the 'quantity' of ICT investment increases in government, but also its 'quality' as well: from digitization of existing internal processes we proceed to overall 'digital transformation' of government agencies, concerning both their internal administrative and policy making processes, and their interaction with citizens; furthermore, e-Government becomes more 'context-specific', i.e., more closely associated with the specific local, country and sectoral contexts it aims to support [7]. These increase the technological and organizational sophistication of e-Government, making its development more difficult, demanding and risky. This critical size and high complexity of government ICT investment, and also the need for an efficient exploitation, operation and support of the existing government ICT infrastructures, necessitate extensive relevant human capital, which generates wide range of needs for e-Government education. Previous management and economic sciences research has revealed the importance of the human capital of organizations for knowledge intensive innovation related activities, as it improves their capacity to absorb relevant external knowledge, combine it with pre-existing internal knowledge, adapt it to specific needs and objectives, and exploit it for innovation purposes [9].

Therefore, e-Government education is of critical importance for the development of modern highly complex and sophisticated e-Government. For this reason public agencies, ICT implementers, students, and faculty are demanding e-Government education offerings with an urgency rarely seen before in academia. It is necessary, for a variety of e-Government-related roles occupations that have emerged, ranging from those requiring heavy technical skills in ICT and limited organizational knowledge, to those demanding extensive organizational skills and only modest technical knowledge (with many 'hybrid' ones that need considerable both technological and organizational capabilities). Previous literature has emphasized that the e-Government domain is a highly interdisciplinary. It combines knowledge from four main domains: the technological, management, economic and political sciences [7][10][11]. For this reason, the e-Government practitioners (in government agencies as well as in involved private firms, such as ICT or consulting ones) have their background in one of these four fields. In this regard, they need to acquire knowledge and experience from the other three domains, and then obtain the main knowledge of the e-Government domain. However, despite the abovementioned inherent difficulty and complexity of e-Government education, as well as its high importance, limited research has been conducted about it. Most of these researches describe relevant educational programs and initiatives.

According to Augustinaitis and Petrauskas [12], the interdisciplinary nature of e-Governance allows integrating a broad range of specialized knowledge, for instance knowledge from public administration, law, information technologies, communication, management and political sciences. In addition, significant percentage of students of such educational programs are primarily originated from these disciplines.

Janowski et al. [13] analysed seven e-Government graduate university programs. The results indicate that 29% of the programs train political leaders, 57% of them train government leaders, project managers and management staff, and 43% of the programs train technical staff. The focus on only one of the above roles in these programs is very limited (29%). The majority of the programs (71%) target more than one role, while none of them target all roles.

Concerning specific learning topics, the literature is mostly concentrated in country-specific studies, which provide different, but complementary results. Anohina Naumeca et al. [14] highlight the lack of learning courses concerning interoperability in the European countries. Interoperability related courses are essential, as they drive delivery of cross-border and cross-sectoral public sector services.

Biasiotti and Nannucci [15] argue that regarding Italy, master degrees on Public Administration (PA) and information technology organized by public administration schools, concentrate on technological issues (information systems, communication networks, tools and methodologies for public communication) and on legal instances of technological innovation in the PA (security, information technology law, internet law, etc.). Ganapati and Reddick [8] conducted a survey of Master in Public Administration (MPA) programs in the U.S.A. concerning the provision of e-Government related courses, as well as the importance assigned to such courses. More than a quarter of the respondents (29%) viewed such a course as "extremely unimportant" or "very unimportant", which indicates that a considerable share of MPA programs is not aware of some realities in public administration, associated with the high penetration and impact of ICT. Therefore, it has been concluded that the e-Government related education provided in the main U.S. MPA programs is not sufficient, and e-Government is under-represent in them, so they finally train a workforce unprepared for the digital world.

The needs for e-Government education increase, as government proceeds to the gradual exploitation of recent disruptive ICTs, and shift from solely looking to the support of administrative processes to a more ambitious purposes of supporting higher-level policy-making processes and functions.

These new objectives and directions of e-Government, and the above new technological advances, as well as the full range of involved disciplines, necessitates the development of corresponding new e-Government courses, and in general a holistic educational public sector digital transformation.

III. RESEARCH METHOD

The methodology undertaken includes the following steps: 1) the definition of the research keywords regarding the data collection of existing training programs related to e-Government, 2) the mapping of the geographical search areas, 3) the specification of a training programs metadata scheme and 4) the filtering and analysis of training programs focused on e-Government area.

