Digitalisation of the German administration – An analysis of ICT skills taught in German administrative degree programs

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Submitted by:

Nina Schäfer

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Supervisors:

Prof. Dr. R. Müller-Török

Prof. Dr. T. Hemker

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Abstract

As the digital transformation in the German public administration has to be mastered with fewer human resources in the future, ensuring appropriate education for coming professionals has become a matter of utmost significance. Since most of the employees who have to face the digital transformation are civil servants with a bachelor's degree, it is necessary to analyse which digital competences are taught in the respective administrative degree programs.

For this purpose, the statutory orders of the federal states and the federal republic are analysed in order to see which typical administrative degree program they mention, which in turn will then be examined more in depth in each case. In the subsequent step, the module manuals which detail the statutory orders are analysed to determine the Information and Communication Technology (ICT) modules, their time scopes and their contents. In order to ascertain which of them contain basic skills, their contents will then be mapped to the International Certification of Digital Literacy (ICDL) modules and their corresponding topics. The remaining topics are clustered bottom-up into categories and finally it is considered which of the them contain administration-specific and which general technology-related topics.

The results of the analysis reveal that, on average, only 37 hours, but in two cases not even any seconds, are spent on teaching ICT skills. Further analysis unveils that about half of the ICT topics contain basic skills according to the ICDL Germany and the other half consist of subjects that exceed basic knowledge. Finally, it turns out that half of the topics, that provide exceeded knowledge, contain administration-specific content while the other half contain general technology-related topics.

As mentioned before, on average, only 37 hours are designated for teaching ICT skills. This is not even equivalent to a single full working week during the typical three-year degree program. Besides, half of the contents taught in this already limited time of 37 hours, deal with the teaching of basic ICT skills that should formerly have been taught in secondary school. In summary, it is clear that only few ICT competences are taught in the current degree programs and that the future digital transformation will therefore be a tough challenge for those graduates entering the German administration.

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List of abbreviations

Abbreviation	Explanation
B	Bavaria
BB	Brandenburg
BBRG	Beamtenrechtsrahmengesetz
BER	Berlin
BRE	Bremen
BW	Baden-Württemberg
DESI	Digital Economy and Society Index
DLGI	Dienstleistungsgesellschaft für Informatik mbH
DMS	Document Management System
ECDL	European Computer Driving Licence
ECTS	European Credit Transfer and Accumulation System
E-Files	Electronic files
E-Government	Electronic Government
EO	Executive Office
EU	European Union
FR	Federal Republic
GDPR	General Data Protection Regulation
GIS	Gesundheits-Informationssysteme
H	Hamburg
HE	Hesse
HRG	Hochschulrahmengesetz

Abbreviation	Explanation
HTML	Hypertext Markup Language
ICDL	International Certification of Digital Literacy
ICT	Information and Communications Technology
ISTE	International Society for Technology in Education
LS	Lower Saxony
MWP	Mecklenburg-Western Pomerania
NRW	North Rhine-Westphalia
RP	Rhineland-Palatinate
S	Saxony
SA	Saxony-Anhalt
SH	Schleswig-Holstein
SL	Saarland
T	Thuringia
WSQ	Workforce Skills Qualification

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1. Introduction

In 2022, Germany was ranked 13th out of the 27 European Union (EU) countries in the Digital Economy and Society Index (DESI) with 52.9 of 100 points and is thus in the top half of the EU countries.[1] The DESI looks at the dimensions of human capital, connectivity, integration of digital technology and digital public services.[2] However, in the area of digital public services, Germany only ranks 18th with approximately 63 out of 100 points, which falls below the EU average.[3]

At a state level, the Digital Municipality Index, which was determined by the *Kompetenzzentrum Öffentliche IT*, showed similar results for 2021.[4] The index is calculated by allocating an individual point value out of 20 for each of the areas: findability of information, usability of the municipality's website, and other offerings with regard to transparency and citizen participation.[5] A point value out of 40 is added to this for the area of provided online services, then adding all the points together to obtain a total index number out of 100 points.[6] The average Digital Municipality Index in 2021 was 53 out of 100 points.[7] Berlin achieved the highest value with 80.7 points, while Saxony-Anhalt had the lowest value with 38.6 points.[8]

Hence, it is clear that Germany needs to improve in the area of public administration digitalisation. These improvements are primarily being addressed by the average civil servant graduating from university, mostly from a specialised institution as demonstrated later. Therefore, the question arises as to what Information and Communication Technology (ICT) competences are taught in the typical administrative degree programs of the federal states and the federal republic in order to implement the desired improvements in administration digitalisation.

This question will be answered in the following thesis.

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[1] Cf. European Commission: DESI 2022, Thematic chapters, 2022, p. 19.
[2] ibid., p. 13.
[3] Cf. European Commission: DESI 2022, Digital public services, 2022, p. 4.
[4] Cf. Kompetenzzentrum Öffentliche IT: Deutschland Index der Digitalisierung 2021, 2021.
[5] ibid, p. 8f.
[6] ibid, p. 8f.
[7] Cf. Kompetenzzentrum Öffentliche IT: Digitale Kommune (Index), 2021.
[8] ibid.

2. Points of Analysis

To begin with analysing the ICT skills taught in German administrative degree programs, it is essential to identify which specific courses of study will be examined.

"Germany operates a system of universities, mostly universities of applied science, which are dedicated to the education of civil servants."[9] The aforementioned system includes nearly 40 universities with many different courses of study.[10]

This thesis focuses on the administrative degree programs which require a college entrance qualification to start the course of study and end with a bachelor's degree/diploma. Furthermore, all analysed degree programs are dual, which means they contain both theoretical and practical parts. The completion of these courses of study qualifies graduates to work in a specific career path in public administration.

Since the reform of the German federal system in 2006, the career group regulations for state civil servants, and a large part of higher education law, are the responsibility of the federal states[11] under article 70 of the German Fundamental Law.[12] This means that each federal state can make its own regulations within the framework of overarching federal laws. Due to this, most federal states have different career paths with different labels. Therefore, a proxy term was chosen for simplification in this thesis. The terminology from the federal law § 13 II Beamtenrechtsrahmengesetz (BBRG) was selected: Gehobener (Verwaltungs-) Dienst.[13] As there is no global and commonly used equivalent term in English, the "five civil service job grades"[14] of the United Kingdom are used. The "*Gehobener Verwaltungsdienst*" is, therefore, referred to the term Executive Office (EO).[15]

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[9] Müller-Török/Hemker: Digital Competences in Public Sector Education as a Prerequisite for e-Government, 2022, p. 46.

[10] Cf. Rektorenkonferenz der Hochschulen für den öffentlichen Dienst: Liste Hochschulen, n.d.

[11] Cf. Sturm: Kompetenzverteilung zwischen Bund und Ländern bei der Gesetzgebung, 2009.

[12] Cf. Bundesministerium der Justiz: Grundgesetz für die Bundesrepublik Deutschland, 1949.

[13] Cf. § 13 Beamtenrechtsrahmengesetz.

[14] Institute for Government: Grade structures of the civil service, 2017.

[15] Cf. ibid.

Each federal state, as well as the federal republic, has its own regulations, in addition to their own statutory orders regulating the career paths for state civil servants and a large part of higher education law. These are mostly training and examination regulations, which define which specific degree program(s) qualifies for being appointed to the EO in Germany. If a regulation states that there are several administrative degree programs that qualify for working in the EO, the one which is most general, i.e. without any particular specialisation, is selected for further research.

After determining which typical administrative degree programs, the federal states and the federal republic have, the focus will be on the different courses of study and their contents. In Germany, nearly every course of study has a so-called "module manual" that contains all teaching and examination modules for the course, the associated topics covered in these modules, as well as the scheduled time available for studying each module plus the credits achievable in the European Credit Transfer System (ECTS). "The ECTS is a points system used by universities and agreed by governments, that makes international education more easily comparable across borders."[16]

For the analysis of these module manuals, the focus will be on answering three research questions. The first step in evaluating the above-mentioned courses of study is to determine how many hours are devoted to teaching ICT skills. To classify this value, the amount of teaching ICT skills will be compared to the number of hours determined to teaching legal competences. This comparison results to a rough estimate of how much importance is laid on ICT skills based on how many hours are devoted to their teaching. This leads to the first research question: *How many hours of ICT skills are taught[17] in the selected administrative degree programs compared to legal competences?*

In addition to the temporal aspects of ICT modules, their content is also of particular interest. By analysing the module content of each degree program, it can be ascertained which skills taught are "basic ICT skills" and which exceed the basics.

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[16] Atack Patrick: What is the European Credit Transfer System (ECTS), 2022.
[17] *It is assumed that the hours in the module manual are effectively taught in full.*

To determine which competences are basic ICT skills, the International Certification of Digital Literacy (ICDL), which is a global standard for digital skills, is used as a yardstick.[18] The ICDL itself consists of 19 different modules that focus on various competences.[19] As the ICDL is a global standard, the contents of the modules are the same in all countries.[20] However, the labels of the modules may vary, which is why it makes sense to choose the labels of one country.[21] Since all of the degree programs examined are located in Germany, further research will refer to the ICDL Germany and its corresponding modules as well as its module labels.[22] The second research question therefore is: *Which of the taught ICT skills are considered "basic skills" by ICDL Germany and which exceed the basics?*

Those skills that go beyond will be clustered into categories. This approach makes it possible to find out which other dimensions of ICT knowledge are taught in the degree programs. Clustering also ensures a certain amount of clarity here. The cluster will then be analysed to determine which of the categories contain skills that are specifically taught for working in administration and which are technology-related in general. This results in the third and last research question: *Which of the ICT skills that exceed the basics are administration-specific and which are general technology-related?*

With these three questions in mind, the following thesis will examine the most general administrative degree program, i.e. the one without any particular specialisation, in each federal state, as well as the federal republic of Germany itself, in relation to its taught ICT competences.

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[18] Cf. ICDL Europe: About us, n.d.
[19] ibid.
[20] ibid.
[21] ibid.
[22] ibid.

3. The statutory orders

The first step of the analysis is to examine the various statutory orders of the federal states and the federal republic. With the aim of understanding why the individual federal states have different statutory orders, it is important to first understand the German federal system. A federal system describes "A system of government in which power is divided between a central, larger government and the local, regional, or state governments beneath it."[23]

In the case of Germany, the central government is the federal government and the local governments are those of the 16 individual federal states.[24] The constitutional framework in Germany is the "Grundgesetz" (or Basic Law) which regulates the legislative competences and responsibilities of the federal republic and the 16 federal states.[25] This consists of both exclusive and concurrent legislation. The federal states can only determine their legislation within the limits of the laws of the federal republic, i.e. within the competences assigned to them in the Basic Law.[26] In order to regulate their own legal affairs, the federal states enact either laws or statutory orders.[27] The hierarchy of norms must be observed here. This means that the Basic Law always takes precedence over the laws and statutory orders of the federal states.[28] Moreover, an enacted law takes precedence over a statutory order.[29]

Each of the examined regulations in the consecutive section is a statutory order. They are statutory orders and not laws, because they are enacted by a minister or the whole federal/federal state government, i.e., by an executive power, and not by a parliamentary assemble.[30] However, there are also different types of statutory orders. These variations within the orders will be discussed below.

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[23] Content Team: Federal Government, 2016.
[24] Cf. At a Glance - Federal Republic, n.d.
[25] Cf. Grundgesetz (Basic Law) Germany.
[26] Cf. At a Glance - Federal Republic, n.d.
[27] Cf. Bundesministerium für Gesundheit: Unterschied zwischen förmlichen Gesetzen und Rechtsverordnungen, 2016.
[28] ibid.
[29] ibid.
[30] Cf. Bundeszentrale für politische Bildung: Rechtsverordnung, n.d.

3.1 Type of statutory orders and their scope of regulation

Even though all the examined degree programs are dual administrative courses of study regulated by statutory orders, they can be separated into different types.

