Does E-Government education meet competency requirements? An analysis of the German university system from international perspective

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Abstract

Necessary competencies in the context of e-government and the lack thereof have received some academic attention in the last years. Questions remain, whether study programs for public administration pick up the topic, how it is conceptualized and taught in order to develop e-government competencies. This article analyzes which fundamental conceptualizations of e-government underlie study programs for public administration in Germany and which e-government- and IT-related topics are taught. Against the background of two international study programs in e-government, the article discloses a parallelism of IT-related and non-IT-related topics within study programs, a technical bias in e-government programs, and outlines essentials for e-government education.

1. Problem Statement and Research Question

Administrations are facing major challenges in the context of E-Government, especially regarding its implementation [1, 3, 7]. E-government implementation goes well beyond the mere use of certain ICT tools or the adoption of ICT in government in general; instead it implies an organizational transformation enabled and facilitated by the potentials and use of ICT [6, 23]. Thus, its implementation requires competencies that surpass pure technical skills to adopt and use ICT or traditional organizational skills [25]. ICT have penetrated public administration at all levels so thoroughly in the last years and have become so fundamental for the functioning of government that it can be argued ICT-related competencies have become basic competencies for all public managers. This is not only the case in Germany, but internationally. However, especially in Germany a perspective on competencies is interesting, because of its distinctive legal state (Rechtsstaat) model [19]. Administration is often considered in its legalistic function, whereas in other countries, e.g. in Scandinavia or Anglo-Saxon countries, a much more managerial understanding predominates [19]. In Germany, the legal state model also plays a role in recruitment schemes. This leads to a predominance of legal professions in the public sector, especially at the state and federal level [27, 20].

A multitude of failed e-government projects [8] indicates a severe lack of skills for ICT-use and -implementation within the public sector. New competencies in terms of knowledge, skills and attitudes are in demand [5, 11]. However, these competencies are not generally self-evident as in the context of ICT-use a new context-specific division of labor emerges: Managers and employees at different organizational levels need different skills and competencies to be up to their task. Even though there is a lack of empirical research about which knowledge, skills and competencies are required in different international administrative cultures and at the various administrative levels, some recently published articles give indications [11, 24]. These provide hints especially in regard to public managers’ technical and non-technical competency requirements. For example, public managers need a minimum of IT-knowledge to exploit the potentials for modernization of e-government [25]. Furthermore, this includes socio-technical competencies, for example to design newly emerging organizational interfaces in the context of e-government efficiently and effectively.

During the last two decades, the relevance of ICT in public sector research and education has markedly increased. That is also reflected in administrative scientific conferences and journals, which pick up the issue more often within distinct tracks and special issues (e.g. IRSPM, EGPA, PMR). 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 multi-disciplinary the e-government research community is [2, 10, 22]. Therefore, this article aims to explore the
supply-side in e-government education in Germany from an international perspective. At the core is the question, in which programs and disciplines e-government and IT within the public sector is addressed in which manner and in how far this meets competency requirements for e-government.

The article is structured as follows: First, it describes which competencies are necessary in the context of e-government. This provides the analytical basis for the empirical data. Thereupon, the empirical findings from Germany are described and discussed. It is illustrated, in how far these programs meet the competency requirements for e-government. As an additional analytical background, two education programs are drawn upon in more detail, to derive further requirements and conclusions for academic education in e-government.

2. Competencies for E-Government

To analyze current academic literature about e-government competencies, relevant articles were identified in the databases of ISI Web of Science von Reuters, the ACM Digital Library and IEEE Xplore. Here relevant articles were included that exhibit in combination with variations of the term e-government at least one of the following terms: “competency”, “skills”, “knowledge”, “capabilities”, “expertise”, “teaching”, “education”, “training”, “learning”, “curricula”. The majority of the 146 articles found within this search mentions e-government competencies merely cursorily, for example as an important topic to implement e-government successfully (see i.a. [7]).

Overall it becomes evident that e-government competencies have still been scarcely discussed in the academic literature [15, 17, 26, 28]. Even fewer attempts have been made to comprehensively systematize e-government competencies [11, 18], which could serve as a basis for this article. These attempts are summarized in table 1.