Between February and May 2018, exhaustive Web search was conducted, using various search engines to analyse Web page descriptions of e-Government programs and course offerings by different types of educational institutions. Also particular web pages of universities reputed in the related literature or other publications to have an e-Government program were accessed. Also, all programs suggested from e-Government researchers and practitioners have been considered. Some established e-Government programs did not have a clear web presence or other did not provide the program courses. Identified e-Government programs include academic ones, executive training ones and various types of certifications. Most programs were at the master's level, but a few were available for undergraduates. They varied considerably in their focus, types of courses offered, and degree requirements. We chose only those programs that were described in detail on the web and came up with a total of 73 programs in May 2018. The total number of institutions offering e-Government education stood at 64.

We examined programs considering the following aspects: (a) Institution's country, (b) program's educational level, (c) provided courses. The considered courses were further classified in clusters. We used course titles and descriptions to place courses in categories. The classification scheme intended to provide a general picture of the types of courses offered in this area and an idea about the extent to which such programs give emphasis in each course cluster.

IV. FINDINGS

Seventy e-Government programs have been identified and considered. The most common strategy among these programs is to offer a concentration (or track or specialization) in a specific area of e-Government.

Institutions that offer e-Government educational programs are located in 32 countries (alphabetical order): Argentina 2, Armenia 2, Austria 1, Barbados 1, Belarus 1, Belgium 3, Estonia 1, Bosnia & Herzegovina 1, Canada 2, China 1, Colombia 3, Estonia 4, Germany 5, India 2, Italy 4, Mexico 5, Netherlands 2, New Zealand 1, Norway 1, Poland 3, Portugal 1, Romania 6, Russia 1, Serbia 1, Singapore 1, Slovenia 1, South Africa 2, Sweden 1, Switzerland 2, U.S.A. 10, Uganda 1, UK 3.

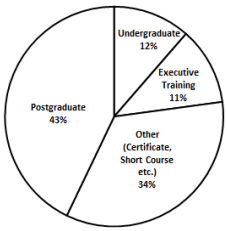

Figure 1. e-Government training programs categorized based on the certificate they award

Regarding the education level, there are eight executive training programs, eight undergraduate university programs, thirty postgraduate university programs and the rest of them are short course ones (Figure 1). The courses of e-Government related programs have been classified in the following clusters (each cluster is described, number of identified courses in parenthesis, course examples are provided in each group) (Figure 2):

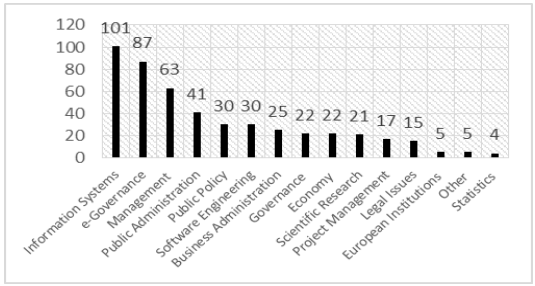

Figure 2. Course clusters and number of courses identified in each of them in e-Government related training programs

e-Governance (87). Courses in e-Governance category consider aspects such as the application of information and communication technology (ICT) for delivering government services, exchange of information, communication transactions, integration of various stand-alone systems and services between government and users, back office processes and interactions within the entire government framework, etc.

Indicative courses: Phases of e-Government and stages of e-Government development, Impact and measurement of e-Governance, Development of government websites.

Public Policy (30). The public policy category focuses on the systematic analysis of issues related to public policy and the decision processes associated with them. This includes training in the role of economic and political factors in public decision-making and policy formulation; microeconomic analysis of policy options and issues; resource allocation and decision modelling; cost/benefit analysis; and various applications to specific public policy topics. Public policy courses teach students policy analysis, policy studies, public policy, political economy, urban planning, public administration, public affairs, public management, etc.

Indicative courses: Sustainability and innovation in society, Public Innovation and Resistance to Change, Importance and Impact of Social Channels on Public Policy, Information Security Policy and Ethics, Information Policy.

Governance (22). Governance is composed of all processes of governing, whether undertaken by a government, a market or a network, over a social system and whether through the laws, norms, power or language of an organized society. It relates to the processes of interaction and decision-making among the actors involved in a collective problem that leads to the creation, reinforcement, or reproduction of social norms and institutions. Governance courses cover public sector, public organizations, and the concepts of leadership and governance. They study the features of the political structure of countries. They contain information on the institutional, procedural and value components of the political system and public policy in countries, as well as a description of the problems, contradictions, and prospects for the political development

of the country. They consider aspects such as the political system and regime, state institutions, political parties, civil society, directions and problems of economic and social policy.
Indicative courses: Government Enterprise Architecture, Democracy and Governance, Evidence, Institutions and Power, Risk Assessment and Governance.