Thirteen of the federal states specify their career regulations through training and examination regulations: Baden-Württemberg (BW)[31], Brandenburg (BB)[32], Hamburg (H)[33], Hesse (HE)[34], Mecklenburg-Western Pomerania (MWP)[35], Lower Saxony (LS)[36], North Rhine-Westphalia (NRW)[37], Rhineland-Palatinate (RLP)[38], Saarland (SL)[39], Saxony (S)[40], Saxony-Anhalt (SA)[41], Schleswig-Holstein (SH)[42] and Thuringia (T).[43]

In contrast, this is regulated by a specialised ordinance in Bavaria (B).[44] The regulations for Bremen (BRE) can be found in the Bachelor examination regulations of the corresponding degree program.[45] The training and examination regulations for the EO in Bremen have been out of force since 2006 and are therefore no longer applicable.[46] In Berlin (BER), the regulations can be found in the study and examination regulations, which in turn were published in the newsletter of Berlin School of Economics and Law.[47] The regulations of the Federal Republic (FR) can be found in its "*Verordnung über den Vorbereitungsdienst für den gehobenen nichttechnischen Dienst in der allgemeinen und inneren Verwaltung des Bundes* (GntDAIVVDV)".[48]

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[31] Cf. APrOVw gD Baden-Württemberg.
[32] Cf. APOgD Brandenburg.
[33] Cf. APO-AllgVwD-LG2Ea1 Hamburg.
[34] Cf. APOgDPA Hesse.
[35] Cf. APOLg2E1AD M-V Mecklenburg-Western Pomerania.
[36] Cf. APVO-AD-VerwD Lower Saxony.
[37] Cf. VAP2.1 North Rhine-Westphalia.
[38] Cf. APOVwD-E2/3 Rhineland-Palatinate.
[39] Cf. APO g.D. AVD Saarland.
[40] Cf. SächsAVwDSozwDAPO Saxony.
[41] Cf. APVO AV LSA – LG 2, 1.EA Saxony-Anhalt.
[42] Cf. APO AV-LG 2/1 Schleswig-Holstein.
[43] Cf. ThürAPOgVwD Thuringia.
[44] Cf. FachV-nVD Bavaria.
[45] Cf. City University of Applied Sciences: Bachelorprüfungsordnung Bremen, 2011.
[46] Cf. Brem. APO g.a. VD Bremen.
[47] Cf. Berlin School of Economics and Law: Mitteilungsblatt, 2023.
[48] Cf. GntDAIVVDV Federal State.

The training and examination regulations of Lower Saxony[49] and Rhineland-Palatinate[50] are additional exceptions, because they state that there are multiple courses of study that can be completed to qualify for working in the EO. In Lower Saxony, there is even a selection of three various degree programs at two different universities.[51] In these two cases, the degree program that is selected for further analysis is the one that is most administratively common, i.e. without any specialisation. For LS it is the course of study *Allgemeine Verwaltung* at the *Kommunale Hochschule für Verwaltung in Niedersachsen* and for RLP it is *Allgemeine Verwaltung* at the University of Public Administration in Rhineland-Palatinate.

The analysis of the 17 different degree programs reveals that all but one course of study are taught at the official university of administration of the respective federal state/the federal republic.[52] The exception to this is Bremen. There, the Public Administration degree program is not offered at the Bremen University of Public Administration, rather at the City University of Applied Sciences.[53]

In order to summarise the results analysed in this section, the following table provides a concise overview of the degree programs, which in turn result from the corresponding statutory order, will be analysed more in depth.

Federal State	Statutory orders	Degree program
Baden-Württemberg	APrOVw g.D.	Public Management
Bavaria	FachV-nVD	Diplom-Verwaltungswirt
Berlin	SPO ÖV	Öffentliche Verwaltung
Brandenburg	APOgD	Öffentliche Verwaltung Brandenburg
Bremen	BPO	Public Administration
Federal Republic	GntDAIVVDV	Verwaltungsmanagement

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[49] Cf. § 28 I APVO-AD VerwD Lower Saxony.
[50] Cf. § 22 I APOVwD-E2/3 Rhineland-Palatinate.
[51] Cf. § 28 I APVO-AD VerwD Lower Saxony.
[52] Cf. Annex 2.2.
[53] Cf. City University of Applied Sciences: Dualer Studiengang Public Administration B.A., n.d.

Federal State	Statutory orders	Degree program
Hamburg	APO-AllgVwD-Lg2Ea1	Public Management
Hesse	APOgDPA	Public Administration
Mecklenburg-Western Pomerania	APOLg2E1AD	Öffentliche Verwaltung
Lower Saxony	APVO-AD-VerwD	Allgemeine Verwaltung
North Rhine-Westphalia	VAP2.1	Allgemeine Verwaltung
Rhineland-Palatinate	APOVwD-E2/3	Allgemeine Verwaltung
Saarland	APO g.D. AVD	Diplom Verwaltungswirt
Saxony	SächsAVwDSozwDAPO	Allgemeine Verwaltung
Saxony-Anhalt	APVO AV LSA – LG 2, 1.EA	Öffentliche Verwaltung
Schleswig-Holstein	APO AV-LG 2/1	Allgemeine Verwaltung/ Public Administration
Thuringia	ThürAPOgVwD	Kommunalverwaltung und staatliche allgemeine Verwaltung

Table 1: Overview of selected degree programs with corresponding statutory order and federal state[54]

After analysing the most general administrative degree program and its associated university from the statutory orders of each federal state and the federal republic, the question arises as to what the degree programs are about. The subsequent step therefore involves determining whether the statutory orders regulate minimum contents.

3.2 Minimum contents of the degree programs

The term minimum content describes topics that must be included in the degree program according to its statutory order. Neither the universities nor the students

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[54] Own illustration.

can deviate or choose from the listed contents, as they must be taught in a legally binding manner.[55]

The search for minimum contents in the corresponding statutory orders reveals that the 17 degree programs can be divided into three groups: (1.) those that define specific minimum contents, (2.) those that specify subject areas that need to be taught, (3.) and those that do not specify any of the above.

The first group (1.) includes those statutory orders that define four minimum contents: Law, Administrative Sciences, Economics and Social Sciences/Studies.[56] ICT-related topics belong to the field of administrative sciences.[57] This first group consists of BW[58], NRW[59], RLP[60] and SH.[61]

The second group (2.) lists specific areas of competence or subject areas from which content must be included in the degree programs. It consists of eight federal states B[62], BB[63], H[64], MWP,[65] LS[66], SL[67], SA[68], T[69], and the federal republic.[70] However, these subject areas differ depending on the federal state.

Three of those statutory orders require four areas of study: Law, Administrative Sciences, Economics and Social Sciences.[71] ICT topics count as Administrative

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[55] Cf. Bundeszentrale für politische Bildung: Rechtsverordnung, n.d.
[56] Cf. § 18 III APrOVw gD Baden-Württemberg, § 9 II VAP2.1 North Rhine-Westphalia, § 24 APOVwD-E2/3 Rhineland-Palatinate, § 11 II APO AV-LG 2/1 Schleswig-Holstein (Own translation).
[57] ibid.
[58] Cf. § 18 III APrOVw gD Baden-Württemberg.
[59] Cf. § 9 II VAP2.1 North Rhine-Westphalia.
[60] Cf. § 24 APOVwD-E2/3 Rhineland-Palatinate.
[61] Cf. § 11 II APO AV-LG 2/1 Schleswig-Holstein.
[62] Cf. § 23 II FachV-nVD Bavaria.
[63] Cf. § 13 APOgD Brandenburg.
[64] Cf. § 7 V APO-AllgVwD-Lg2Ea1 Hamburg.
[65] Cf. § 9 II APOLg2E1AD M-V Mecklenburg-Western Pomerania.
[66] Cf. § 10 APVO-AD-VerwD Lower Saxony.
[67] Cf. § 18 III + IV APO g.D. AVD Saarland.
[68] Cf. § 10 II APVO AV LSA – LG 2, 1.EA Saxony-Anhalt.
[69] Cf. § 2 II Nr. 1 ThürAPOgVwD Thuringia.
[70] Cf. § 7 II + III GntDAIVVDV Federal Republic.
[71] Cf. § 9 II APOLg2E1AD M-V Mecklenburg-Western Pomerania, § 10 APVO-AD-VerwD Lower Saxony, § 18 III + IV APO g.D. AVD Saarland (Own translation).

Sciences.[72] These three statutory orders belong to MWP[73], LS[74] and SL[75], and their four mandatory subject areas describe the same thematic fields as the legally prescribed minimum contents of the first group.

The remaining statutory requirements of the second group all demand three areas of study: Law, Economics (and Finances), plus some sort of Administrative/Social Sciences.[76] Despite the three areas of study that these federal states have in common, there are differences in the further areas of study that are regulated by the individual statutory orders. Two statutory orders contain ICT topics that belong to the area of Administrative Sciences: Bavaria[77] and Thuringia.[78] The statutory orders of Hamburg and the Federal Republic do not mention ICT competences.[79] The regulation of Hamburg adds the area of study labelled "Other".[80] This area consists of topics that cannot be firmly assigned to one of the other subject disciplines.[81] The special feature of the federal republic's degree program in turn is that the competence area of English and the area of Human Resources and Intercultural Action are taught additionally.[82]

Finally, yet importantly, there is the third group. Their statutory orders define neither minimum content nor areas of study or anything similar. This group includes BER[83], BRE[84], HE[85] and Saxony.[86]

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[72] Cf. ibid.
[73] Cf. § 9 II APOLg2E1AD M-V Mecklenburg-Western Pomerania.
[74] Cf. § 10 APVO-AD-VerwD Lower Saxony.
[75] Cf. § 18 III + IV APO g.D. AVD Saarland.
[76] Cf. § 23 II FachV-nVD Bavaria, § 2 II Nr. 1 ThürAPOgVwD Thuringia, § 7 V APO-AllgVwD-Lg2Ea1 Hamburg, § 7 II + III GntDAIVVDV Federal Republic (Own translation).
[77] Cf. § 23 II FachV-nVD Bavaria.
[78] Cf. § 2 II Nr. 1 ThürAPOgVwD Thuringia.
[79] Cf. § 7 V APO-AllgVwD-Lg2Ea1 Hamburg, Cf. § 7 II + III GntDAIVVDV Federal Republic.
[80] Cf. § 7 V APO-AllgVwD-Lg2Ea1 Hamburg.
[81] ibid.
[82] Cf. § 7 II + III GntDAIVVDV Federal Republic.
[83] Cf. Berlin School of Economics and Law: Mitteilungsblatt, 2023.
[84] Cf. City University of Applied Sciences Bremen: Bachelorprüfungsordnung Bremen, 2011.
[85] Cf. APOgDPA Hesse.
[86] Cf. SächsAVwDSozwDAPO Saxony.

4. Analysis of the selected degree programs

After the one standard administrative degree program, the associated statutory order and, if applicable, the minimum contents have been analysed for each federal state and the federal republic itself, the ensuing step is to focus on the modules of the courses of study. For this purpose, the module manuals or curricula of the individual degree programs are examined more in-depth. The aim here is to focus on two different groups of modules: the modules that include ICT competences and those that include legal competences. The emphasis will be on their respective content and time requirements, in order to compare them at the end. The first step for this is to look for the module manuals online at the websites of the universities.

There are only two module manuals that could not be found completely online. First is the one of the federal republic. The Federal University of Applied Administrative Sciences only makes the module manual from the second through to the last semester available online,[87] so, a request was made for the module manual from the first semester. In response, a document with the relevant information about the first semester was sent.[88] The second such case was that of Saarland, where there is no module manual to be found online at all.[89] After a request was made to the responsible person, several Excel spreadsheets with the modules, their contents and their time requirements were made available.[90]

Subsequently, all the module manuals/curricula were collected, so that it was possible to start with an analysis. At first glance, it appears that the majority of the examined universities offer a bachelor degree in public administration or public management. Some of these, on the other hand, offer a diploma program. As mentioned above, all degree programs have one thing in common: they are dual courses of study, which means they have both a theoretical and a practical part.

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[87] Cf. Federal University of Applied Administrative Sciences: Modulhandbuch, 2022.
[88] Cf. Annex 1.2.
[89] Cf. Fachhochschule für Verwaltung des Saarlandes: Allgemeiner Verwaltungsdienst, 2020.
[90] Cf. Annex 1.1, including 1.1.1 to 1.1.8.

