Educating Future Digital Leaders: Developing e-Governance Curriculum in Estonia and Ukraine

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ABSTRACT

The successful transformation of a country to an advanced digital state is substantially dependent on education and more specifically, the development of an e-Governance curriculum in higher institutions. Estonia as a role model has demonstrated that e-Governance implementation significantly stems from a strong collaboration between stakeholders such as the state, private sector, and academia. This study aims to examine the risk factors of e-Governance curriculum development in an emergent e-democracy state – Ukraine, and how lessons learnt from Estonia's digital transformation can be used for coping with underlying risks. To conduct this research, a survey on Digital Competence in e-Governance Education in Ukraine was conducted along with analyzing secondary data related to Estonia's case. The results suggest that issues related to e-Governance curriculum implementation in Ukraine include comprehensive factors like low digital competence and low awareness in available trainings in e-Governance, as well as access to technology and respected e-learning sources. Thus, the recommendations which stem from Estonia's experience as an e-state are suggested for overcoming the risk factors that Ukraine faces in e-governance curriculum development.

CCS CONCEPTS

• **Human-centered computing → Empirical studies in collaborative and social computing**;

KEYWORDS

e-Governance, ICT in Education, Curriculum, Digital Leadership

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1 INTRODUCTION

Comprehensive factors of social transformation (globalization, digitization, development of a new media ecology) highlight the development of various types of meaningful networking structures in the knowledge economy: knowledge networks, professional networks and networked society overall. Subsequently, networked society as a global institution in the knowledge economy context calls for the implementation of networked governance. Networked, accessible and equipollent governance structures are facilitated by the electronic medium (interface, tools, communication). This way, E-government is defined as the use of digital communications devices to provide public services to citizens and other persons in a country or region. E-government offers new opportunities for more direct and convenient citizen access to government, and for government provision of services directly to citizens [13].

Interoperable with the notion of e-Governance is the notion of E-democracy. E-democracy or digital democracy is the use of information and communication technology in political and governance processes to promote democracy [13]. E-democracy encompasses social, economic and cultural conditions that enable the free and equal practice of political self-determination [8]. Digital democracy is ambient of the full-scale implementation of the concept of digital citizenship [16] crucial for global economic and political development. Digital citizenship can be fostered through e-democracy education of various types: formal, informal, life-long for in-service officials.

The topical need to revisit and reexamine the established models of e-democracy and e-Governance education arises from the changes that networked societies experienced due to the global pandemic COVID-19. The global pandemic and subsequent quarantine measures and restrictions have posed an array of challenges to the structure and procedure of e-Governance institutional operations and e-Governance training, subsequently. In the educational sphere, the result of the COVID-19 pandemic development was the need to take quick action in order to achieve such desirable results:

a) To adapt the educational scenarios to digital or hybrid formats;
b) To activate skillsets, underutilized in the practice of digital citizenship;

c) To enhance ICT competence in e-Governance services of all participants of the educational process as well as of all stakeholders of e-democracy institutions across the board.

Therefore, the inquiry overarching **objective** *is to critically review the best practices of two contrastive cases of e-Governance curriculum implementation in higher education of a fully functional e-state (Estonia) and an emergent e-state (Ukraine).* The study empirical findings are carried out within the framework of the joint international Ukraine-Estonia project Counseling Ukrainian universities on "E-government Masters study program development and awareness raising on e-Governance" of Tallinn Technological University, Borys Grinchenko Kyiv University, National Academy of Governance of the President of Ukraine.

2 LITERATURE REVIEW

In the technology-driven era, development of the e-Governance studies is highly important. Considering that it is an interdisciplinary study that stands on several pillars such as technology, governance, economy, law and politics, e-Governance educational programs are remarkably compound. On the contrary to such study programs' importance, it is notable that research conducted on the given area is limited. However, several authors have contributed in the following manner.

