

# Teacher training for Data Literacy & Computer Science competences

## D1.2 - System to Compare Policies

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## 1. Executive summary

This report is the second in a series of project deliverables aiming to develop a policy monitor related to digital education, with a focus on evaluating the state of data literacy and AI education (including teacher education in this context). The focus of this deliverable is to report on the development of a compare system for a policy monitor taking into account the recommendations given as a result of the initial analysis reported in the first deliverable (D1.1) of this series, which are reviewed in Section 2. Future work which will be reported in the final deliverable of this series includes substantiation of the policy monitor, e.g. through upcoming stakeholder workshops, and a potential extension including the initial case studies with relevant additional national examples.

Section 3 reports on the compare system developed for the policy monitor. Following general indicators have been identified: **Issuer, Target audience, Mandatory, Type, Issuing year**. In order to assess whether **data literacy education** is covered by a policy document, following criteria have been introduced:

- Browsing, searching and filtering data, information and digital content
- Evaluating data, information and digital content
- Managing data, information and digital content.

In order to assess whether **AI education** is covered by a policy document, following criteria have been introduced:

- Technical aspects of AI
- Social and cultural aspects of AI
- Application related aspects of AI

Aside from the content focused evaluation, an indicator to assess whether a document **covers pedagogical and/or didactical competences** in the context of teacher education has been introduced.

Section 4 presents the initial version of the policy monitor, in which 34 policy documents have been evaluated according to the compare system introduced in this deliverable. Those policy documents are part of the initial case studies considered by the project (EU, Germany, Austria, Lithuania), as well as important international policy documents.

Section 5 reports observations made from this initial version of this policy monitor, and recommendations based on those observations. Initial observations show that data literacy is already established and often practically implemented in education. On the contrary, AI education is currently much less developed, although it is given a high priority in national/regional AI strategies. With the exception of Germany, all considered national case studies have teacher education policies for digital literacy in place, following the content frameworks established in this context. Given that AI education is currently less developed, it is not surprising that teacher education in this context is not yet implemented on the policy level. The recommendations based on those observations include:

- If AI education is to reach the same status as data literacy education, more effort on the development of a general content framework (in analogy to the

EU DigComp for digital competence) would be beneficial. Any progress in this respect should be closely monitored by this policy monitor in future.

- Teacher education in the context of digital literacy is much less developed in the German case study than it is in the other national case studies considered. In the 2021 Supplement to the Conference of Ministers of Education and Cultural Affairs' strategy "Education in the Digital World" this aspect is addressed on the national level, but its practical impact is yet unclear, given the implementation is a regional responsibility. Progress in this respect should be closely monitored by this policy monitor in future.
- In all case studies, a clear strategy to teacher education for AI is at this point missing. This is not surprising, since a clear commitment to AI education at the same level of digital literacy education has not been observed in any case study. Any progress in teacher education in the context of AI should be monitored in concert with developments on AI education policies.

## 2. Introduction and Context

In the first project deliverable of this series (D1.1 - Policy Research Summary) a review of policy documents in the context of digital education (focused on data literacy and AI) and teacher education (identified through stakeholder workshops and desk research), has been presented. The research was done in parallel with the research for deliverable D5.1 – the investigation of existing policies and curricula regarding DL&AI education and teacher training recommendations. The review focused on the four national case studies chosen for this project, namely the EU, Germany, Austria and Lithuania. D1.1 concluded with a set of recommendations to consider in a policy monitor, given the observations made during the analysis of the policy documents. Specifically, following recommendations were identified:

**Recommendation 1:** The policy documents that need to be considered in the education context are quite diverse and range from high level strategies to concrete curricula implementations.

**Recommendation 2:** The target audience for this diverse set of policy documents is broad, which needs to be considered by the policy monitor.

**Recommendation 3:** The approach to policy implementation differs between member states, and may be national or regional responsibility. This needs to be considered by the policy monitor.