Further articles analyze educational programs in regard to e-government and for this refer to underlying competency requirements (see i.a. [5, 14]). Besides rather narrowly focused contributions that analyze trainings for one specific competency, e.g. open government trainings [14], more holistic approaches can be found that build on comprehensive competency frameworks [5]. In general the articles illustrate the manifold use of the term e-government and how different the various academic disciplines circumscribe it (i.a. [10]). A broader discussion about the further development of educational programs against the background of technological developments is conducted in the IS-Community (see Education Track of ICIS 2013). However, this refers to educating IT-specialists (see [13, 21]) who are not in the focus of this article. Competencies mentioned in the context of e-government education programs are summarized in table 2.

<table>
<thead>
<tr>
<th>Article</th>
<th>Knowledge, Skills, Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parrado (2005) [18]</td>
<td>business s.: matching business strategy to new technologies; information management s.; information technology s.; strategy and planning, system development and implementation, service and user support; information society s.: stakeholder management, technological literacy and ICT awareness, implementation and evaluation management</td>
</tr>
<tr>
<td>Hunnius/ Schupp (2013) [11]</td>
<td>generic competencies: personal and social c. (e.g. networking c.), change c. (e.g. change management and project management), administrative c. (e.g. administrative culture); e-government core c.: design c. (e.g. process design c. and IS design c.), management c. (e.g. contract management c.), E-Policy c. (e.g. strategies and policies, models and concepts); E-Competencies (e.g. information processing c. and ICT literacy)</td>
</tr>
</tbody>
</table>

Table 1: Competency frameworks for e-government.

<table>
<thead>
<tr>
<th>Article</th>
<th>Knowledge, Skills, Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaeger et al. (2011) [12] (Focus on Library and Information Studies (LIS) graduates)</td>
<td>study of the nature of government information, the role of the political process and information policy in shaping e-government, the reasons that cause populations to use or not use e-government, challenges to accessing e-government, and the means of evaluating the impacts and successes of e-government; critical foundational content areas that information professionals will require in designing, delivering, evaluating, and managing e-government</td>
</tr>
<tr>
<td>Edelmann et al. (2013) [4]</td>
<td>e-government structures, services and tools, the legal framework, how administrative workflows are improved, new internal and external communication channels and processes; understand why new e-government processes are necessary and important; e-government services and tools currently being used; specific e-government knowledge as well as a variety of skills beyond e-government, other topics such as public management, process management and change management</td>
</tr>
<tr>
<td>Estevez/ Janowski (2013) [5] (Competencies for CIO education programs)</td>
<td>20 broad knowledge areas: leadership, public administration, public policy, innovations and trends, legal aspects, strategy development, architecture and standards, information management, project management, financial management, information systems, economics, human resources, operations management, e-government, development and ICT, sustainable development, international development, networking and partnerships, performance management; five skills: leadership, communication, inter-personal skills, negotiation, analytical skills</td>
</tr>
</tbody>
</table>

Table 2: Competencies in e-government education programs.

Overall the literature analysis about e-government competencies shows that especially earlier contributions understood relevant competencies strongly IT-related. Increasingly, the role of competencies rested in various academic disciplines as well as the role of social and personal competencies is acknowledged. With a view in particular to the latter, only teachable aspects of competencies, i.e. knowledge and skills, are relevant for the research undertaken in this article.

The intersection of the listed competencies transcends traditional disciplinary boundaries. The relevant competencies can be traced back to the
information systems discipline, library and information science (LIS), public management and administrative science, with elements of jurisprudence, social informatics, political science as well as science and technology studies (STS). This again is symptomatic for the multi- and inter-disciplinarity of e-government research [22].