The research on Master's studies on e-Governance Administration, a program which is taught in Law of School of Lithuania, discusses that due to novelty and the interdisciplinary nature of e-Governance programs, there are a plethora of emerging issues that have to be addressed [5]. One of the major problems arises from the gap that lays between the academic knowledge and practical application of the program [5]. Besides, there are other questions that have to be examined, for example, "how to integrate technological skills with social, political and economic knowledge in comprehensive and to modern public management-oriented conceptual unit" [5]. Janowski et al. [11] suggest a theoretical model to improve the respected programs in a comprehensive manner. Thus, the developed theoretical framework incorporated the following questions to be addressed when improving or creating the e-Governance graduate programs: who (learner), why (role), what (competency), how (program), where (school) and when (prerequisites) [11]. According to the Janowski et al. [11], "theoretical framework can be used in various ways:

(1) as a tool for landscaping, comparing and analyzing the offerings by different programs;
(2) as a tool applied to individual programs to help students make decisions on the ways to approve them or to highlight possible improvements;
(3) as a tool to help to design new programs;
(4) as a tool to detect and correct inconsistencies within a program" [11].

Pappel et al. [18] discusses the most notable impediments of the respected program development. Also, it emphasizes the importance of how the given curriculum facilitates theoretical knowledge implementation in practice considering that it provides a broad range of courses that stem from the interdisciplinary character of the program [18].

Anohina-Naumeca et al. [4] emphasizes that due to the fact that interoperability is one of the key aspects of cross-border e-services of EU countries, courses concerning interoperability have to be offered to students.

Biasiotti and Nannucci [6] argues that teaching e-Government in Italy is critical for e-Government implementation in the country. It also reviews a number of initiatives taken by public and private universities in cooperation with Ministries for delivering trainings to the public servants. Also, the research highlights the fact that existing courses focus on technical and legal aspects of e-Governance and lack interdisciplinary character [6].

3 METHODOLOGY AND DESIGN

In order to conduct the research, the following methodology was chosen: a survey on Digital Competence in e-Governance Education in Ukraine was conducted along with analyzing secondary data to Estonia's case. The study design of the inquiry methodology included the following procedural steps:

(1) e-Governance activity, experience and application profiling;
(2) Overview of e-Governance case-studies in Estonia and Ukraine for the purpose of the contrast and comparison of an established and an emergent e-Governance paradigm;
(3) The online survey method (based on Dillman's concept of mixed media and mixed mode surveys [7]) applied to assess e-Governance experiences and practices by relevant groups of stakeholders;
(4) e-Governance curriculum development recommendations, outline and projected study results, tailored to the overall context of European integration and stakeholders' target group needs.

Based on the activity profile (e-Governance) a survey was conducted among the stakeholders of electronic government institutions – in-service government officials and students of government management programs. The survey comprised of 13 questions total (multiple choice and Likert-scale score), divided into such groups: 1) questions on overall experiences in e-government; 2) questions on the needs and modes of e-Governance education; 3) questions on e-democracy as a social. A sample of 70 respondents took part in the survey.

In-service and in-training government officials of Ukraine comprised the sample of respondents. The distribution of demand for e-Governance education is generally in keeping with the higher educational landscape estimate of 2020.

Higher education technology landscape 2020 [9] was prognosticated to include the following components: institutional IT infrastructure; admissions and enrolment management; ICT tools for performance assessment; ICT tools for student distinction. The inquiry elaboration premise included identification of ICT competency principles, derivative of 21st century skills [3, 4, 10, 15, 17] for educational purposes and profiled digital literacy requirements in the educational and civil service spheres:

(1) *UNESCO Framework* [2] is based on the core ICT competence principle: the need to be able to help the students actualize soft skills through using ICT so they will be effective citizens
(2) *Liberal Arts (Digital Humanities) ICT proficiency profile*, according to the European e-competence framework guideline

[10], includes the following key components: training to reach predefined standards of ICT technical /business competence; analyzing skills gaps; defining and implementing ICT training policy to address organizational skill needs and gaps.