**Recommendation 4:** Content indicators for data literacy and AI derived for the compare system of the policy monitor should be based on the DigComp ((1) Browsing, searching and filtering data, information and digital content, (2) Evaluating data, information and digital content, (3) Managing data, information and digital content) and “Dagstuhl-Dreieck” ((1) Technical aspects of AI, (2) Social and cultural aspects of AI, (3) Application related aspects of AI) definitions, since they provide the most appropriate data literacy and AI definitions given the context of the policy monitor.

**Recommendation 5:** The nature of the diverse policy documents necessitates a valuation of indicators in the compare system that is more complex than true/false valuation.

**Recommendation 6:** Besides content indicators, the policy monitor should assess whether pedagogical and didactical competences in the context of teacher education are covered by a policy document.

The work leading up to this deliverable was to develop a compare system able to capture the characteristics of all relevant classes of policy documents related to the project's context, taking into account the recommendations established during the initial analysis. An initial policy monitor based on this compare system will be presented in this deliverable. This initial version of the policy monitor will be the basis for upcoming project work, the results of which will be presented in subsequent project deliverables. The upcoming work includes the substantiation of the policy monitor by (a) discussing the initial policy monitor in upcoming stakeholder workshops (national policy building workshops), in order to ensure the validity of the valuation given to the policy documents in the individual use cases, (b) to ensure and cross-check through the stakeholder workshops that all relevant policy documents in the individual case studies have been identified, and (3) potentially extend the initial use cases with additional representative national examples.

### 3. Compare system development

Given the challenges identified in the initial analysis presented in deliverable D1.1, and the specific observations and recommendations to be considered when developing a compare system for a policy monitor in digital literacy and AI education (including teacher education), this Section presents the individual indicators that have been established when developing the compare system.

Compare system indicator	Indicator description	Indicator valuation
Issuer	The issuing authority or organisation of the policy document. This indicator partially addresses recommendation 3, as the name of the issuer indicates if it is an international, national or regional authority/organisation.	The <b>name</b> of the issuing authority or organisation
Target audience	The main target audience of a policy document. This indicator was specifically introduced to address recommendations 1 and 2, to be able to assess the wide variety of policy documents and thus target audiences of the policy documents. The core target audience have been identified as being	<p><b>Policy makers for education:</b> The policy document is aimed at policy makers in education (usually a strategy aimed specifically at education)</p> <p><b>Policy makers including but not limited to education:</b> The policy document is aimed at</p>

	<p>policy makers for education and educators (including teacher educators). However, a wide variety of relevant policy documents is not only aimed at education, but includes aspects that concern policy making for education.</p>	<p>policy makers in general, with a specific part aimed at education (usually a broader strategy that includes education elements, among other topics)</p> <p><b>Educators for young people:</b> The policy document is aimed at school education (age group may be specified, if applicable)</p> <p><b>Educators for educators:</b> The policy document is aimed at teacher education and/or teacher training</p>
<p><b>Mandatory</b></p>	<p>Indicates if a policy is mandatory or not.</p>	<p><b>Yes:</b> The policy is mandatory</p> <p><b>No:</b> The policy is not mandatory</p> <p><b>n.a.:</b> The obligation of the document could not be determined.</p>
<p><b>Type</b></p>	<p>This indicator was introduced to address recommendation 1, allowing to assess if the policy is issued for high-level strategical purposes, or for concrete implementation of educational aspects. A wide variety of types ranging from AI and digital competence strategies, down to concrete curricula implementations and teacher further education programs have been identified.</p>	<p><b>Reference frame:</b> A policy document framing the competences to be addressed in a specific field.</p> <p><b>Strategy:</b> A policy document outlining a strategy in a specific field</p> <p><b>Action Plan:</b> A document outlining action points (e.g. to implement a reference frame or a strategy) in a specific field</p> <p><b>Curriculum framework:</b> A policy document framing</p>