The average duration of these degree programs is three years.[91] Exceptions to this are Berlin[92], Brandenburg[93], and Saxony-Anhalt[94], because the duration of their courses of study is three and a half years. Since these three degree programs have a longer duration, they are also accredited with more points in the ECTS, namely 210 instead of 180 credits.[95] One ECTS corresponds to a workload of 30 hours of time.[96] The only exception to this is Hesse, where one ECTS corresponds to a workload of 28 hours.[97]

The majority of the degree programs have several practical parts, which all together last twelve months.[98] There are only four exceptions to this. Baden-Württemberg has a practical phase of 14 months.[99] The practical phase of Bavaria[100], Hesse[101] and Thuringia[102] has a duration of 15 months.

Another thing that was noteworthy during the analysis is that the time requirements in most module manuals are given in teaching units of 45 minutes.[103] Since the common form for time indication is hours, all time data used for further analysis was therefore stated in terms of hours, which corresponds to 60 minutes.

4.1 Teaching hours

With this information in mind, the subsequent step is to compare the different modules and their time requirements. The examination of the modules revealed a difficulty. There are both mandatory and elective modules in all the study programs examined. The mandatory modules are obligatory and must therefore be completed by every student. With the elective modules, students can choose which modules

[91] Cf. Hemker/Müller-Török: (Zu) Wenig Digital-Kompetenzen in der Ausbildung für die öffentliche Verwaltung, 2023, p. 90.
[92] Cf. Berlin School of Economics and Law: Mitteilungsblatt - § 4 I SPO ÖV HWR Berlin, 2023.
[93] Cf. § 7 I APOgD Brandenburg.
[94] Cf. § 7 I APVO AV LSA – LG 2, 1.EA Saxony-Anhalt.
[95] Cf. Berlin School of Economics and Law: Mitteilungsblatt - § 4 I SPO ÖV HWR Berlin; Cf. § 11 III APOgD Brandenburg; § 10 I APVO AV LSA – LG 2, 1.EA Saxony-Anhalt.
[96] Cf. ibid.
[97] Cf. University of Applied Sciences Hesse: Modulbuch, 2022, p. 139.
[98] Cf. Hemker/Müller-Török: (Zu) Wenig Digital-Kompetenzen in der Ausbildung für die öffentliche Verwaltung, 2023, p. 91.
[99] Cf. § 18 II Nr. 2 APrOVw gD Baden-Württemberg.
[100] Cf. § 42 II FachV-nVD Bavaria.
[101] § 8 II APOgDPA Hesse.
[102] Cf. § 15 I ThürAPOgVwD Thuringia.
[103] Cf. Hemker/Müller-Török: (Zu) Wenig Digital-Kompetenzen in der Ausbildung für die öffentliche Verwaltung, 2023, p. 91.

they want to take. This thesis focuses only on mandatory content, because electives chosen by students may of course contain ICT content, but they are, as their names suggests, not mandatory. Hence, it is possible to complete the degree program and start working in the Public Administration without this knowledge acquired. So, with the aim of bringing a certain structure into this thesis, only mandatory and no elective modules will be examined.

Before starting the analysis of the teaching hours, it must be noted that a small calculation error was found in the module manual of Saxony's degree program *Allgemeine Verwaltung*. The module manual states that the module *IT-gestützte Verwaltungsorganisation* has a temporal scope of 104 teaching units. According to the module manual, this corresponds to 77 hours[104], but 104 teaching units of 45 minutes each actually correspond to 78 hours of 60 minutes each.

The following table provides a graphical overview, and therefore summarises which ICT modules are included in each of the examined degree programs. It also shows how much time both ICT and legal modules take up per course of study.[105]

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[104] Cf. Hochschule Meißen (FH) und Fortbildungszentrum: Bachelorstudiengang Allgemeine Verwaltung, 2021, p. 25.
[105] *The time will be given in hours of 60 minutes each.*

Degree program + (Federal State)	ICT module	Hours of time ICT module	Hours of time legal competences
Public Management (BW)	E-Government und Verwaltungsinformatik	48,75 h	540 h
Diplom-Verwaltungswirt (B)	Informations- und Kommunikationstechnik (+DMS)	58,5 h	517,5 h
Öffentliche Verwaltung (BER)	Digitalisierung in der Verwaltung	40,5 h	243 h
Öffentliche Verwaltung Brandenburg (BB)	Informationsmanagement	45 h	540 h
Public Administration (BRE)	Verwaltungswissenschaften – E-Government und IT	22,5 h	472,5 h
	Controlling-Anwendungen in ERP am Beispiel SAP	22,5 h	
Verwaltungsmanagement (FR)	Betriebswirtschaftliche Grundlagen des Verwaltungshandelns, Organisation und Informationsverarbeitung (partly)	21 h	687 h
Public Management (H)	Einführung in die Informationstechnologie	24 h	360 h
	Grundlagen des E-Governments	24 h	
	Datenbanken	24 h	
	IT-Aspekte der Digitalisierung I	24 h	

Degree program + (Federal State)	ICT module	Hours of time ICT module	Hours of time legal competences
Public Administration (HE)	-	-	538 h
Öffentliche Verwaltung (MWP)	Information und Kommunikation (partly)	18 h	861 h
Allgemeine Verwaltung (LS)	-	-	735,75 h
Allgemeine Verwaltung (NRW)	E-Government/ Wissensmanagement (partly)	9 h	745,5 h
Allgemeine Verwaltung (RLP)	Informationstechnik	24,75 h	540,35 h
Diplom Verwaltungswirt (SL)	Informations- und Kommunikationstechnologie	60 h	791,3 h
Allgemeine Verwaltung (S)	IT-gestützte Verwaltungsorganisation	78 h	722 h
Öffentliche Verwaltung (SA)	Verwaltungsreformen: Modernisierung & Digitalisierung (partly)	30 h	600 h
Allgemeine Verwaltung/ Public Administration (SH)	E-Government	16,5 h	363 h
Kommunalverwaltung und staatliche allgemeine Verwaltung (T)	Informations- und Kommunikationstechnologie	45 h	967,5 h

Table 2: Degree programs with their ICT modules and time scopes for ICT and legal modules[106]

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[106] Own illustration. For further details: Cf. Annex 2.2.

The table *(cf. Table 2)* consists of four coloumns. The first column states which degree program of which corresponding federal state is analysed. The second column shows which ICT modules the degree programs contain, while the third column states how many hours of time are spent on teaching these. The last column comparatively displays how many hours are used for teaching legal competences in the corresponding degree program. In summary, it can be seen that between zero and four ICT modules are taught per degree program.[107] In addition, the table already reveals that the number of teaching hours for legal competences is many times higher than the number of teaching hours for ICT competences.[108]

	ICT (hours of time)	Legal competences (hours of time)
Baden-Württemberg	48,75	540
Bavaria	58,5	517,5
Berlin	40,5	243
Brandenburg	45	540
Bremen	45	472,5
Federal Republic	21	687
Hamburg	96	360
Hesse	0	538
Mecklenburg-Western Pomerania	18	861
Lower Saxony	0	735,75
North Rhine-Westphalia	9	745,5
Rhineland-Palatinate	24,75	540,35
Saarland	60	791,25
Saxony	78	722
Saxony-Anhalt	30	600
Schleswig-Holstein	16,5	363
Thuringia	45	967,5
AVERAGE	37	601

Figure 1: Heat mapping - Hours of time heatmapped per column[109]

In order to examine the temporal aspects more closely, the respective hours of teaching time per module group are compared in a separate table *(cf. Figure 1)*. Each column of the table is marked on a colour scale from green to red using conditional formatting. This is also referred to as heat mapping. The smaller the number, the redder the cell and the larger the number, the greener the cell.[110]

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[107] Cf. Annex 2.2/table 2.
[108] ibid.
[109] Annex 2.3.
[110] Cf. Annex 2.3/figure 1.

The heat mapping shows that the time requirements for the ICT modules range from 0 to 96 hours, whereas the time requirement of the law-related modules is between 243 and 968 hours.[111] Therefore, the first difference that can be noted between the two examined areas is that each of the degree programs contains modules that teach legal competences, but not all contain ICT modules.[112]

The ensuing step is to compare the average values of teaching hours in each examined area. For the ICT modules, the average is 37 hours in total.[113] In comparison, the average value for law-related modules is 601 hours during the course of study.[114] This comparison shows that the average value of hours for teaching law-related modules is 16 times as large as the value for ICT modules.[115] A further comparative calculation shows that, even if you compare the biggest value of ICT teaching hours (96h) with the smallest value of law-related teaching hours (243h), it does not even equal 40%.[116] Moreover, the highest value of ICT teaching hours (96h) does not represent 16% of the average value of teaching hours in law-related topics (601h).[117] A comparison of the maximum ICT teaching hours (96h) with the maximum legal competences hours (968h) in their respective courses shows that the ICT value does not even correspond to 10%.[118]

In summary, the analysis shows that the examined degree programs, on average, use less than one working week of a civil servant[119] to teach ICT competences. Another result is that, when comparing the average teaching time in hours, the time spent on modules that teach legal competences is approximately 16 times as big as the time for teaching ICT modules.[120] Furthermore, it is interesting to see that while every degree program includes law-related compulsory modules, there are two

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[111] Annex 2.2.
[112] ibid.
[113] Cf. Annex 2.3/figure 1.
[114] ibid.
[115] Cf. Annex 2.3.
[116] ibid.
[117] ibid.
[118] ibid.
[119] A German civil servant's working week comprises between 40 and 42 working hours.
  Cf. dbb beamtenbund und tarifunion: Deutsche Beamte arbeiten am längsten, 2017.
[120] Cf. Annex 2.3.

courses of study (Lower Saxony and Hesse) that do not include any compulsory modules in ICT topics.[121]

In order to classify the results correctly, it must be clarified that the given time values are only served to determine the temporal scope of the taught topics. Just because a module includes many teaching hours does not necessarily mean that many relevant topics are taught. Just as well, many relevant topics can be taught in little time. Therefore, the subsequent step is to examine the content of the selected ICT modules more closely in order to perform a more precise comparison of the degree programs with each other. In this further analysis, only the ICT modules and no module that teaches legal competences will be examined in detail, as the thesis only focuses on the taught ICT skills.

4.2 Module contents

With the intention of finding out the exact contents of the ICT modules, the module manuals are reviewed again. A closer look is taken at each ICT module to examine and document its contents.

To record the results a new Excel spreadsheet is created. This table consists of four columns: Federal state, modules, hours of time and exact topics of the modules.[122] Each of the exact topics is numbered with a consecutive number so that the corresponding topic of the ICT module can be identified more easily in further analyses or diagrams. If the table is read from left to right, it displays which contents each study program of a federal state contains.

Federal State	Modules	Hours of time	Exact topics of the modules
Baden-Württemberg	E-Government und Verwaltungsinformatik	48,75	1. Funktionsweise von Computern 2. Funktionsweise des Internets 3. Interoperabilität 4. Sicherheit 5. Datenbanken samt Datenmodellierung

Figure 2: Excerpt: Contents of E-Government und Verwaltungsinformatik[123]

The excerpt from the table inserted here shows, for instance, that the module *E-Government und Verwaltungsinformatik* is taught in the selected administrative

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[121] Cf. Annex 2.3.
[122] Annex 2.4.
[123] More information: Cf. Annex 2.4.

degree program in Baden-Württemberg. This module has a time requirement of 48.75 hours. The ensuing column contains the contents of the module, such as the topic of databases or interoperability. The documentation of all the contents shows that, on the whole, 19 ICT modules are taught in the courses of study. All contents taken together, the 19 ICT modules contain 162 topics.[124]

At this point, it must be noted that not all modules have been fully considered. Some modules contain other topics in addition to ICT, which is why only the ICT part of the module was contemplated. For this purpose, the percentage of the module that includes ICT was estimated on the basis of the listed contents and time scales in the module manuals. This calculated share of hours was then noted in the table.[125]

The listing of all contents of the corresponding modules shows at first glance that there is a wide-ranging variety of topics. They reach from classic Microsoft Basics, such as working with spreadsheets or presentations, Computer Basics, Networks, Internet, IT-Management, IT-Security and Hardware to E-Government, digitalisation and many more contents.[126] All ICT topics from the module manuals can be found in the annex.[127]

The listing of contents already makes it clear that there are many different topics with various levels of difficulty and depth. For a better classification, the consecutive chapters will therefore analyse which of the topics comprise basic knowledge and which extend that.