(3) *Digital Competence framework* [4] consists of 5 core parameters assessed according to proficiency: 1) Information and data literacy; 2) Communication and collaboration; 3) Digital content creation; 4) Safety; 5) Problem-solving.

4 CASE-STUDY: ESTONIA SUCCESS STORY

4.1 Historical Overview

Estonia's transformation from a post-soviet country to a digital state has been a complex process. It evolved around a rapid technological development which was in parallel with a socio-political change. The path towards becoming one of the most advanced digital societies in the world [3] has been compound with a number of socio-political, legal, economic, and technological aspects. Some of the factors dis-cussed below facilitated e-Governance adoption and brought the country to the advanced digitalization level.

To begin with, after the restoration of independence in 1991, the political elite agreed on adopting e-Governance as a founding niche of the country [17].

However, hereby, it is notable that the chosen path would be impossible to take and maintain without a strong public-private partnership that played a critical role in designing e-Governance policies and increasing overall e-Governance awareness in society. Thus, as a result of successful cooperation between these two stakeholders, Estonia has developed advanced public e-services which are available on the citizen's platform and which operated through X-Road – a data exchange layer used by a number of Estonian state authorities [23]. Other than a public-private partnership, one more factor that had a catalyst effect was a legal one. Due to the Soviet past, and newly restored independence, the state had to start from scratch in terms of a legal framework which played a positive role in the given moment considering that there were no laws that would obstruct new processes.

Also, it is notable that one of the key contributors has been the program e-LocGov model which raised awareness and successful systematic introduction of e-Government at the local level [19]. It is noteworthy that Estonia has significantly focused on the marketing of e-Governance related matters included but not limited to e-Residency and paperless management (e-LocGov model) – initiatives that have also been great contributors in e-nation branding concept [12, 19].

Successful transformation of Estonia would be impossible without a focus on education field. When it comes to the legal framework, as mentioned above, the country had to make a fresh start, but in the case of the ICT competence, there was a solid ground prepared which facilitated the transformation problem and played a role of impetus [12]. Thus, strong ICT education has been a drive-force of these developments. Success in this particular filed would unattainable without the collaboration of public authorities, the private sector and academia. Also, other than the strong will of the involved stakeholders, one more critical element of progress in ICT education laid in strong ICT infrastructure which was already available by that time [12]. Digital competence would be impossible to develop without such educational initiative as Tiger Leap "which was launched in 1996 and laid a ground for the education system and society as a whole to be prepared for the rapid technological developments of the Information Age" [12].

4.2 ICT-related Courses Taught in Leading Universities of Estonia

Strong ICT infrastructure, both: public and private, and R&D policies were one of the major pillars of the e-Governance development process. Hereby it is notable that leading educational institutions such as Tallinn University of Technology, Tallinn University and University of Tartu, have actively been engaged in the given process as one of the driving force of Estonia's successful transformation to the advanced digital state.

Tallinn University of Technology largely contributes to the IT knowledge of the country. The obtainable programs provided by the School of IT are as followed: Cyber Security, Communicative Electronics, Computer and Systems Engineering, e-Governance technologies and Services, Digital Health, Software Engineering – a joint program with the University of Tartu [14]. Programs by School of Business and Governance: Technology Governance and Digital Transformation, Public Sector Innovation and e-Governance – a joint program with the University of Leuven and University of Münster [14]. As also mentioned in the strategic development plan of the university: "The mission of Tallinn University of Technology (TalTech) is to be a promoter of science, technology and innovation and a leading provider of engineering and economic education in Estonia" [21].

When it comes to the University of Tartu, the following Master courses are available: Education Technology, Politics and Governance in the Digital Age, Information Technology Law, Innovation and Technology Management, Sound and Visual Technology, Computer Science, Materials Science and Technology, Robotics and Computer Engineering, Software Engineering, Cyber Security – a joint program with the Tallinn University of Technology, Smart Mobility Data and Analytics – joint program with EIT Urban Mobility Master School [22]. As the University of Tartu strategic plan states, the university focuses on strengthening e-learning: "We support using e-learning opportunities both abroad and in different regions in Estonia…We contribute to information technology capabilities and make sure that the data of the university become valuable and available assets" [25].