		<p>the content areas to be addressed in a specific field</p> <p><b>Model of competence:</b> A policy document detailing the competences to be addressed in a specific field</p> <p><b>Curriculum:</b> A policy document detailing the content to be addressed in a specific field</p> <p><b>Teacher further education:</b> A policy document detailing the content/competences for teacher further education in a specific field</p>
<p>Issuing year</p>	<p>In order to be able to evaluate and assess timeliness of a policy document, the indicator specifying the issuing year was introduced.</p>	<p>The issuing <b>year</b> of the policy document.</p>
<p>Pedagogical didactical competences</p>	<p>This indicator was introduced to address recommendation 6, in order to be able to assess if a policy document includes considerations for teacher education that go beyond pure content aspects, and include considerations for pedagogical and/or didactical competences in digital literacy and AI education for teachers.</p>	<p><b>Yes:</b> The policy addresses pedagogical/didactical competences</p> <p><b>No:</b> The policy does not address pedagogical/didactical competences</p>

<p><b>Data Literacy Education</b></p> <ul style="list-style-type: none"> <li>• Browsing, searching and filtering data, information and digital content</li> <li>• Evaluating data, information and digital content</li> <li>• Managing data, information and digital content</li> </ul>	<p>This indicator was introduced in order to be able to assess how data literacy education is addressed by a policy document.</p> <p>Addressing recommendation 4, the EU DigComp definitions were used in order to be able to assess a more fine-grained evaluation of the content covered by the policy document.</p> <p>Addressing recommendation 5, a 3-state valuation system was chosen to be able to indicate if a policy document partially addresses an indicator. Furthermore, an additional state (n.a.) was introduced to indicate if the context of a policy document is not applicable to the indicator.</p>	<p>n.a.:Not applicable  <b>1:</b> Not addressed  <b>2:</b> Partially addressed  <b>3:</b> Fully addressed</p>
<p><b>Artificial Intelligence Education</b></p> <ul style="list-style-type: none"> <li>• Technical aspects of AI</li> <li>• Social and cultural aspects of AI</li> <li>• Application related aspects of AI</li> </ul>	<p>Addressing recommendation 4, the definitions based on the “Dagstuhl-Dreieck” were used in order to be able to assess a more fine-grained evaluation of the content covered by the policy document.</p> <p>Addressing recommendation 5, a 3-state valuation system was chosen to be able to indicate if a policy document partially addresses an indicator. Furthermore, an additional state (n.a.) was introduced to indicate if the context of a policy</p>	<p>n.a.:Not applicable  <b>1:</b> Not addressed  <b>2:</b> Partially addressed  <b>3:</b> Fully addressed</p>

	document is not applicable to the indicator.	
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## 4. Initial policy monitor

This section presents the policy monitor evaluation according to the compare system presented above, considering policy documents identified for the project’s case studies including the EU, Germany, Austria and Lithuania. Additionally, important international policy documents in this context have been evaluated. In addition to how the recommendations of D1.1 have been addressed by the chosen compare system indicators, the structure of the policy monitor table itself further addresses recommendation 3 by structuring the table according to their national/international context, and further sub-structuring the regional context using regional codes in front of the policy document names, where applicable. In addition to the visual representation, it goes without saying that regional policies need to be identified and validated where applicable, e.g. in the context of the German case study.

	Issuer	Target audience	Mandatory	Type	Issuing year	Pedagogical didactical competences	Data Literacy Education			Artificial Intelligence Education		
							Browsing, searching and filtering data, information and digital content	Evaluating data, information and digital content	Managing data, information and digital content	Technical aspects of AI	Social and cultural aspects of AI	Application related aspects of AI
<b>European Union</b>												
The Digital Competence Framework for Citizens (DigComp) <sup>1</sup>	Joint Research Center (JRC), the EC science and knowledge service	Policy makers for education	no	Reference frame	2017	no	3	3	3	1	1	1