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[124] ibid.
[125] Cf. Annex 2.2.
[126] Cf. Annex 2.4.
[127] Additional information: Cf. Annex 2.4.

5. ICDL Mapping

To determine which topics are basic ICT skills, the ICDL is used as a yardstick. As already mentioned, the ICDL is the International Certification of Digital Literacy.[128] The ICDL, previously known as the European Computer Driving Licence (ECDL), was founded in 1995 with the aim[129] "to examine how to raise the levels of digital literacy throughout Europe."[130] It defines certain modules and their contents, which are considered to be basic ICT skills.[131] Over the years the ECDL Foundation continued to expand all over the world until finally, in 2019, they launched[132] "a new brand identity […] at an event in Brussels. Along with a new look, several new ICDL modules were announced."[133] The ICDL itself is nowadays "available in over 100 countries around the world."[134] Each of those 100 countries have their own test centres and some, such as the ICDL Germany, even have their own regional website.[135]

Five of the 19 ICDL modules occur multiple times: Once to learn the basics and once to acquire advanced knowledge. An example of this is the module that focuses on working with spreadsheets, which is part of both the Workforce Base modules and the Advanced modules, allowing learners to acquire both basic and advanced skills in this area.[136] The contents of these 19 different modules are all based on so-called "Syllabi". Syllabi are curricula that contain the learning goals of each module.[137] This ensures that a module basically contains the same learning goals, regardless of the various countries in which it is taught.[138] However, despite containing similar contents, the module labels often vary across countries.[139]

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[128] Cf. ICDL Europe: About us, n.d.
[129] ibid.
[130] ICDL Europe: About us, n.d.
[131] Cf. ibid.
[132] ibid.
[133] ICDL Europe: About us, n.d.
[134] ICDL Europe: ICDL in your country, n.d.
[135] Cf. ibid.
[136] Cf. ICDL Europe: ICDL Workforce; ICDL Professional, n.d.
[137] Cf. ICDL Germany: Häufige Fragen, n.d.
[138] Cf. Natascha Pilger: ICDL Deutschland, 2023. (Cf. Annex 4).
[139] ibid.

The ICDL was chosen as ta yardstick due to its global presence in more than 100 countries.[140] Moreover, it has existed since 1995, although not to the current extent and under the current name.[141] In addition to that, the advantage of the ICDL is that the modules cover the same content in all countries, which is uniformly defined in the syllabus.[142] This uniformity ensures the greatest possible comparability between the various countries.

Another reason why the ICDL was chosen as a benchmark is because it is widely recommended and mapped by numerous organisations and initiatives around the world to align with their programs and qualifications.[143] One example of a country that has mapped the ICDL is Singapore. "Since 2011, the ICDL program has been mapped to the Workforce Skills Qualification (WSQ) Employability Skills ICT Framework"[144] of Singapore. Besides, the ICDL was "recognised with the ISTE Seal of Alignment"[145] in 2017. ISTE is the abbreviation for International Society for Technology in Education.[146] "ISTE is a membership organisation that is committed to educational technology. Based in the United States, but active around the world, it maintains the ISTE Standards to provide a framework that helps educators transform learning with technology."[147]

Since the ICDL modules are to be compared with the contents of the ICT modules of German administrative degree programs, these should also be compared with the ICDL of Germany and its modules. Consequently, the labels and contents of the ICDL Germany will be used for further analysis. For better readability, ICDL Germany will not be written out each time in the following sections, but rather only the term ICDL will be used as a proxy.

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[140] Cf. ICDL Europe: About us, n.d.
[141] ibid.
[142] Cf. ICDL Germany: Häufige Fragen, n.d.
[143] Cf. ICDL Europe: Recognitions, n.d.
[144] ICDL Europe: Recognitions, n.d.
[145] ibid.
[146] ISTE: About, n.d.
[147] ibid.

5.1 ICDL Germany

The ICDL of Germany, operated by the *Dienstleistungsgesellschaft für Informatik mbH (DLGI)*[148], consists of 19 different modules.[149] These modules can be assigned to two superordinate categories: The ICDL Workforce Modules and the ICDL Professional Modules.[150] The ICDL Workforce Modules cover basic digital competences for everyday work, whereas the ICDL Professional Modules cover the learning of advanced digital skills.[151]

Both superordinate categories can be divided into subcategories, which in turn are composed of different modules. In the consecutive sections, the subcategories for each superordinate group will be named. Afterwards, the contents of the modules will be explained briefly.

The ICDL Workforce Modules are divided into the ICDL Workforce Base and the ICDL Workforce Modules.[152]

1.	2.	3.	4.
Computer & Online Essentials	Textverarbeitung	Tabellenkalkulation	Präsentationen
Workforce Base	Workforce Base	Workforce Base	Workforce Base

Figure 3: ICDL Workforce Base modules[153]

The Workforce Base Modules *(cf. Figure 3)* include the following four modules: Computer & Online Essentials (1.), Documents (2.), Spreadsheets (3.) and Presentations (4.).[154] The Computer & Online Essentials module is about teaching "skills in file management, networking, online communication and -information and IT-security".[155] The Documents module deals with the creation, editing and formatting of text documents. [156]

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[148] Cf. ICDL Germany: Impressum, n.d.
[149] Cf. ICDL Germany: Module, n.d.
[150] ibid.
[151] ibid.
[152] ibid.
[153] ICDL Germany: Module, n.d.
[154] ibid.
[155] ICDL Germany: Computer & Online-Essentials, n.d. (Own translation).
[156] Cf. ICDL Germany: Textverarbeitung, n.d.

It also aims to teach the use of tables and graphics, as well as spell-checking in Microsoft Word.[157] The handling of tables is to be taught in the module of Spreadsheets. The skills taught range from creating and editing data to formatting it and using formulas.[158] The last of the Workforce Base Modules deals with presentations. Here the focus is on giving presentations, formatting them and making them interesting.[159] Basics such as layouts, transitions, creating diagrams and using the spell checker are taught.[160]

Figure 4: ICDL Workforce modules[161]

The Workforce modules *(cf. Figure 4),* in turn, include the four Workforce Base Modules mentioned above plus the subsequent three modules: Digital Teamwork Essentials (5.), IT- Security (6.) and Data Protection (7.).[162]

The Digital Teamwork Essentials module "introduces the concept of remote working, a model of working in a location away from a central office."[163] The IT-Security module covers how to identify risks and threats at an early stage.[164] This includes topics such as malware, password regulations, data backup, etc.[165] Finally, data protection is introduced. Here, the students are taught the legal framework

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[157] Cf. ICDL Germany: Textverarbeitung, n.d.
[158] Cf. ICDL Germany: Tabellenkalkulation, n.d.
[159] Cf. ICDL Germany: Präsentationen, n.d.
[160] ibid.
[161] ICDL Germany: Module, n.d.
[162] Cf. ICDL Germany: ICDL Workforce, n.d.
[163] ICDL Germany: Digitale Zusammenarbeit Grundlagen, n.d. (Own translation).
[164] Cf. ICDL Germany: IT Sicherheit, n.d.
[165] ibid.

conditions of the GDPR as well as the technical framework conditions that should be implemented in the organisation.[166]

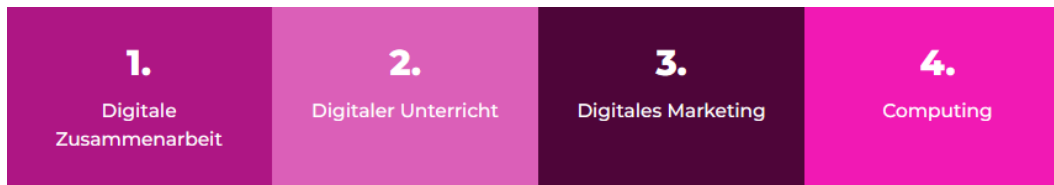The ICDL Professional Modules are divided into the Digital Professional, Professional and Advanced Professional Modules.[167]

Figure 5: ICDL Digital Professional modules[168]

The Digital Professional modules *(cf. Figure 5)* consist of the four modules: Digital Teamwork (1.), Digital Teaching (2.), Digital Marketing (3.) and Computing (4.).[169] The first module is Digital Teamwork, which "teaches competences applicable to professional as well as school collaboration and introduces tools and platforms that can be used for effective digital collaboration."[170] The Digital Teaching module is aimed at showing teachers how to make pedagogical use of technology and digital media to enhance their teaching.[171]

The Digital Marketing module teaches the "essential knowledge and fundamental concepts of digital marketing."[172] Finally, the Computing module is about teaching the knowledge "needed for 'computer thinking' and programming to develop small simple computer programs."[173]
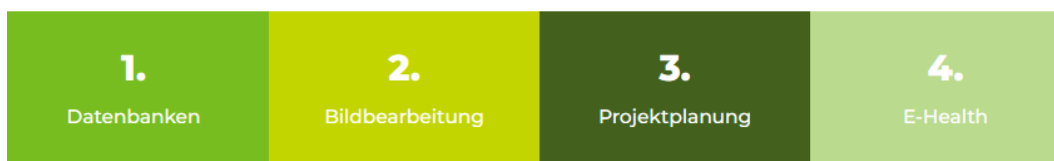

Figure 6: ICDL Professional modules[174]

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[166] Cf. ICDL Germany: Datenschutz, n.d.
[167] Cf. ICDL Germany: Module, n.d.
[168] ICDL Germany: Module, n.d.
[169] ibid.
[170] ICDL Germany: Digitale Zusammenarbeit, n.d. (Own translation).
[171] Cf. ICDL Germany: Digitaler Unterricht, n.d.
[172] ICDL Germany: Digitales Marketing, n.d. (Own translation).
[173] ICDL Germany: Computing, n.d. (Own translation).
[174] ICDL Germany: Module, n.d.

The Professional modules *(cf. Figure 6)* include the following modules: Databases (1.), Image Editing (2.), Project Planning (3.) and E-Health (4.).[175]

The Databases module "covers the elements and structure of databases and the essential knowledge and skills needed to create and competently use a database."[176] The Image Editing module deals with the "basics of image editing and the essential knowledge and skills needed to edit digital images with an image editing program and to prepare them for printing or for use on the internet."[177] The project planning module, as the name suggests, is about acquiring essential knowledge and skills in project management.[178] "The e-health module is aimed at health workers who use health information systems (GIS) in administration, medical care, nursing or care."[179]

| 1. | 2. | 3. | 4. |
| Advanced Textverarbeitung | Advanced Tabellenkalkulation | Advanced Datenbanken | Advanced Präsentationen |

Figure 7: ICDL Advanced Professional modules[180]

The ICDL Advanced Professional modules *(cf. Figure 7)* consist of the four advanced modules: Documents (1.), Spreadsheets (2.), Databases (3.) and Presentations (4.).[181] The four advanced modules are about imparting advanced knowledge that builds on those of the Base modules. The syllabus requirements are significantly higher than those of the basic modules.[182]

Each module has its own fields of knowledge and learning objectives, which can be viewed on the module's sub-website.[183] In addition, each module has a downloadable catalogue of learning objectives according to the unified syllabus.[184]

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[175] Cf. ICDL Germany: Module, n.d.
[176] ICDL Germany: Datenbanken, n.d. (Own translation).
[177] ICDL Germany: Bildbearbeitung, n.d. (Own translation).
[178] Cf. ICDL Germany: Projektplanung, n.d.
[179] ICDL Germany: E-Health, n.d. (Own translation).
[180] ICDL Germany: Module, n.d.
[181] Cf. ICDL Germany: ICDL-Professional Module, n.d.
[182] Cf. ICDL Germany: Advanced Textverarbeitung; Advanced Tabellenkalkulation; Advanced Datenbanken; Advanced Präsentationen, n.d.
[183] Cf. e.g. ICDL Germany: Advanced Textverarbeitung, n.d.
[184] ibid.