<table>
<thead>
<tr>
<th>Category</th>
<th>Exemplarily assigned knowledge, skills, competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>technical</td>
<td>Information technology skills [18]; IS design competency [11]; information systems [3]</td>
</tr>
<tr>
<td>socio-technical</td>
<td>e-government impact [11, 12]; technology and e-government adoption; politics of e-government [12]</td>
</tr>
<tr>
<td>organizational</td>
<td>e-government structures [4]; organizational design [11]; process management [4, 11]</td>
</tr>
<tr>
<td>managerial</td>
<td>Business skills [18]; project management, financial management, performance management [5]; change management [11]</td>
</tr>
</tbody>
</table>

Table 3: Categorization of e-government knowledge, skills, and competencies.

Even though the mentioned competencies transcend disciplinary boundaries, they predominantly evoke the impression to be assembled multi-disciplinarily. Most of the competencies can be traced back to specific disciplines and are rarely amalgamated in a truly interdisciplinary manner. Therefore, we broadly distinguish between rather technical, rather organizational, rather socio-technical, rather managerial, and rather political-administrative competencies. Exemplary competencies are assigned to these categories in table 3. Critical as multi- instead of inter-disciplinarity might be for e-government competencies in general, it seems to be rather helpful for the approach in this article to identify and analyze different disciplinary biases in e-government education.

3. Method

The empirical analysis is based on a complete sample of study programs that refer to e-government and/or public administration. These were identified in the database of the German Rector’s Conference which contains all study programs in Germany. This surfaced 91 BA- and MA-programs of 55 German universities with linkages or orientations towards a public sector career. This represents a full survey of the German public administration education. Thereupon, examination regulations, curricula descriptions and/or the module handbooks of these programs were analyzed. The analysis of those documents consisted of four steps:

A. Identify e-government- as well as IT-related contents  
B. Classify the importance of e-government- and IT-related content within the programs

C. Analysis of five thematic categories and their manifestation within the programs  
D. In-depth analysis of the programs regarding the specific topics

The importance of e-government within the study program (B.) was categorized based on the number of courses on the topic. Here, study programs were clustered into groups that have either e-government as the study program’s main focus, several courses on e-government, one course, e-government as a side issue within one course, or made no reference to e-government or IT-related topics.

The manifestation of the thematic categories (C.) was classified by a 1-4-scale for each category, ranging from not to strongly manifested. The classification was carried out by a comparison of the extent of the thematic categories. For this, BA- and MA-programs as well as programs with one or several relevant courses and programs with main focus on e-government had to be distinguished, to guarantee a valid and reliable analysis. Programs without relevant courses or with e-government as a side issue within one course were excluded from this analysis.

The analysis of the documents was supplemented by a workshop with five professors for e-government from German universities, asking for experiences in teaching e-government and the motivation of students to deal with issues of IT within the public sector.

3. Empirical findings from Germany

The empirical results illustrate that e-government has entered higher education in Germany, however to a varying degree. On the one hand over 50% of the 91 programs have no IT- or e-government related courses or contents at all. Among universities with a more practical approach (Universities of Applied Sciences) 64% offer e-government-related topics while only 24% of universities offer respective issues. On the other hand, 9% (absolute: 8) of the overall study programs have e-government at their center. Additional 9% offer several and 24% one course on e-government.

<table>
<thead>
<tr>
<th>Universities</th>
<th>Universities of Applied Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main focus</td>
<td>BA</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Several courses</td>
<td>0</td>
</tr>
<tr>
<td>One course</td>
<td>2</td>
</tr>
<tr>
<td>Side issue within a course</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 4: Role of e-government in study programs in Germany.
The subsequent analysis focused on the thematic categories which were derived from the literature analysis – technical, socio-technical, managerial, organizational, and political-administrative topics. Therefore, programs without relevant courses or with e-government as a side issue within one course were excluded from this analysis, which thus focuses on 38 out of the 91 study programs.