European Framework for the Digital Competence of Educators (DigCompEdu) <sup>2</sup>	Joint Research Center (JRC), the European Commission science and knowledge service	Policy makers for education	no	Reference frame	2017	yes	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Digital education action plan 2021-2027 <sup>3</sup>	European Commission	Policy makers for education	no	Action plan	2021	no	3	3	2	2	2	2
<b>International</b>												
A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2 <sup>4</sup>	UNESCO	Educators on all levels	no	Model of competences	2018	no	3	3	3	1	1	1
Informatics Curriculum Framework for School <sup>5</sup>	Informatics for all	Educators for young people (~6-18)	no	Curriculum framework	2021	no	3	3	3	1	2	2
Educational Data Literacy Competence Framework <sup>6</sup>	Learn2Analyze (Erasmus+ Project)	Educators on all levels	no	Model of competences	2020	no	3	3	3	1	1	1

Germany												
(DE) Shaping Digitalization <sup>7</sup>	The German federal government	Policy makers including but not limited to education	no	Strategy	2021	no	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(DE) Data strategy of the federal German government <sup>8</sup>	The German federal government	Policy makers including but not limited to education	no	Strategy	2021	no	3	3	3	1	1	1
(DE) Artificial Intelligence Strategy of the German Federal Government <sup>9</sup>	The German federal government	Policy makers including but not limited to education	no	Strategy	2020	no	n.a.	n.a.	n.a.	1	1	1
(DE) Education in the digital world <sup>10</sup>	The Standing Conference of the Ministers of Education and Cultural Affairs	Policy makers for education	yes	Strategy	2016	no	3	3	3	1	1	2

(DE) Supplement to the Conference of Ministers of Education and Cultural Affairs' strategy "Education in the Digital World" <sup>11</sup>	The Standing Conference of the Ministers of Education and Cultural Affairs	Policy makers for education	yes	Strategy	2021	yes	3	3	3	1	1	1
(BW) Digitalisation strategy <sup>12</sup>	The federal state government of Baden-Württemberg	Policy makers including but not limited to education	no	Strategy	2017	yes	2	2	2	1	1	1
(BW) Education plan 2016 - Media education <sup>13</sup>	Ministry for culture, youth and sports Baden-Württemberg	Educators for young people (~11)	yes	Curriculum	2016	no	3	3	2	1	1	1
(BW) Education plan 2016 - Computer science <sup>14</sup>	Ministry for culture, youth and sports Baden-Württemberg	Educators for young people (~13)	yes	Curriculum	2016	no	1	1	1	1	1	1

(BW) Teacher further education - Media education (Education plan 2016) <sup>15</sup>	Teacher further education Baden-Württemberg	Educators for young people	n.a.	Teacher further education	2016	no	3	3	2	1	1	1
(BW) Teacher further education - Computer science (Education plan 2016) <sup>16</sup>	Teacher further education Baden-Württemberg	Educators for young people	n.a.	Teacher further education	2016	no	1	1	1	1	1	1
(BE) Greenbook for the strategy of digitalization <sup>17</sup>	Senate department for economy, energy and business	Policy makers including but not limited to education	no	Strategy	2021	yes	2	2	2	1	1	1
(BE, BB) Base curriculum media education <sup>18</sup>	Berlin / Federal state of Brandenburg	Educators for young people (~6-16)	yes	Curriculum	2017	no	3	3	3	1	1	1
(BE, BB) Computer science further education <sup>19</sup>	Berlin / Federal state of Brandenburg	Educators for young people	no	Teacher further education	2021	yes	1	1	1	1	1	1

(BB) Strategy Paper Digital Brandenburg <sup>20</sup>	Federal state of Brandenburg	Policy makers including but not limited to education	no	Strategy	2018	yes	2	2	2	1	1	1
(NRW) Strategy for the digital NRW 2.0 <sup>21</sup>	The federal state government of Nordrhein- Westfalen	Policy makers including but not limited to education	no	Strategy	2021	no	3	3	3	2	1	2
(NRW) Digital strategy for schools in NRW <sup>22</sup>	Ministry for school and education (NRW)	Policy makers for education	yes	Strategy	2021	yes	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(NRW) Media competence framework <sup>23</sup>	The federal state government of Nordrhein- Westfalen	Educators for young people (~6-18)	yes	Model of competence	2020	no	3	3	3	1	1	1
(NRW) Educators in the digital world <sup>24</sup>	Ministry for school and education (NRW)	Educators for educators	yes	Model of competence	2020	yes	3	3	3	1	1	1