This document is more detailed and again breaks down the knowledge areas of the website into several specific learning objectives[185], which adds another level of detail to the knowledge and makes it clear what content is being taught in concrete terms.[186]

5.2 The procedure

After examining which categories and which associated modules the ICDL Germany comprises, the next step is ICDL Mapping. For this, both the subcategories and the associated modules were written into an Excel spreadsheet. In the ensuing step, the topics of the ICDL modules – which resulted from the learning goals of the website of the individual module – were noted for the respective ICDL modules. Subsequently, all 162 topics of the ICT modules of the degree programs were looked through one by one. For each topic covered, it was considered whether it fitted into one of the ICDL modules and its contents. If this was the case, the number of the topic was written in the column of the federal state and the row of the corresponding module.

Module categories	Modules	Content of the module	BW
ICDL Workforce Modules	1. Computer & Online Essentials (Workforce Base)	Computer & Endgeräte (Hard- und Software) Netzwerke (Netzwerkgrundlagen, Netzwerkzugriff)	1, 4, 14, 36

Figure 8: Excerpt: Result of the ICDL Mapping[187]

This excerpt shows that four topics from the module manual of the degree program from Baden-Württemberg belong to the Computer & Online Essentials module. In addition, the contents of the corresponding ICDL module, such as networks or hardware and software, are listed. Furthermore, the table shows that the module belongs to the Workforce Base modules, which in turn is part of the module category of ICDL Workforce modules.[188]

At this point it is important to mention that the topics of some modules include both ICDL Basics and topics beyond. In these cases, the topic is assigned to what the majority of it belongs to. Additionally, in the area of Microsoft Basics, i.e.

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[185] Cf. e.g. ICDL Germany: Advanced Textverarbeitung, n.d.
[186] Cf. e.g. ICDL Germany: Computer & Online Essentials, Syllabus 1.0, n.d.
[187] Annex 2.5.
[188] Cf. ibid.

spreadsheets, documents & presentations with the Microsoft Applications, it is very difficult to derive from the module manuals how profound the taught knowledge is. If the assignment is not clearly recognisable from the module manuals, the topic is assigned to both levels of difficulty, i.e. to the basic as well as to the advanced module.

If a corresponding topic of the degree program does not match any of the ICDL modules, it is noted into a separate table. This table consists of the three columns: Federal state, number and description. An example of this can be found in the following *Figure 9*.

Federal State	Number	Description
SL	150	Adobe Acrobat und PDF

Figure 9: Excerpt: Topics that go beyond ICDL[189]

Figure 9 shows that the topic with the consecutive number 150, which is taught in SL and deals with Adobe Acrobat and PDF, does not match any of the ICDL modules, which is why it was noted into the table of topics that exceed basic ICDL knowledge.

5.3 ICDL Mapping results

The subsequent section presents the results of the ICDL Mapping. The first outcome is that not all degree programs cover ICDL topics. Two groups can be distinguished here. Hesse and Lower Saxony form the first group. None of the two administrative degree programs examined in these federal states include the teaching of any ICT competences.[190] This means that neither ICDL basic skills nor any topic beyond that is taught.[191]

The second group consists of Berlin, Bremen, North Rhine-Westphalia, Saxony-Anhalt, Schleswig-Holstein and the Federal Republic.[192] These five federal states, as well as the federal republic itself, teach ICT competences in their courses of

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[189] Cf. Annex 2.6.
[190] Cf. Annex 2.2.
[191] ibid.
[192] Cf. Annex 2.5.

study, but none of the topics covered, however, count as basic knowledge according to the ICDL.[193]

The upcoming section will now look at those federal states whose modules include ICDL basic skills. For each module, the mapping shows in which federal state the corresponding topics are taught. The consecutive table summarises the results graphically.[194] The columns marked in blue indicate the federal states that do not teach any ICDL content.[195] All orange-coloured rows, on the other hand, mark these ICDL modules that do not appear in any of the examined degree programs.[196] The numbers in the cells correspond to those consecutive numbers in the table of module contents (*cf. Figure 2*).[197] The results are subsequently described in more detail.

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[193] Cf. Annex 2.5.
[194] Cf. Figure 10.
[195] Cf. Annex 2.5/figure 10.
[196] ibid.
[197] Cf. Annex 2.4.

Module categories	Modules	BW	B	BER	BB	BRE	FR	H	HE	MVP	LS	NRW	RP	SL	S	SA	SH	T
ICDL Workforce Modules	1. Computer & Online Essentials (Workforce Base)	1, 4, 14, 36	13f., 16-23, 25, 27, 31, 33-35, 37f.					76, 81-83					119	145-148				137-141
	2. Textverarbeitung (Workforce Base)		39, 41					78		111			115, 117	149, 159	121			
	3. Tabellenkalkulation (Workforce Base)		39, 41					77		109, 110			115	149				143
	4. Präsentationen (Workforce Base)		39							111								
	5. Digitale Zusammenarbeit Grundlagen		40					82, 86, 90							124			
	6. IT-Sicherheit	4	16, 26., 29f., 32		62			101, 105		112				152f.				141
	7. Datenschutz	8																
ICDL Digital Professional Modules	1. Digitale Zusammenarbeit							78, 82, 86, 90										
	2. Digitaler Unterricht																	
	3. Digitales Marketing																	
	4. Computing																	
ICDL Advanced Professional Modules	1. Advanced Textverarbeitung		39, 41					78		111			117	149, 159	121			
	2. Advanced Tabellenkalkulation		39, 41					77		110				149				
	3. Advanced Datenbanken	5						93-99							125, 131			
	4. Advanced Präsentationen									111				149				
ICDL Professional Modules	1. Datenbanken	5	42					93					116		125			
	2. Bildbearbeitung																	
	3. Projektplanung	6				57												
	4. E-Health																	

Figure 10: Summary ICDL Mapping results[198]

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[198] Cf. Annex 2.5.

As the table shows, contents of the Computer and Online Essentials module are taught in BW, B and H as well as in RLP, SL and T.[199] The three Microsoft Essential modules (Documents, Spreadsheets & Presentations) are largely taught in the same federal states. Topics belonging to these modules can be found in B, MWP, RLP, SL and T.[200] The exceptions are H and S, where only document and spreadsheet competences are trained, but no presentation skills.[201] Topics belonging to the module Digital Teamwork Essentials are taught to students in B, H and S only.[202] The IT-security and Data Protection modules are tutored in BW, BB, MWP, RLP and SL respectively.[203] In the states of B, H and T, on the other hand, content is only taught on the topic of IT-security and not on data protection.[204]

Of the ICDL Digital Professional modules, only topics from the module digital teamwork appear in the module handbooks/curricula of the degree programs and that again only in Hamburg.[205] In the area of advanced Microsoft skills, the topics documents and spreadsheets are trained similarly to the basic modules in B, H, MWP, SL and S.[206] In RLP, only advanced knowledge in the area of documents is taught.[207] Advanced presentation skills are only taught in MWP and SL.[208] Both basic and advanced database skills are trained in BW, H and S.[209] In B and RLP, only basic knowledge in the field of databases is taught.[210] The last examined module is Project Planning. The content of this is taught in BW as well as in BB.[211]

This examination of the respective modules shows that not all ICDL modules are part of the investigated degree programs. The contents of the five modules: Digital Teaching, Digital Marketing, Computing, Image Editing and E-Health are not taught in any of the analysed courses of study.[212] Although not all ICDL modules

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[199] Cf. Annex 2.5.
[200] ibid.
[201] ibid.
[202] ibid.
[203] ibid.
[204] ibid.
[205] ibid.
[206] ibid.
[207] ibid.
[208] ibid.
[209] ibid.
[210] ibid.
[211] ibid.
[212] ibid.

are taught in the degree programs, the question arises whether there is at least one ICDL module that is taught in all courses of study.

Since the degree programs in Hesse and Lower Saxony do not include ICT modules at all, it is clear that they do not cover ICDL topics either.[213] Consequently, there can be no ICDL module that is taught in all courses of study. However, even if only the remaining degree programs are considered, all of which include ICT modules, no ICDL module is covered in all of them. The modules that come closest are documents, spreadsheets and IT-security.[214] Each of these three modules is taught in 7 of 17 degree programs.[215] This corresponds to approximately 41% of all degree programs examined and about 47% of courses of study that include ICT modules.[216]

Another important finding of the ICDL Mapping is that each of the ICDL Workforce and ICDL Workforce Base modules are taught in at least three of the examined degree programs.[217] The smallest value here forms the Digital Teamwork Essentials module, which is taught in the degree program of the three federal states Bavaria, Hamburg and Saxony.[218] The highest value are the three above-mentioned modules: documents, spreadsheets and IT-security, which are taught in seven degree programs.[219] Lastly, the mapping shows that 79 of 162 topics belong to the ICDL modules and their contents.[220] This means that approximately 49% of the topics taught are basic ICT skills according to the ICDL Germany.[221] This leaves 83 themes that go beyond the basic ICDL skills.[222]

In summary, it can be said that half of the examined degree programs teach ICDL basic skills. Moreover, not all ICDL modules are covered in the degree programs and there is no ICDL module that is covered in all the courses of study. After the ICDL Mapping, 83 of 162 topics remain that exceed basic ICDL knowledge.

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[213] Cf. Annex 2.2.
[214] Cf. Annex 2.5.
[215] ibid.
[216] ibid.
[217] ibid.
[218] ibid.
[219] ibid.
[220] ibid.
[221] ibid.
[222] Cf. Annex 2.6.

6. Clustering further competences

The following chapter will take a closer look at the 83 remaining topics. It is interesting to see into which possible categories the remaining subjects can be clustered. Since the topics are contents of administrative degree programs, the question also arises which of the competences are taught specifically to qualify for future work in administration.

6.1 The procedure

To cluster these remaining topics in an appropriate way, the bottom-up method is used. The term "bottom-up method" is mainly used in the field of corporate management and project planning. The idea here is that a decision is not only made by the top management level, but that the corresponding employees below are also allowed to participate bottom-up in the decision-making process.[223]

Clustering the remaining topics is not such a decision with management and employee level as mentioned above, but a procedure that is, however, also carried out bottom-up. It follows that the subjects are clustered from the bottom up. In that case, this means that no fixed categories are defined in advance to which the contents are assigned. Instead, the topics that are similar are clustered together and afterwards it is decided which category they will form. This allows the categories to be named as precisely as possible. In addition, the approach makes it possible to address the individual subjects, thus allowing the categories to be developed in a more suitable and better tailored manner. To name the final categories, the terms from chapter four of Catakli's work were used as a guide.[224] The terms "digital organisation management"[225], "digital process management"[226] and "technological knowledge"[227] were taken directly from this chapter.[228]

For simplicity and in order to give a quick overview, the results of this bottom-up cluster are presented graphically in a mind map.[229]

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[223] Cf. Team Asana: Top-down-Management vs. Bottom-Up-Management, 2021.
[224] Catakli: 2021.
[225] ibid., p.197 (Own translation).
[226] ibid., p. 196 (Own translation).
[227] ibid., p. 179 (Own translation).
[228] ibid., p. 177-216.
[229] Cf. Annex 3.