### Table 5: Thematic foci in study programs in Germany

<table>
<thead>
<tr>
<th>Strong</th>
<th>Existent</th>
<th>Weak</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>10 (26%)</td>
<td>1 (3%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>Organization</td>
<td>15 (39%)</td>
<td>15 (39%)</td>
<td>10 (26%)</td>
</tr>
<tr>
<td>Management</td>
<td>10 (26%)</td>
<td>19 (50%)</td>
<td>14 (37%)</td>
</tr>
<tr>
<td>Socio-Technology</td>
<td>3 (8%)</td>
<td>3 (8%)</td>
<td>12 (32%)</td>
</tr>
<tr>
<td>Politics/Admin.</td>
<td>2119</td>
<td>2119</td>
<td>2119</td>
</tr>
</tbody>
</table>

Looking at table 5 it becomes evident that most study programs cover a variety of topics from all five thematic categories. However, social scientific topics are mostly taught apart from technical topics so that questions and potentials of IT remain undervalued. Programs that score high in organizational topics mostly score low on technical topics. Two BA- and eight MA-programs ignore technical aspects altogether. If e-government surfaces in these programs at all, it is mostly restricted to online service delivery to citizens. Socio-technical aspects are barely integrated into the curricula in general.

Taking a more nuanced look at study programs with e-government at their core, it becomes evident, that these exhibit a strong tendency to technological, managerial and administrative topics. Again, technical and managerial remain largely disconnected from political-administrative topics, which are taught in separate courses by different lecturers, each specialist in their respective field. Some universities, like the University of Potsdam, try to bridge the gap between courses in information science and administrative science or management and politics/administration respectively by designated e-government courses.

### Table 6: Thematic foci in e-government study programs in Germany

<table>
<thead>
<tr>
<th>Strong</th>
<th>Existent</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>3 (37.5%)</td>
<td>0</td>
</tr>
<tr>
<td>Organization</td>
<td>6 (75%)</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Management</td>
<td>2 (25%)</td>
<td>0</td>
</tr>
<tr>
<td>Socio-Technology</td>
<td>3 (37.5%)</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Politics/Admin.</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

After comparing the extent of the thematic blocks, the specific courses on e-government were looked upon. It illustrates that single courses on e-government are mainly reduced to discussing national e-government-strategies or online-platforms. The transformational character of IT for the public sector, its functioning and tasks does not come into play in the vast majority of programs. As already mentioned, technical contents – if at all – are taught isolated from other topics. Furthermore, e-government and IT are barely integrated systematically in the curricula. Mandatory courses are found only in programs with a main focus on e-government, which are mostly rather programs of information science than of administrative science or public management. The latter offer optional courses on e-government, largely disregarding technical aspects like IT governance or IT infrastructures. This is notable especially because some of these programs already offer relevant issues like process management, or e-government fundamentals which are strongly influenced by IT. Still, the most important perspective of public sector education in Germany is a strong focus on legality.

The majority of e-government courses is taught at universities of applied sciences compared to other universities indicates that e-government is still considered as a mainly operative issue and less as a strategic challenge and an instrument for a substantial transformation of the modern state. The low importance of e-government in German curricula is not surprising considering the fact that administrative science and public management are generally underrated disciplines within the public sector. The German system of public administration is traditionally shaped and characterized by staff with a degree in law. Graduates of law dominate especially the management level. Also the education of officers of the middle level was characterized for decades by an emphasis on legality. During the last years, more issues of organization and management were added on this level, while the recruiting for the management level with focus on legal scholars did not change significantly [20].

### 4. Case studies

The two cases have been selected based on the reputation of the responsible scholars, the time of the establishment of the program, and its thematic focus. While the program at the University of Wellington has only recently been established with a fundamental interdisciplinary approach, the program at the University of Örebro is well-established, has a strong technical focus, and is lead by one of the most renowned e-government scholars. The selection does not attempt to be representative in any way, but shall illustrate examples of different approaches to the topic, both of which have their merit and justification.

#### 4.1. University of Örebro, Sweden
The two-year masters program Information Systems – IT in Public Administration of the Örebro University is an example for a program with a strong emphasis on technical competencies. Furthermore, it gives some indications for parallelism of IT-related topics on the one hand and questions of management, organization and politics on the other hand. It is designed for graduates who hold a bachelors degree with at least 60 credit points in informatics or computer science (usually a third of a bachelors program). The courses in information science such as Information Systems Requirements or Information Systems Evaluation are therefore designed for students with advanced knowledge in information science and less for graduates of public management.