In the case of the Tallinn University, ICT-related programs that followed: Digital Learning Games, Human-Computer Interaction, Open Society Technologies, Educational Innovation and Leadership, Human Rights in the Digital Society [24]. As the strategic plan of the university states, "in order to support open governance, citizen subjectivity and democracy on the level of the state and the local government as well on a level broader than the state, we shall develop knowledge dissemination practices and research methods based on the principles of knowledge-based policymaking" [20].

5 CASE-STUDY – UKRAINE, THE EMERGENT E-DEMOCRACY

According to the Cabinet of Ministers of Ukraine mandate "On approval of the e-government in Ukraine development concept" [1] e-Governance is one of the tools of the information society elaboration, the implementation of which will facilitate conditions for open and transparent public administration. As is stated: *"Today, one of Ukraine's priorities is the development of the information society, which can be defined as targeting interests of the people, open to all and aimed at forming an innovative model of high-tech society where every citizen can create and accumulate data and knowledge, have free access thereof, use and share it to allow each person to actualize their potential for personal and social development and quality of life improvement"* [1].

The institutional level of e-Governance implementation in Ukraine comprised of the following core initiatives: the development of e-Governance in Ukraine is impossible without appropriate training of relevant qualified professionals. The inquiry object, thus, is the case study of e-Governance experience and application by relevant stakeholders as a prerequisite of curriculum development. The canvas sweep of the e-Governance programs available in higher educational institutions and non-governmental organizations of Ukraine has been analyzed in view of the core needs and expectations of the e-Governance curriculum, disclosed in the survey.

The established and active e-Governance curricula of five institutions were analyzed: 1) Borys Grinchenko Kyiv University (BGKU) (Kyiv, Ukraine); 2) National Association of Civil Service (NACS); 3) National Academy of State Governance (NAPA); 3) National Center of E-governance support (NCEGS); 4) Kyiv Polytechnic Institute (KPI). The sweep comprises of 3 formal higher educational institutions (BGKU, NAPA, KPI) and 2 informal educational institutions (NACS and NCEGS). *The educational institutions that have a varified history of an implemented e-Governance curriculum on different levels (full major degree curriculum, full minor degree curriculum (specialization), micro-credential curriculum) were selected for best practices analysis.* The sample structure comprises of 3 formal higher educational institutions (BGKU, NAPA, KPI) and 2 informal educational institutions (NACS and NCEGS).

The educational formats, efficient or sought after in the area of governance digitization (table 1) are distributed as such:

(1) One off training and workshops (40%);
(2) Persistent online courses (34,3%);
(3) Webinars (22,9%).

Table 1: Educational formats in the area of e-Governance per sampled educational institutions

EI	One off training and workshop	Persistent online courses	Webinars
BGKU	+	+	+
NACS	+	+	+
NAPA	+	-	+
NCEGS	+	-	+
KPI	+	-	-

The estimation of the educational formats, efficient or sought after in the area of governance digitization, designed into the existent e-Governance curricula are calculated against the surveyed expectations of the stakeholders in the following way: One-off trainings and workshops – 100% efficiency of implementation in the e-curriculum design; Webinars – 80% efficiency of implementation in the e-curriculum design; Persistent online courses – 60% efficiency of implementation in the e-curriculum design.

According to the level of accessibility of e-Governance learning formats – only two higher educational institutions (Borys Grinchenko Kyiv University and National Academy of State Governance) of formal learning provide the most widely accessible formal and informal learning format.

The respondents identified the key educational components needed in the sphere of governance digitization (table 2): 1) e-service design and development (72,9%); 2) data protection (67,1%); 3) cyber security and integrity (47,1%); 4) case studies for digital skills development (41,4%); 5) case studies for digital transformations (34,3%).