6.2 Clustering further competences: results

This bottom-up clustered mind map consists of eight different categories: "Digital process management"[230], "Digital (organisation) management"[231], E-Government, Electronic Files (e-Files) & document management system (DMS), Internet-Law, Specialised applications, Administration-specific competences and "Technological knowledge".[232] Between 2 and 29 topics are assigned to each of the categories.[233]

Most of the topics that are clustered belong to one category, but eight suited two different ones. They are therefore assigned to both categories in the mind map *(cf. Figure 11)*. This can be seen from the connecting arrows as well as from the two corresponding colours of the topic fields.[234]
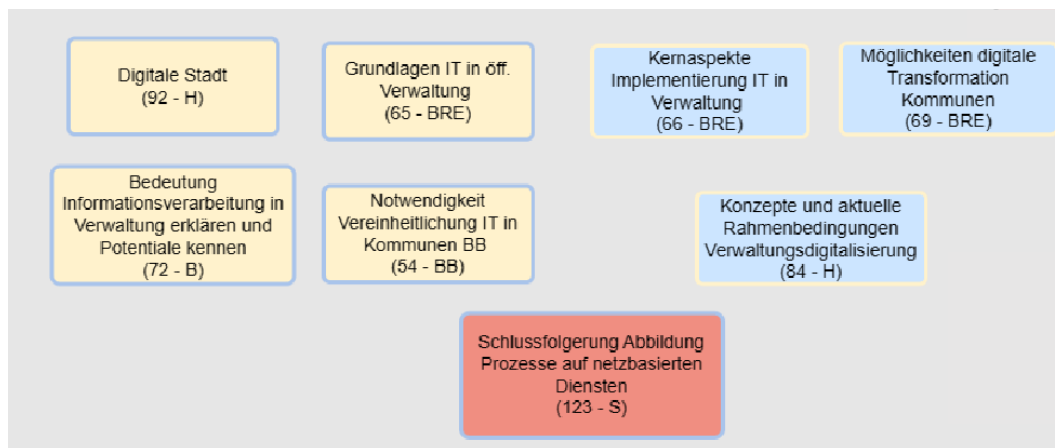
Figure 11: Topics that belong to two different categories[235]

After this has been clarified, the individual dimensions of the mind map will be explained in more detail below. First, there is a figure of the respective dimension and the associated topics. Then, the category and its contents are described in more detail.

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[230] Catakli: 2021, p.196 (Own translation).
[231] Cf. ibid, p. 197 (Own translation).
[232] ibid, p. 179 (Own translation).
[233] Cf. Annex 3.
[234] Cf. Annex 3/figure 11.
[235] Annex 3.
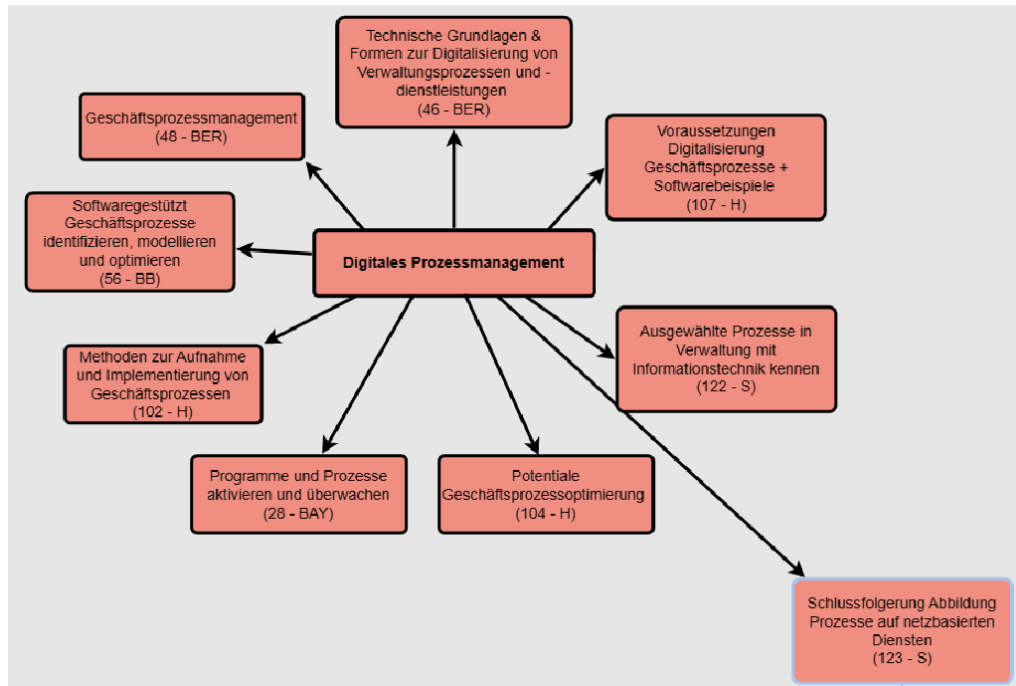
The first category, which is shown in *Figure 12*, deals with "digital process management".[237] Process management is about "identifying, designing, implementing, controlling, improving and documenting"[238] processes. Since this category is about "digital process management"[239], the focus is on implementing the process management just described with the help of digital means. An example of this would be the use of software to model and subsequently improve an existing process.

Nine topics are assigned to this category.[240] One third of the topics are taught in Hamburg.[241] This is followed by Berlin and Saxony, where two subjects are taught each.[242] Lastly, are Bavaria and Brandenburg, which each teach one topic.[243] The topics in this category range from the optimisation of existing systems to business process optimisation and implementation as well as getting to know the

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[236] Annex 3.
[237] Catakli: 2021, p. 196 (Own translation).
[238] Vienken: Prozessmanagement, 2021 (Own translation).
[239] Catakli: 2021, p. 196 (Own translation).
[240] Cf. Annex 3.
[241] ibid.
[242] ibid.
[243] ibid.

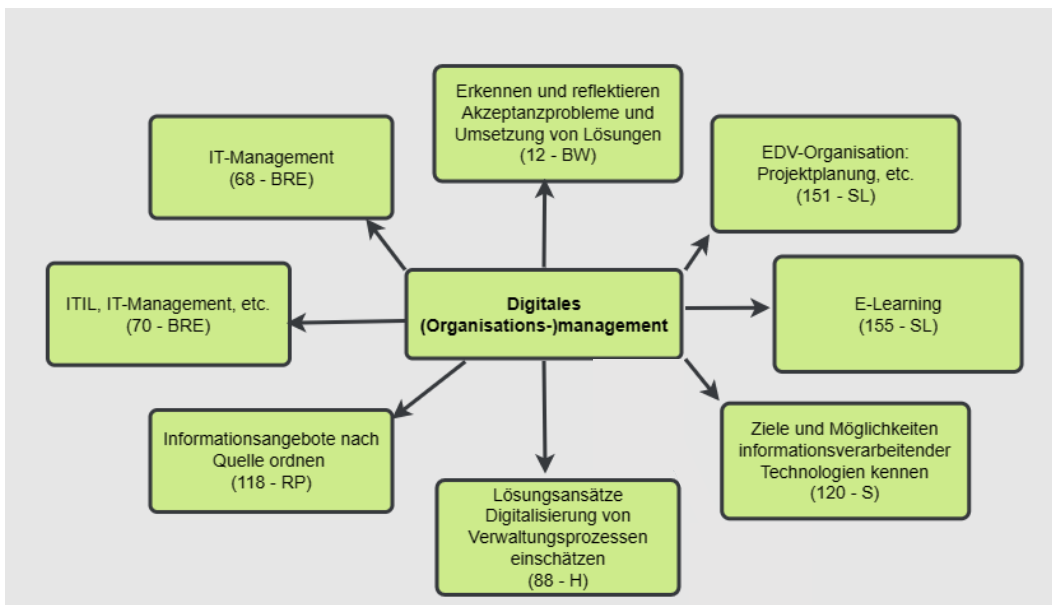requirements for the digitalisation of business processes and some software examples.[244]

Figure 13: Category 2 - Digital (organisation) management[245]

The second category of "digital organisation management"[246], which is shown in *Figure 13* is about managing the organisation digitally as efficiently and effectively as possible.[247] In addition, employees should be properly empowered for their tasks, for instance with the help of information technologies.[248]

A total of eight themes from six different federal states are assigned to this category.[249] BRE and SL share the highest value with two topics each.[250] BW, H, RLP and S fall behind with one topic each in this area.[251] The subjects assigned to this category range from IT-Management over e-Learning and project management to solving acceptance problems in the implementation of new technologies or systems.[252]

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[244] Cf. Annex 3.
[245] Annex 3.
[246] Catakli: 2021, p. 197 (Own translation).
[247] Cf. Organization Management, n.d.
[248] ibid.
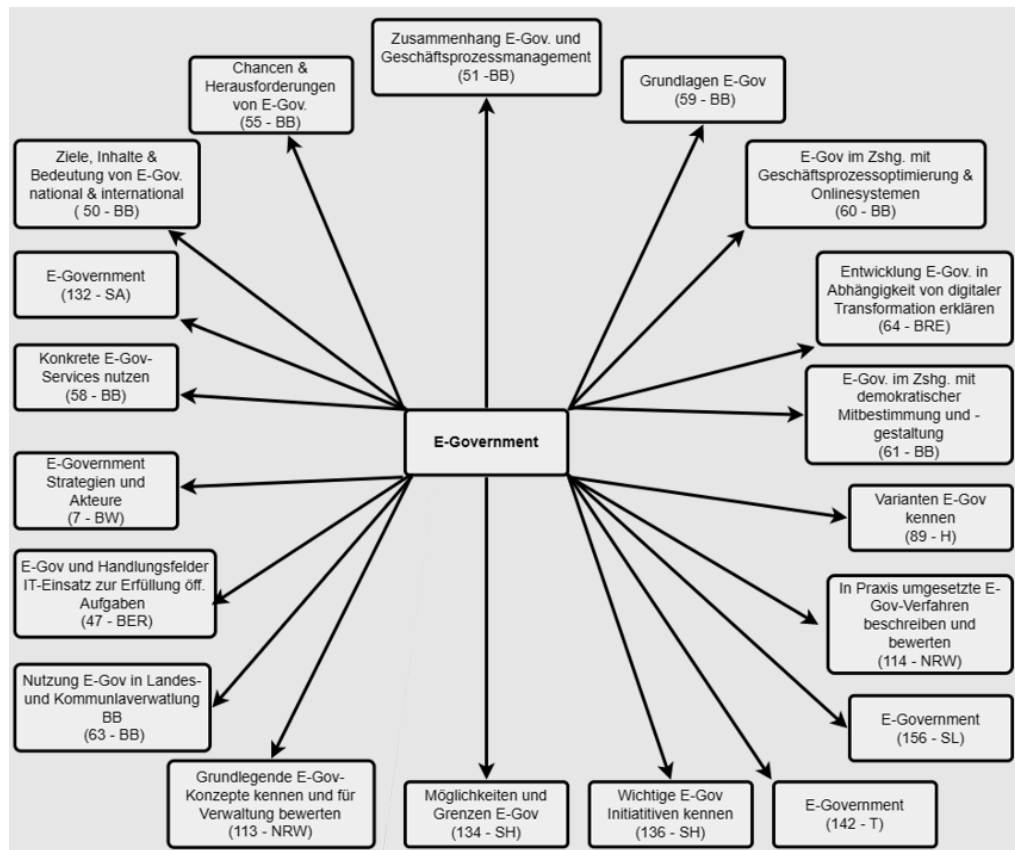[249] Cf Annex 3.
[250] ibid.
[251] ibid.
[252] ibid.