(SH) Digitalisation program <sup>25</sup>	Ministry for energy transition, agriculture, environment, nature and digitalisation (SH)	Policy makers including but not limited to education	no	Strategy	2021	yes	2	2	2	1	1	1
(SH) Artificial Intelligence strategy <sup>26</sup>	The prime minister of the federal state of Schleswig-Holstein	Policy makers including but not limited to education	no	Strategy	2021	yes	n.a.	n.a.	n.a.	2	3	3
<b>Austria</b>												
Digital competence model for Austria (DigComp 2.2 AT) <sup>27</sup>	The Federal Ministry for Digital and Economic Affairs	Policy makers for education	no	Reference frame	2021	no	3	3	3	1	1	1

Artificial Intelligence Mission Austria 2030 (AimAT 2030) <sup>28</sup>	The Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology; The Federal Ministry for Digital and Economic Affairs	Policy makers including but not limited to education	no	Strategy	2018	yes	n.a.	n.a.	n.a.	3	3	3
digi.komp4 model of competence <sup>29</sup>	The Federal Ministry of Education, Science and Research	Educators for young people (~6-10)	yes	Model of competence	2016	no	3	3	3	1	1	1
digi.komp8 model of competence <sup>30</sup>	The Federal Ministry of Education, Science and Research	Educators for young people (~10-14)	yes	Model of competence	2016	no	3	3	3	1	1	1
digi.komp12 model of competence <sup>31</sup>	The Federal Ministry of Education, Science and Research	Educators for young people (~14-18)	yes	Model of competence	2016	no	3	3	3	1	2	3
digi.kompP model of competence <sup>32</sup>	The Federal Ministry of Education, Science and Research	Educators for educators	yes	Model of competence	2016	yes	3	3	3	1	2	3

Lithuania												
Lithuanian Artificial Intelligence Strategy <sup>33</sup>	Ministry of the Economy and Innovation	Policy makers including but not limited to education	no	Strategy	2019	yes	n.a.	n.a.	n.a.	3	2	2
Description of Requirements for Teachers and Student Support Professionals for Digital Literacy Programs <sup>34</sup>	The Minister of Education and Science of the Republic of Lithuania	Educators for educators	yes	Model of competence	2018	no	3	3	3	1	1	1

## 5. Conclusions and future work

In this deliverable, the project's work on the development of a compare system for a data literacy and AI education (including teacher education) policy monitor has been reported. An initial policy monitor based on the policy documents identified through stakeholder workshops and desk research for the initial case studies (EU, Germany, Austria and Lithuania), including important international policies, has been presented. The awareness provided by this initial policy monitor allows to draw several conclusions in the context of the considered case studies:

- Our analysis shows that in all national case studies, there are digitalisation strategies and/or AI strategies, all of which give significant attention to digital education (including data literacy and AI). This usually includes elements relating to school education, higher education, and life-long learning. The actual implementation of such high-level strategies varies between the case studies.
- Data literacy already has a significant presence in education policies. In all case studies considered, data literacy is highlighted in policy documents on the strategic levels (starting at international and EU level, down to national regional levels where relevant), in most countries it has already been implemented as curriculum guidelines or is present in applied curricula.
- Compared to data literacy, AI education is much less present in relevant education policies. While the need for AI education is highlighted in most relevant strategic documents (mainly national/regional AI strategies), our analysis shows that actual implementation in curricula guidelines or actual curricula is lacking behind data literacy. Furthermore, it has been observed that AI education is more focused on ethical or application specific areas, not on technological aspects. Technical basic education is usually covered in some form via computer science education. While it has been our experience that individual content modules in the context of computer science or data literacy education exist (which is outside the scope and context of this policy monitor), our analysis clearly shows that on the policy level a clear strategy and dedication to implement AI education is less developed than it is for data literacy education.
- Teacher education is a key aspect in all national/regional digitalisation/AI strategies that address the education aspect. It is clearly recognised that digital competence building (including relevant pedagogical and didactical competences) for teachers needs to go hand in hand with the introduction of new content areas. However, the practical implementation state of teacher education policies has been observed to be quite different between the national case studies. While Austria and Lithuania have already defined teacher education policies for digital education in line with the digital education content frameworks, the situation in Germany appears to be less developed and greatly differs between regional contexts. While in its 2021