Project Management (17). The project management category covers all aspects that are related to managing technology and innovation projects in the public sector. They include a variety of areas such as effort management, project portfolio management, program management, project risk management, project workforce management, etc.
Indicative courses: Project Management, Management of IT Projects in Administration.

Software Engineering (30). Software engineering courses consider issues regarding the systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software. Courses that are specifically incorporating programming, program design in their titles and that are technical in nature, such as web programming and security systems, are classified as software engineering.
Indicative courses: Introduction to Development in Cloud, Building interoperability and digital data exchange, Principles of Database Management, Data Warehouse and Business Intelligence, Mobile Apps: Application Development, User-Based Design, Spatial Data Capture.

Information Systems (101). Information Systems courses consider aspects such as management of information systems, design, implementation and development of information systems, systems analysis, data communications, database design, collection, organization, storage, and communication of information, etc. It also integrate topics related to business process design and automation, reengineering and transformation.
Indicative courses: Business Information Systems, Virtual Environments Usability, Information Management in the Public Sector, Information Systems Architecture, Information security in state and municipal government, Collaborative Systems in Administration.

Business Administration (25). Business administration courses provide a broad knowledge of the functional aspects of an organisation and their interconnection. They include all aspects of overseeing and supervising business operations and related fields which contain accounting, finance, and marketing. They also consider the performance or management of business operations and decision making, as well as the efficient organization of people and other resources, to direct activities toward common goals and objectives.
Indicative courses: Advanced Business Process Modelling and Automation, Transformation and change management, Start-up world & Prototyping ideas, Develop an innovative ecosystem, Digitally-driven Entrepreneurship.

Management (63). Management courses consider the administration of an organization, whether it is a business, a not-for-profit organization, or government body. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. Management courses provide a solid foundation in organizational behaviour, human resource management, labour-management relations, negotiation, conflict resolution, compensation systems, and organizational development.
Indicative courses: Human Resources Management, Leadership and Teamwork, Strategic Planning, Conflict Management, Impact Assessment.

Public Administration (41). Public Administration courses study the implementation of government policy and prepare civil servants for working in the public service. They introduce concepts whose fundamental goal is to advance management and policies so that government can function efficiently and effectively. They include aspects of economics, public finance, research methods/statistics, policy analysis, ethics, public management, leadership, program evaluation/performance measurement and human resources management.
Indicative courses: Public Sector Service Design and Implementation, State and Municipal Administration, Theory of the state and rights, Theory of Administration, Organisation of the Public Sector, Public Procurement.

Legal Issues (15). Courses in the legal issues category educate individuals in the principles, practices, and theory of law. This cluster of courses provides to the trainee, the knowledge and skills necessary for admission to legal practice in public administration. It also provides to current lawyers with advanced training or greater specialisation, or it updates lawyers on recent developments in the law. They include aspects such as understanding of the potential of e-Governance, the policies, the required legal and institutional frameworks, and insights into an engaging e-Governance involving different stakeholders.
Indicative courses: Legal aspects of e-Governance, cyber security & secure governance, Administrative Law, Legal Organisation of Public Administration, E-Regulation.

Scientific Research (21). Scientific research courses concentrate on the fundamentals of doing research, aimed primarily, but not exclusively, at the postgraduate level. These courses provide an understanding of research approaches and skills, and importantly an ability to deploy them in students´ studies or their professional lives. They aid those who have research as part of their postgraduate studies. Research methods courses prepare the student to design effective, ethical investigations. They teach appropriate frameworks and tools for qualitative and quantitative studies in e-Governance.
Indicative courses: Strategy and methods of scientific research, Research Methods for Process Analysis,

Investigative methods for e-Governance, Research on Public Management and Organizations, Quantitative Methods.

Economy (22). Economy courses include microeconomics, macroeconomics, econometrics, economic statistics, history of economic thought and political economy. They cover aspects such as microeconomic theory, macroeconomic theory, and econometrics.

Indicative courses: Public Finance, Public Budgets, Financing Programs for Digital Development, Health Care Finance.

Statistics (4). The statistics category is concerned with statistical methods, evidence-based reasoning, particularly with the analysis of data. Statistics courses study the collection, analysis, interpretation, and presentation of data.

Indicative courses: Statistics in Administration, Probability and statistics.

European Institutions (5). European institutions courses provide structured knowledge of EU fundamentals and focus on selected priority issues for an in-depth understanding and future-oriented approach to EU integration. The institutions of the European Union are the seven major decision-making bodies of the European Union (EU).

Indicative courses: European Integration and EU Institutions, European Administrative Law, EU Funds Management.

Other (5). The category "other" includes the rest of the provided courses.

Indicative courses: Physical Education, Ethics, Publicity, Mathematics for decision sciences, English for Science and Research.