Figure 14: Category 3 - E-Government[253]

The third category is e-Government *(cf. Figure 14)*, which is the abbreviation for electronic Government.[254] This is about the general use of more IT technology and electronic media in government and administrative processes.[255] Also, the authorities should communicate with each other and with citizens electronically.[256] One example of e-Government in Germany is the tax return, which can be submitted electronically via the ELSTER portal.[257]

This category forms the second largest of the eight, as it includes a total of 19 topics.[258] The front-runner is BB with eight topics, while BW, BER, H, SL, SA and T lag with only one topic each.[259] The midfield is formed by NRW and SH with

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[253] Annex 3.
[254] Cf. Textwerkstatt JSinger/ Klein: Was ist E-Government?, 2017.
[255] ibid.
[256] ibid.
[257] Cf. ELSTER: ELSTER, eine Erfolgsstory, n.d.
[258] Cf. Annex 3.
[259] ibid.

exactly two topics each.[260] The content taught in this category in the degree programs ranges from the definition and best practices to chances and challenges of e-Government, the using of E-Government Services and understanding the connection of this dimension with others.[261]
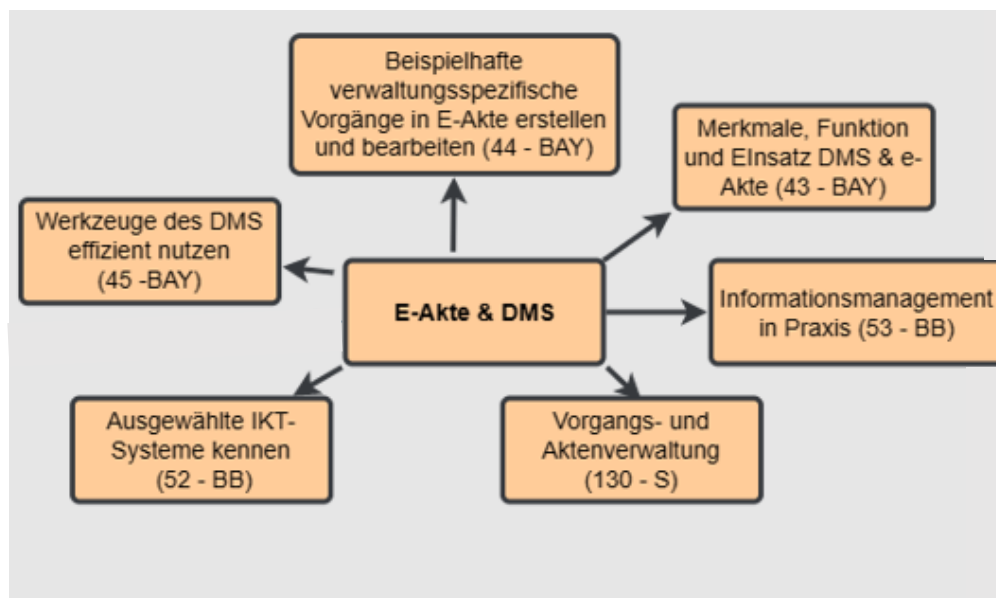

Figure 15: Category 4 - E-Files and DMS[262]

The fourth category, which is shown in *Figure 15*, deals with the topic of e-Files and DMS. The e-File is about the digital storage of paper files in a document management system.[263] This DMS makes it possible to systematically process and store files, which saves time and money.[264]

Six different topics from a total of three different federal states are assigned to this category.[265] B tops the list with three themes.[266] This is followed by BB with two subjects and finally Saxony with one theme.[267] The topics in this category are about

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[260] Cf. Annex 3.

[261] ibid.

[262] Annex 3.

[263] Cf. IBM: What is document management?, n.d.; Cf. Ginn: What is a Document Management System?, 2022.

[264] ibid.

[265] Cf. Annex 3.

[266] ibid.

[267] ibid.

learning what is meant by case and file management as well as learning how to use it correctly and efficiently.[268]
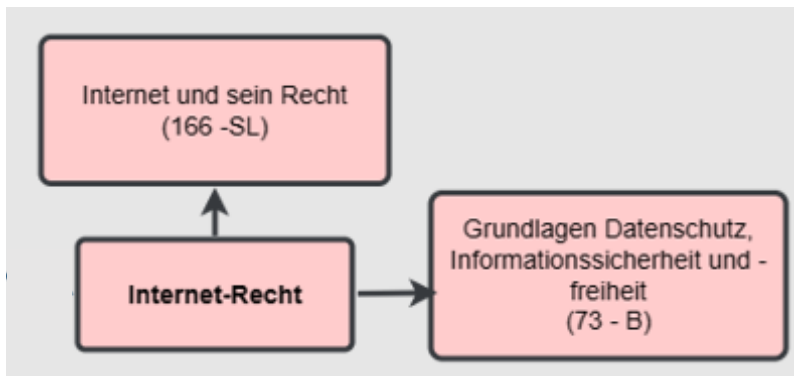

Figure 16: Category 5- Internet law[269]

The category of internet law *(cf. Figure 16)* is, as the name suggests, about law on the internet. It comprises exactly two topics.[270]

Firstly, the Internet and its law in the course of study of SL and secondly, the basics of data protection, information security and information freedom in the degree program of the federal republic.[271] This category thus forms the smallest of the eight.[272]
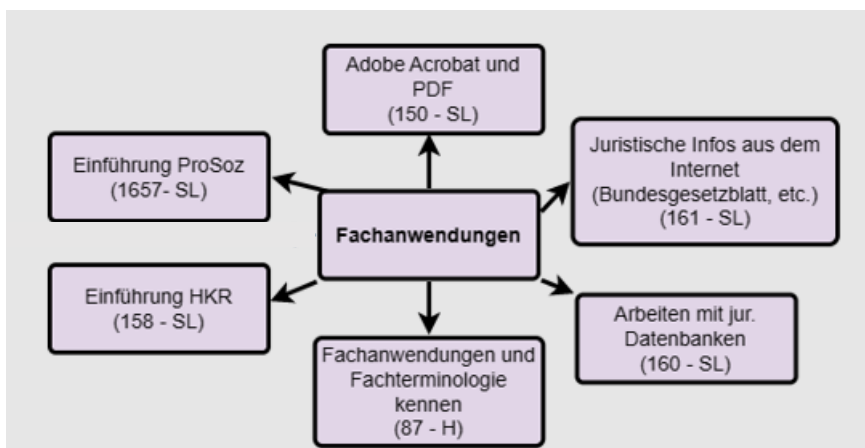

Figure 17: Category 6 - Specialised applications[273]

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[268] Cf. Annex 3.
[269] Annex 3.
[270] Cf. ibid.
[271] ibid.
[272] ibid.
[273] Annex 3.

The sixth category, which is shown in *Figure 17*, deals with specialised applications that the employees of the administration use for their daily work.[274] There are many different specialised applications, which can vary greatly both in the municipalities and in the individual federal states.[275]

Exactly six subjects are taught in the area of specialised applications: five of them in SL and one of them in H.[276] In the context of this category, students should therefore get to know and use the selected specialised applications and also familiarise themselves with the corresponding specialised terminology. One example of this are the specialised applications from the company ProSoz, with which students are familiarised as part of their administrative studies in Saarland.[277] ProSoz develops various software to digitalise the processes of the administration.[278] At this point it must be noted, that training in the usage of software products bears the risk that the students learn to use one special software and, given the administration opts for another software later, is at least ex-post partly in vain.
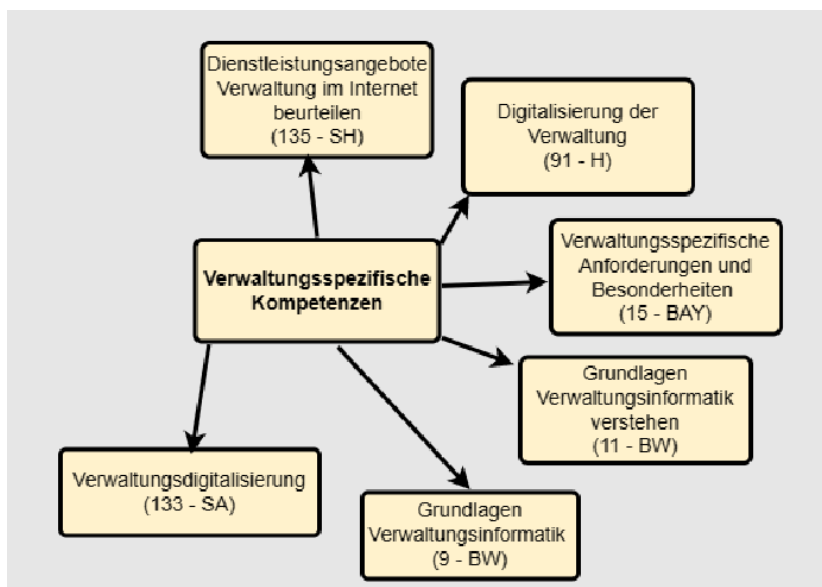

Figure 18: Category 7 - Administration-specific competences[279]

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[274] Cf. Annex 3.
[275] Cf. Keitel: Fachverfahren, in: Südwestdeutsche Archivalienkunde, 2017.
[276] Cf. Annex 3.
[277] ibid.
[278] Cf. ProSoz: Lösungen, n.d.
[279] Annex 3.

The ensuing category *(cf. Figure 18)* includes administration-specific competences.[280] A total of 13 topics are taught in this area.[281] BRE and H have the highest value with three topics.[282] BW follows directly behind with two.[283] Lastly, are B, BB, FR, SA and SH, each with one topic in this category.[284]

The themes of this group are about becoming familiar with subjects that play a role specifically in administration. An example of this is administrative informatics or the digitalisation of the administration.[285]
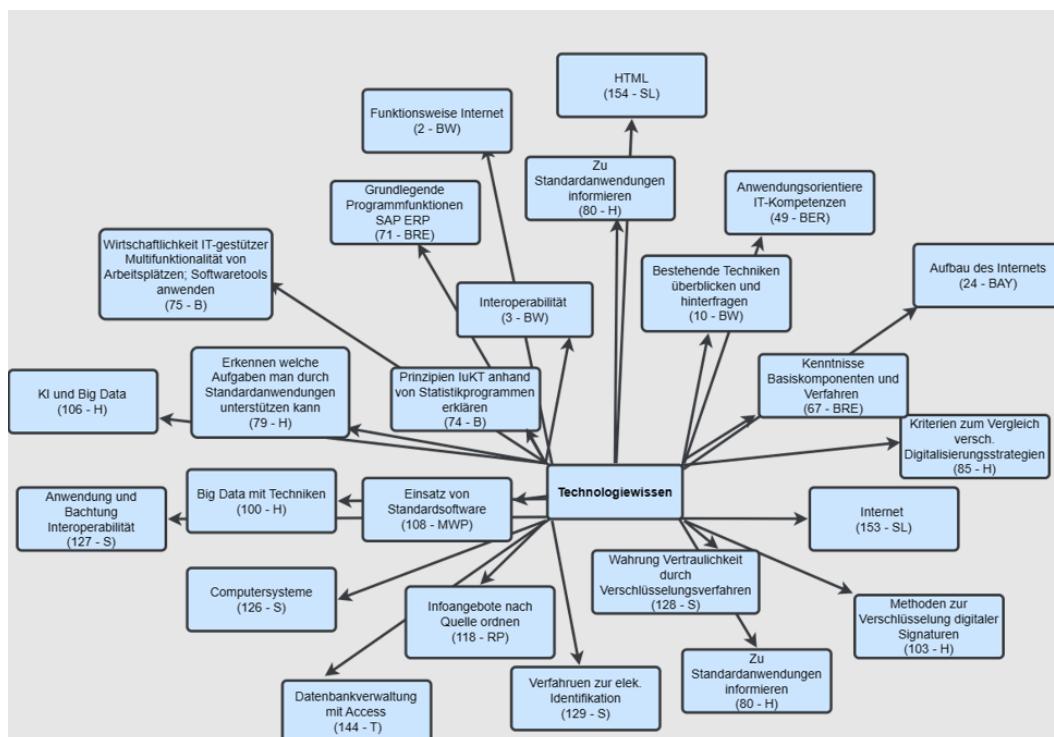

Figure 19: Category 8 - Technological knowledge[286]

The last and largest category, which is shown in *Figure 19*, is "technological knowledge".[287] According to the dictionary, technology is "the branch of knowledge that deals with the creation and use of technical means and their

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[280] Cf. Annex 3.

[281] ibid.

[282] ibid.

[283] ibid.

[284] ibid.

[285] ibid.

[286] Annex 3.

[287] Catakli: 2021, p. 179 (Own translation).

interrelation […]".[288] "Technological knowledge"[289] thus refers to the knowledge of technical means and their connections or even linkage possibilities with other dimensions.[290]

The category includes topics from eleven different federal states.[291] H is at the top with eight topics.[292] In the middle are SA with five, BRE with four, BW with three and the FR as well as SL with two.[293] Bringing up the rear are B, BER, MWP, RLP and SH with one each. In total, 29 topics are assigned to the category.[294] This group of "technological knowledge"[295] contains many different subjects that all have something to do with technology, sometimes in the narrower and sometimes in the broader sense. [296] The themes range from interoperability and the structure of the internet over Hypertext Markup Language (HTML) and Big Data within technologies to the process for electronic identification and many more.[297]

Now that the clustering is complete, the 83 topics have been grouped into 8 different categories. It remains to be said that there is a great diversity of subjects. However, since all these themes come from administrative degree programs and are intended to prepare the respective students for the future challenges of administrative digitalisation, the question arises as to which of the clustered topics are more administration-related and which are rather general technology-related. This question will be answered in the subsequent section.