The estimation of the learning key educational components needed in the sphere of governance digitization, designed into the existent e-Governance curricula are calculated against the surveyed expectations of the stakeholders in the following way: e-service design and development – 100% efficiency of implementation in the e-curriculum design; case studies for digital skills development – 60% efficiency of implementation in the e-curriculum design; case studies for digital transformations – 60% efficiency of implementation in the e-curriculum design; cybersecurity and integrity – 40% efficiency of implementation in the e-curriculum design; data protection – 20% efficiency of implementation in the e-curriculum design.

As is evident from the comparative analysis of e-Governance curricula, the majority of institutions in Ukraine do not cater in full to the estimated needs and expectations of the e-Governance curriculum design, informed by empirical practices of the stakeholders.

When asked to assess the learning outcomes needed for efficient use of digital technologies upon completion of an e-Governance study course, in-service and in-training governance stakeholders identified the following top-scoring priorities (table 3): 1) Digital services development (67,1%); 2) Digital databases operation (60%); 3) Digital literacy and digital skills (58,6%); 4) Digital workplace tools proficiency (48,6%); 4) Re-engineering of government services (44,3%).

The estimation of the learning outcomes efficiency, designed into the existent e-Governance curricula can be, therefore calculated against the surveyed expectations of the stakeholders in the following way: Digital services development – 80% efficiency of implementation in the e-curriculum design; Digital workplace tools proficiency – 60% efficiency of implementation in the e-curriculum design; Re-engineering of government services – 60% efficiency of implementation in the e-curriculum design; Digital databases operation – 20% efficiency of implementation in the e-curriculum design.

Overall, as of the year 2020, formal educational establishments in Ukraine provide an e-Governance curriculum, more customized

Table 2: Key educational components in e-Governance curriculum per sampled educational institutions

EI	E-service design and development	Data protection	Cyber security and integrity	Case studies for digital skills development	Case studies for digital transformations
BGKU	+	+	+	+	-
NACS	+	-	+	-	-
NAPA	+	-	-	+	+
NCEGS	+	-	-	-	+
KPI	+	-	-	+	+

Table 3: Key learning outcomes in e-governance curriculum per sampled educational institutions

EI	Digital services development	Digital databases operation	Digital literacy and digital skills	Digital workplace tools proficiency	Re-engineering of government services
BGKU	+	+	+	+	-
NACS	-	-	-	+	+
NAPA	+	-	+	+	-
NCEGS	+	-	-	-	+
KPI	+	-	-	-	+

to the meta-evaluated needs of e-citizenship and e-Governance stakeholders in the context of knowledge economy.

6 CONCLUSION

In the cases of Estonia and Ukraine, the impact areas of e-Governance curriculum development include the public sector domains: higher education (development and implementation of generic study programs of e-Governance); civil society institutions and public sector (development of a comprehensive e-democracy educational standard); democratic institutions (raising awareness and provision of comprehensive, advanced training for institutional decision-makers in principles and vehicles of e-Governance).

In the emergent e-state of Ukraine, which is also a developing economy and a developing democracy, there may arise risks in the workflow of e-Governance curriculum implementation, such as low digital competence of stakeholders; low awareness of the options and formats of customized in-service training in e-democracy; impaled access to e-learning resources and impediments in access to technology overall.

Considering the success story of Estonia in implementing functional e-Governance and e-citizenship institutions, the main recommendations can be introduced:

(1) with the provision of supplementary ICT competence development for the general public;
(2) with the introduction of systemic changes into the vaster areas of education curricula to accommodate functional hard skills (data-bases processing, data analysis, service tools development);
(3) diversification of accessible formats of formal and informal e-Governance training which are customized to different groups of stakeholders;
(4) awareness-raising in the public sector on the sufficiency of e-democracy training for civil society development in the context of knowledge economy through augmentative dissemination means (social media, mass media, public engagement).

Future work can incorporate comparative analyses of emergent e-democracies in various sociopolitical and cultural contexts; the case-studies of e-Governance education implementation in different countries of the European Union; the comparative studies of national and international e-Governance curricula.

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