Supplement to the Conference of Ministers of Education and Cultural Affairs' strategy "Education in the Digital World", Germany has highlighted the importance for teacher education, it is too early to assess the impact of this amendment on the regional level. In addition to those considerations for teacher education related to data literacy, there have been no concrete policies related to teacher education in the field of AI observed in any case studies. This is not necessarily surprising given the fact that there were no concrete content frameworks specific to AI education identified in any case studies.

Based on this initial analysis, following recommendations can be made:

- If AI education is to become a key education focus area (which is clearly the goal based on the national/regional AI strategies that have been considered by the policy monitor), more effort is required to establish a content framework for AI education. Ideally, an international/ EU level policy along the lines of the EU DigComp framework should be established to guide the national/regional implementation of AI education. Any progress in this respect should be closely monitored by this policy monitor in future.
- While teacher education in the Austrian and Lithuanian case studies is clearly outlined by relevant policies, a clear strategy for teacher education seems to be missing in the German use case. In the 2021 Supplement to the Conference of Ministers of Education and Cultural Affairs' strategy "Education in the Digital World" this aspect is addressed on the national level, its practical impact is yet unclear, given the implementation is a regional responsibility. Progress in this respect should be closely monitored by this policy monitor in future.
- In all case studies, a clear strategy to teacher education for AI is at this point missing. This is not especially surprising, since a clear commitment to AI education at the same level of digital literacy education has not been observed in either case study. Any progress in teacher education in the context of AI should be monitored in concert with developments on AI education policies.

Based on the work presented in this deliverable, the project plans to further develop the policy monitor, to be reported in the final deliverable of this series related to policy monitor development. Upcoming work includes a review of the current policy monitor status, results and recommendations within the project, in order to refine the current compare system and initial policy monitor based on different partner's inputs. In a next step, the policy monitor will be discussed in the context of upcoming stakeholder workshops, with the aim to have the stakeholders re-visit their initial input and potentially identify additional policy documents that have not yet been considered. For the final version, the policy monitor will be updated with those additional findings. In a last step, the project will consider extending the current case studies with additional national case studies, if considered beneficial by the project.