6.3 Classification: administration-specific or technology-related

Before classifying whether a category is administration-specific or technology-related, a definition of the two terms should be given. This ensures a certain clarity and comprehensibility here.

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[288] Dictionary.com-Redaktion: Technology, n.d.
[289] Catakli: 2021, p. 179 (Own translation).
[290] Cf. Dictionary.com-Redaktion: Technology, n.d.
[291] Cf. Annex 3.
[292] ibid.
[293] ibid.
[294] ibid.
[295] Catakli: 2021, p. 179 (Own translation).
[296] ibid.
[297] Cf. Annex 3.

The term administration-specific in this thesis, covers all knowledge that is taught specifically for later work in the administration. This is knowledge that is not used outside the administration. In contrast, the term technology-related, in this thesis, refers to all the other knowledge that has something to do with technology but can be applied in both, for working in the administration and for working in the private sector, for example.

Administration-specific	Technology-related
E-Government	Digital process management
E-Files and DMS	Digital organisation management
Specialised applications	Internet law
Administration-specific competences	Technological knowledge

Table 3: Classification administration-specific or technology-related[298]

As the table shows, the category administration-specific includes the topics of e-Government, e-Files and DMS, specialised applications and administration-specific competences.

As the term e-Government already implies, this category is administration-specific. It is about making the administration more digital with the help of electronic means and since this is about the design of the administration, the category is clearly administration-specific.[299] The area of e-Files and DMS is also administration-specific because an e-File of this type primarily exists in the administration. Within the framework of the document management system, processes and files are structured and filed.[300]

The third category deals with specialised applications. Since these are specialised applications that only the employees of the administration use in their daily work, it is logical that this category is also administration-specific. Lastly, the category of administration-specific competences contains topics that are, as the name already

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[298] Own illustration.
[299] Cf. Textwerkstatt JSinger/ Klein: Was ist E-Government?, 2017.
[300] Cf. Ginn: What is a Document Management System?, 2022.

suggests, specifically needed in the administration. Therefore, this category is also clearly administration-specific.

The remaining categories, i.e. "digital process management"[301], "digital organisation management"[302], internet law and "technological knowledge"[303] are consequently technology-related *(cf. table 3)*. Firstly, "digital process management"[304] is technology-related. It involves using digital means to design processes in the best way possible.[305] Since there are processes both in companies and in the administration, this category also belongs to the technology-related ones. The "digital organisation management"[306] is about managing an organisation digitally as efficiently and effectively as possible.[307] This can be done in an administration as well as in a company and is therefore not administration-specific, but technology-related.

The internet is used by both administrations and businesses, so its law is relevant to both. Therefore, this category is technology-related, as it indirectly refers to the technology of the internet. Lastly, the category of "technological knowledge"[308] is, as the name suggests, technology-related. All kinds of technical topics are covered here. However, this knowledge can be applied both in administration and in the private sector.

The classification showed that half of the categories are administration-specific and the other half are technology-related.

6.4 Summary of the clustering

In summary, the 83 topics that exceed the basic knowledge of the ICDL Germany were clustered bottom-up into eight categories. A closer look at the cluster shows that the majority of topics can be assigned to the category of "technological knowledge".[309] Furthermore, the analysis reveals that half of the categories deal

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[301] Catakli: 2021, p. 196 (Own translation).
[302] ibid., p. 197 (Own translation).
[303] ibid., p. 179 (Own translation).
[304] ibid., p. 196 (Own translation).
[305] Cf. Vienken: Prozessmanagement, 2021.
[306] Catakli: 2021, p. 197 (Own translation).
[307] Cf. Organization Management, n.d.
[308] Catakli: 2021, p. 179 (Own translation).
[309] ibid, p. 179 (Own translation).

with administration-specific knowledge, while the other half deals with technological knowledge in general.

This observation is supported by the examination of the clustered topics themselves. It displays that 44 of these deal with administration-specific knowledge, while 49 pertain to basic technological knowledge. Topics that belong to two categories were here added to both.

Moreover, the clustering shows that none of the categories appear in every course of study. Excluding the two degree programs of HE and LS which do not cover any ICT topics, there is still no category that is contained in all degree programs.[310] The category that comes closest to this is technological knowledge, which appears in 11 of the 17 programs examined.[311] Finally, when comparing the number of clustered topics per federal state, it is evident that H performs the best in this comparison with 17 topics, whereas T and MWP fall behind with 1 clustered topic each.[312]

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[310] Cf. Annex 3.
[311] ibid.
[312] ibid.

7. Conclusion

Now that the analysis of the degree programs and their ICT skills has been completed, the most important key statements will briefly be summarised and the three research questions from the beginning will be answered.

The first finding is that the federal states as well as the federal republic each have their own statutory orders with a different scope of regulation. Some specify the degree program, others the higher education institution, and some even specify certain minimum contents for their courses of study. The analysis of the most typical administrative degree program of each federal state and the federal republic also revealed that all examined courses of study contain law-related modules, but not all teach ICT-related modules.[313] In the administrative degree programs of Lower Saxony and Hesse, no ICT skills are taught at all.[314]

After further analysis of the ICT modules, the first research question, namely how many hours of ICT skills are taught in the selected administrative degree programs compared to legal competences, can be answered. The result is that, on average, 37 hours of ICT skills and 601 hours of legal competences are taught.[315] Generally, almost 16 times as many hours are spent on teaching legal competences as on ICT modules.[316] The range of hours spent teaching ICT skills varied from 0 to 96 hours, while the range for legal competences is from 243 to 968 hours.[317]

A more detailed analysis of the previously examined ICT modules answers the second research question about which ICT skills comprise basic skills according to ICDL Germany and which go beyond that. It turns out that about half of the degree programs, namely 9 out of 17, teach basic skills according to ICDL.[318] Of all the topics that make up the content of the ICT modules, 79 out of 162 subjects belong to basic skills according to ICDL.[319] The remaining 83 topics go beyond basic knowledge.[320] Additionally, it can be seen that even without the two degree

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[313] Cf. Annex 2.2.
[314] ibid.
[315] Cf. Annex 2.3.
[316] ibid.
[317] ibid.
[318] Cf. Annex 2.5.
[319] ibid.
[320] Cf. Annex 2.6.

programs, which do not teach ICT skills anyway, there is no single ICDL module that is taught in all courses of study.[321] Moreover, not all ICDL modules are taught in each of the degree programs.[322]

If the number of degree programs that teach basic skills according to ICDL and the ones that teach topics that go beyond are compared, it can be seen that 9 out of 17 programs teach basic skills, whereas 15 out of 17 courses teach skills that exceed basic knowledge.[323] Conversely, this means that almost half of the degree programs do not teach basic skills, but almost 90% of all courses of study teach topics that go beyond basic skills.[324] The only exceptions to this are the two degree programs, namely LS and HE, that do not teach ICT skills anyway.[325]

Even though there are topics that go beyond basic knowledge in more degree programs, a closer look at the clustering of these topics reveals that none of the eight categories appears in every degree program, even without taking into account the two that do not teach any ICT skills.[326] The contents that come closest to this are of the category "technological knowledge"[327], which are contained in 11 of 17 degree programs.[328]

Also, the third research question, that deals with which of the ICT skills beyond the basic ICDL skills are administration-specific and which are general technology-related, is answered. The clustering shows that half of the remaining topics are administration-specific and the other half are general technology-related.[329] This means that half of the advanced ICT skills are taught specifically with regard to the students' future work in administration.

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[321] Cf. Annex 2.5.
[322] ibid.
[323] Cf. Annex 2.5 & 2.6.
[324] ibid.
[325] Cf. Annex 2.3.
[326] Cf. Annex 3.
[327] Catakli: 2021, p.179 (Own translation).
[328] Cf. Annex 3.
[329] Cf. Table 3.

In my opinion, it is very alarming to see that the examined degree programs do not even spend one working week, on average, teaching ICT skills. Even more shocking is that two degree programs do not even spend a moment on teaching ICT skills.

Moreover, half of the taught ICT topics deal with basic skills according to the ICDL which should already be known from secondary school. I think the problem here is that in most federal states there is no continuous compulsory subject in school that teaches ICT skills, so the students already lack basic digital skills. These skills are then taught inefficiently during the administrative degree programs.

From my perspective, it is therefore absolutely not surprising that the digitalisation of Germany's administration is even below EU average. The future employees of the administration are certainly not taught many basic ICT skills, neither at school nor at university, so logically they cannot implement a contemporary digitalisation.

Furthermore, I consider it very worrying that the federal states do not seem to agree on which topics should be taught in order to be well positioned in terms of ICT skills in the future. None of the ICDL or the clustered topics beyond appear in all degree programs, although topics related to e-Government, for instance, affect all the federal states as well as the federal republic.

In order to be able to compete with other countries in the future and to advance digitalisation in Germany, the curricula and module manuals of the degree programs should be urgently improved. In any case, more ICT skills should be taught, as these will form the basis for everything in the digitalised world of the future. Not even one working week of time for teaching ICT skills at the administrative degree programs is therefore far too little.

8. Critical appraisal

Since this bachelor's thesis cannot extensively illuminate all topics and perspectives due to time and space constraints, a critical appraisal with the present limitations follows below. Additionally, it is explained which points can be examined within future research.

The first limitation of this thesis is that only the one most common administrative degree program and its ICT topics were analysed per federal state and the federal republic. In some federal states, however, there are also degree programs that are more oriented towards the requirements of the future digitalised administration. An example of this would be the Digital Administration Management degree program in Baden-Württemberg, which teaches many technical skills in addition to legal and leadership-related ones.[330] In order to obtain an overall picture, these additional degree programs of the federal states and the federal republic should therefore also be examined and included in the future.

Another limitation is that only module manuals and curricula are analysed in this thesis. However, in Germany, according to Article 5 III S.1 Basic Law, there is the so-called freedom of science, research and teaching. In conjunction with § 4 of the Hochschulrahmengesetz (HRG) this means that, within a certain framework, teachers are free to decide in which way and how in-depth they teach the topics of the module manuals/curricula.[331] Consequently, it is possible for the practice of teaching to deviate from the theory of the analysed documents. To counteract this inaccuracy of the thesis, practical studies on this subject should be conducted in the future. These practical studies should, in turn, lead to well-founded results on which and how in-depth the ICT topics are taught, with the aim to classify them as basic skills according to ICDL or as knowledge that exceeds the basics.

For further classification, it is also advisable to do two more things. Firstly, some research on what ICT skills students have after their graduation, right before they start studying at the university, should be executed. This will show whether they need to learn more, less or just as much basic skills according to the ICDL as they

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[330] Cf. University of Applied Sciences Ludwigsburg: Digitales Verwaltungsmanagement, n.d.
[331] Art. 5 III S. 1 Basic Law/Grundgesetz, § 4 HRG

do in their following degree programs right now. Secondly, a survey on what requirements administrations have for students that start working there right after graduation should be done. The aim is to find out how precisely the degree programs are tailored to the requirements of the administrations. Besides the basic ICDL skills, it is also possible to find out what skills beyond that, especially those administration-specific ones, should be taught.

As a final note, there is a limitation in the framework of the Topic clustering that exceed basic ICT skills. The classification of the topics in clusters tried to be as neutral as possible, but at the end of the day it was executed by a human, and therefore there is always a certain subjectivity.

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I certify that I have prepared this bachelor thesis independently, using only the sources indicated.

The data and concepts taken directly or indirectly from other sources are marked with reference to the source.

I am aware that my thesis can be checked by the university with plagiarism software.

Ludwigsburg, 29.05.2023

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