The students have to choose between a specialization in IT in Project Management or IT in Public Administration. The latter includes courses such as Politics and Administration in a Changing World. Additionally, courses in qualitative and quantitative research methods are included to provide substantial research skills.

The courses in information systems are not offered specifically for the specialization in public administration but also for those who specialize in project management. Therefore, the courses in information systems might not be highly focused on public sector specifics. The specialization in public administration shall provide students with the skills needed to understand and act upon the technical, organizational and social changes that occur when IT is used in public sector. Therefore, the students are also taught in political science to understand the democratic dimensions of the function of the public administration. Additionally, there are a few courses on e-government and e-services that try to bridge the courses in IT and other courses.

What the program does not seem to offer is an active linkage of IT-related topics and topics of public administration although this is stated as one of the programs goals. Instead, courses on IT or politics and administration seem rather distinct. Linking the different aspects and recognizing potentials and developments in e-government is still mainly dependent on the personal contribution of the students and not on the study structure and lecturers.

The purpose of the program is rather typical for e-government programs. Also German programs in Koblenz or Potsdam complement programs of information science with rather distinct courses on public management, law or politics and a few courses on e-services without actively linking these courses. Even beyond, some courses were originally designed for study programs in information science or respectively in public management and merely reused for the e-government programs.

4.2. University of Wellington, New Zealand

The Master of e-Government at the Victoria University of Wellington is a newly developed program and therefore offers no empirical experience. Nevertheless already the structure of the curriculum shows a new interdisciplinary perspective on e-government. The one-year program targets BA-graduates of all disciplines with an interest in a public sector career. The program aims to enable graduates to design and implement ICT-enabled processes of state transformation. The main focus of the program is the specialties of the public sector and the challenges by ICT. The curriculum is strongly socio-technical by discussing issues of public management directly in the context of ICT-caused changes. The technical contents are reduced to fundamentals for generalists.

To demonstrate the interdisciplinary character of the program, three courses description are outlined below.

**Example 1: Managing Service Transformation**
The course focuses on ICT-enabled services and relationships between the administration and citizens/businesses. The related specificities and changes are taught and discussed on basis of theories, concepts, existing strategies and case studies.

**Example 2: Managing ICT-enabled forms of Public Engagement**
The course is about challenges, prerequisites and the management of social media within the public sector to gain better governance.

**Example 3: Managing IT-related Change**
The course focuses on change management, which becomes necessary because of the implementation and development of ICT. Issues are the planning of changes, the management of conflicts and opposition, process management and the influence of ICT on individuals and working environments.

The program is designed for future public managers, who plan and take responsibility for transition and changes of the public administration. The innovative character of the program is the result of teaching technical and non-technical contents within the courses in an interdisciplinary way, so that the different issues refer to each other. The graduates gain a substantial understanding for technical solutions, without becoming IT-specialists.
4.3. Comparison

Comparing the two master programs shows a different perception of what e-government actually is. While e-government programs in Germany (Potsdam, Koblenz) and the Örebro program conceptualize e-government rather as the use of IT within public sector, the Victoria University’s program concentrates on the transformational character and potentials of IT. It is therefore not an issue only for IT specialists but for anybody working in the public administration. The program aims to develop “a new language” of e-government by linking IT-related content and organizational, managerial and social issues directly to one another within the courses to guarantee interdisciplinarity. A typical way for parallelism can be seen in Örebro, where ICT courses and other courses are taught independent from each other, merely supplemented by transcending courses on e-government, so that the cognitive performance is only the job of the students. The different approaches are contrasted in table 7.