V. Discussion

Not that long ago, e-Government related programs and course offerings were virtually non-existent, but today they are rapidly increasing. In this research, we identified 64 institutions offering either concentrations or majors in e-Government at different types of educational level worldwide. But even as more universities rush to market with such offerings, major controversies remain unresolved surrounding the need for, and the nature of, e-Government education.

e-Government courses have arrived as a significant element of public administration and technology schools. Educational institutions are scrambling to turn the study of e-Government into majors and degrees. However, the approach to offering such course content varies across institutions. Controversy highlights whether e-Government represents an incremental modification of the capabilities and strategies available to information technology or public administration areas or whether we are witnessing the birth of a new education area. Institutions of higher education are debating if they should "patch" e-Government perspectives into existing courses and programs or offer new courses and majors.

Though some researchers have contended that e-Government should be an integral part of the curriculum and that separate programs and degrees are unnecessary, others have argued for specialized programs in the area [16][17].

Schools with separate majors in e-Government aim to offer intensive study of e-Government and address what might be a new approach to reorganize and manage public sector. Other institutions are designing courses and programs that treat e-Government as an integral part of the broader public administration or information technology curriculum. This approach assumes that a basic grounding in fundamental public administration concepts and information technology aspects is still needed in the new type of government. e-Government facts and content may be obsolete sooner than students can finish a program. Integration of e-Government into established curriculums also may force students to examine the social, global, psychological, and ethical aspects of this approach to government.

Technical versus nontechnical focus aside from the debate on whether to integrate e-Government into a public administration program or offer it separately, there is also a lack of clarity concerning the extent to which such courses should emphasize technology aspects as opposed to functional public administration areas. Should courses emphasize the technology that enables e-Government or focus on the effect of technology on government strategy and decisions? Do e-Government capabilities require a technological foundation, or can students function effectively in e-Government environment without knowledge of the enabling technology? Who should initiate and "own" e-Government education- the computer information systems faculty or the public administration faculty?

In the current study, e-Government programs are being offered by both public administration schools such as Hertie School of Governance and, primarily, technological schools such as the College of Information Science & Technology in the University of Nebraska Omaha or the Institute of Business and Management Informatics of the University of Koblenz Landau. Findings suggest that technology could no longer be an afterthought to government strategy but an integral part of every phase of the strategy development. But what this means regarding the related education is not clear.

Education opportunities in e-Government field remain elusive for some regions and countries, in the developing countries. Only 6 academic programs are provided from institutions that are located in Africa or Asia. Therefore, it is also important to develop tailored e-Government training programs to support new public policy and technology professions to strengthen institutional capacities of developing countries in deploying digital government and digital services.

To design a complete educational e-Government program, the present study suggests fifteen main course clusters that lay a solid foundation for the creation of a comprehensive and coherent e-Government program. These clusters cover different aspects of e-Government needs. The majority of the provided courses belong to Information Systems (20,7%), e-Governance (17,8%), Management (12,9%) and Public Administration (8,4%) clusters.

These e-Government programs should be offered in a holistic way providing the opportunity to students to develop a high level of knowledge and capabilities in:

- an appropriate range of organizational tasks, management procedures, multi-stakeholder projects, legal and methodological concepts towards the efficient and effective execution of public projects;
- a wide range of technological skills (established and emerging ones), towards beneficial innovations, transformations and transitions in the public sector;
- a variety of different aspects of information systems (IS), that can be developed: IS that support internal processes, electronic procurement, digital information provision to citizens and businesses, electronic transactions between the government and citizens/businesses, interoperability, electronic participation, governance and democracy, utilization of social media, open government data, smart cities, etc.

VI. CONCLUSION

The growing interest of e-Government programs during the last years is significant. The debate on whether e-Government should be viewed as a new curricular area has not slowed down curricular innovation. The ability of universities to acquire faculty and technology resources and to continuously offer more innovative courses will affect the success and viability of these programs. This paper examines the nature of 70 e-Government programs and explores their content. It also sets the foundation for curriculum development in e-Government education.

Educational postgraduate programs need a structure that allows the inclusion of country-specific needs based on the maturity stage of the country and the developed governmental action plan. To improve the efficiency and effectiveness of e-Government projects the country's leaders must pay closer attention to the problems of increasing the "right" e-Government skills of civil servants.

Further steps to this study will be to identify, structure and describe the specific modules of undergraduate and graduate level educational programs. A possible research approach is also the identification of the needed micro-certificates interrelated with the appropriate skills from the ESCO ontology, which is a classification that identifies and categorises skills, competences, qualifications and occupations relevant for the European Union labour market and education.

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