## 6. Policy document source links

- <sup>1</sup> <https://publications.jrc.ec.europa.eu/repository/handle/JRC106281>
- <sup>2</sup> <https://publications.jrc.ec.europa.eu/repository/handle/JRC107466>
- <sup>3</sup> [https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan\\_en](https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en)
- <sup>4</sup> <http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf>
- <sup>5</sup> <https://www.informaticsforall.org/>
- <sup>6</sup> <https://learn2analyse.eu/proj/l2a-edl-cp/>
- <sup>7</sup> <https://www.bundesregierung.de/breg-de/suche/digitalisierung-gestalten-1605002>
- <sup>8</sup> <https://www.bundesregierung.de/breg-de/suche/datenstrategie-der-bundesregierung-1845632>
- <sup>9</sup> <https://www.ki-strategie-deutschland.de/home.html>
- <sup>10</sup> <https://www.kmk.org/themen/bildung-in-der-digitalen-welt/strategie-bildung-in-der-digitalen-welt.html>
- <sup>11</sup> [https://www.kmk.org/fileadmin/veroeffentlichungen\\_beschluesse/2021/2021\\_12\\_09-Lehren-und-Lernen-Digi.pdf](https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2021/2021_12_09-Lehren-und-Lernen-Digi.pdf)
- <sup>12</sup> <https://im.baden-wuerttemberg.de/de/digitalisierung/digitalisierungsstrategie/>
- <sup>13</sup> <http://www.bildungsplaene-bw.de/,Lde/LS/BP2016BW/ALLG/GYM/BMB>
- <sup>14</sup> <http://www.bildungsplaene-bw.de/,Lde/LS/BP2016BW/ALLG/SEK1/INF7>
- <sup>15</sup> [https://lehrerfortbildung-bw.de/st\\_digital/medienkompetenz/2\\_bildungsplan16/basis.htm](https://lehrerfortbildung-bw.de/st_digital/medienkompetenz/2_bildungsplan16/basis.htm)
- <sup>16</sup> [https://lehrerfortbildung-bw.de/u\\_matnatech/informatik/gym/bp2016/fb1/](https://lehrerfortbildung-bw.de/u_matnatech/informatik/gym/bp2016/fb1/)
- <sup>17</sup> <https://digitalstrategie.berlin.de/haupt/de/>
- <sup>18</sup> <https://bildungsserver.berlin-brandenburg.de/bcmedienbildung>
- <sup>19</sup> <https://bildungsserver.berlin-brandenburg.de/qualifizierung/weiterbildung-fuer-lehrkraefte/berufsbegleitende-weiterbildung-in-berlin/angebote-der-berufsbegleitenden-weiterbildung/massnahmen-fuer-lehrkraefte/informatik>
- <sup>20</sup> <https://digitalesbb.de/digitalstrategie/>
- <sup>21</sup> <https://www.digitalstrategie.nrw/digitalnrw/de/home>
- <sup>22</sup> <https://www.schulministerium.nrw/digitalisierung>
- <sup>23</sup> <https://medienkompetenzrahmen.nrw/>
- <sup>24</sup> <https://www.schulministerium.nrw/schulpolitik-aktuell-lehrkraefte-der-digitalisierten-welt-orientierungsrahmen-fuer-die>
- <sup>25</sup> [https://www.schleswig-holstein.de/DE/Landesregierung/Themen/Digitalisierung/Digitalisierung/Digitalisierungsprogramm/digitalisierungsprogramm\\_node.html](https://www.schleswig-holstein.de/DE/Landesregierung/Themen/Digitalisierung/Digitalisierung/Digitalisierungsprogramm/digitalisierungsprogramm_node.html)
- <sup>26</sup> [https://www.schleswig-holstein.de/DE/Landesregierung/Themen/Digitalisierung/Kuenstliche\\_Intelligenz/KI\\_Strategie/ki\\_strategie\\_node.html](https://www.schleswig-holstein.de/DE/Landesregierung/Themen/Digitalisierung/Kuenstliche_Intelligenz/KI_Strategie/ki_strategie_node.html)
- <sup>27</sup> [https://www.bmdw.gv.at/dam/jcr:54bbe103-7164-494e-bb30-cd152d9e9b33/DigComp2.2\\_V33-barrierefrei](https://www.bmdw.gv.at/dam/jcr:54bbe103-7164-494e-bb30-cd152d9e9b33/DigComp2.2_V33-barrierefrei)
- <sup>28</sup> <https://www.bmk.gv.at/themen/innovation/publikationen/ikt/ai/aimat.html>
- <sup>29</sup> <https://digikomp.at/digikomp4/kompetenzmodell>
- <sup>30</sup> <https://digikomp.at/digikomp8/ueber-digikomp8>
- <sup>31</sup> <https://digikomp.at/digikomp12/informatik>
- <sup>32</sup> <https://digikomp.at/digikompp/kompetenzmodell>
- <sup>33</sup> [https://eimin.lrv.lt/uploads/eimin/documents/files/DI\\_strategija\\_ENG\(1\).pdf](https://eimin.lrv.lt/uploads/eimin/documents/files/DI_strategija_ENG(1).pdf)
- <sup>34</sup> <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/599d489078af11e89188e16a6495e98c?jfwid=q8i88m58y2>