<table>
<thead>
<tr>
<th>Master of e-Government (Victoria University of Wellington, NZ)</th>
<th>Typical e-government programs (e.g. Potsdam, Koblenz, or Örebro)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-year program for generalists</td>
<td>Two-year program for information scientists</td>
</tr>
<tr>
<td>Goal: Managing transformational processes by e-government and understanding for the specifics of the public sector</td>
<td>Goal: Understanding for and management of technological/organizational/social changes by ICT.</td>
</tr>
<tr>
<td>Socio-technological education by linking public management and IT within new conceptualized courses, e.g. administrative reforms in the context of e-government; change management by ICT</td>
<td>Mainly technological focus (information systems) plus single courses on public administration and political science.</td>
</tr>
<tr>
<td>Educates public manager with fundamental understanding for ICT which is seen as design instrument</td>
<td>Educates IT specialists</td>
</tr>
<tr>
<td>Management by ICT</td>
<td>Management of ICT</td>
</tr>
</tbody>
</table>

Table 7: Comparison of e-government study programs.

5. Discussion

Overall it becomes evident that curricula with their main focus on e-government are usually programs of information science, supplemented by separate courses on public management, law or politics. Here, e-government is mainly conceptualized, analyzed and taught from a technical perspective. In contrast to that, programs of administrative science or public management focus not on the technical insights of e-government, but on strategies, e-government laws or potential benefits of new technologies, especially regarding new ways of democratic participation or reducing administrative burdens with online portals and electronic communication. The broad variety of issues within e-government courses shows that a common definition and understanding of e-government are still missing at universities and in practice.

Neither studies of information science, nor programs of administrative science or public management offer an interdisciplinary approach in which technical, organizational, managerial and administrative issues are linked with each other to identify and discuss the current and future challenges for the public sector or to develop new ideas for administrative reforms and an IT-enabled transformation of the modern state. Quite the contrary, the seemingly interdisciplinary combination of IT and administration is an unrelated parallelism of the disciplines. Instead of learning “a new language” of e-government, the programs try to educate interpreters who speak the language of information science as well as the language of the public administration. That seems insufficient for the challenges society and government are facing.

The experience of professors in e-government shows, that the public administration has no clear image about what kind of educated staff they need in the context of e-government. Thus, they don’t know how and where they should employ graduates of e-government programs. On the other side, the students of programs with a focus on e-government tend work for the well-paying private sector as Germany in general suffers under a significant shortage for IT-experts. Students of public management or administrative science choose courses in e-government mainly because of good jobs perspectives in the private sector as well, especially in the field of consultancy and not because of an articulated need of e-government-experts within the public sector itself.

As a result, e-government competencies are to a large extent insufficiently developed. Looking at how e-government is integrated into study programs, this is not surprising and furthermore does not make for an optimistic outlook. An especially meager picture emerges in the area of e-government implementation for re-organization and modernization. While study programs exist that focus on the technical details of IT with some reference to public sector specifics, the picture is bleak when it comes to e-government as a reform topic. In Germany, no study program exists that meets the requirements to interlink organizational, managerial, public-administrative, technical, and socio-technical questions, as the University of Wellington’s example does. The latter discloses a blind spot in the
German system of higher education for public administration.

6. Conclusion: Essentials for a Modern Education in E-Government

The topic of e-government still only slowly enters public administration and management education. Some study programs ignore the topic altogether, while others simply treat it a supplementary side issue. This does not imply that everyone working in government necessarily needs to be an e-government expert and the topic should be at the core of each study program. Rather, each role in the context of e-government requires a mix of e-government competencies, depending on the tasks each role is assigned. The underlying competencies for these tasks are still not yet clear and require a more extensive and thorough research effort.

However, it can be stated that information technology has penetrated the public sector so profoundly that each role in government needs some understanding of e-government and information technology. This is contingent on whether the role applies IT to fulfill an organizations public task at a strategic level, coordinates IT use in the public sector or implements an e-government project. While the former needs a thorough understanding of IT potentials, its functions, and the fundamentals – whatever these are – and implications of e-government, the other roles need a more intricate understanding of the technical aspects in a public sector context.

With good will, the variety of conceptualizations and considerations of e-government in education programs could be interpreted as exactly this tailored mix of e-government competencies. However, the heterogeneity of topics in basics courses, the outright negligence of the topic, or the additive parallelism of topics around e-government could also point to the fact that study programs still struggle to grasp the topic.

7. References


