

# “We are all designers now”: Mapping AI-related design competence for citizens and students through DigComp 3.0

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**Abstract.** DigComp 3.0, released in November 2025, introduces systematic AI competence labelling across all 21 digital competences – the first European framework to do so. This paper analyses the AI-labelled competence statements and learning outcomes in the DigComp 3.0 data supplement through the lens of design activity, arguing that the framework positions design competence as a universal digital skill. A quantitative content analysis of 362 competence statements and 523 learning outcomes shows that 82% carry some AI relevance (14% AI-Explicit, 68% AI-Implicit), with Area 3 (Content creation) concentrating 45% of all AI-Explicit statements. Five competences – 3.1, 3.2, 3.3, 3.4, and 5.3 – form a “design competence cluster” characterised by high AI density and direct connection to content creation, evaluation, or creative problem-solving. A comparison of DigComp 2.2 and 3.0 shows that competence renames (e.g., “Programming” → “Computational thinking and programming”; “Creatively using digital technologies” → “Identifying creative solutions using digital technologies”) signal a shift toward design-aware digital literacy. Three dimensions of citizen design competence are identified – AI-assisted creation, critical evaluation, and ethical and responsible use – with implications for curriculum design in pedagogical and higher education.

**Keywords:** digital competence, DigComp 3.0, artificial intelligence, design competence, content creation, citizens, students

## 1. Introduction

Generative AI tools – text-to-image generators, AI-assisted design platforms, and large language models – have made creative production accessible to non-specialists [1, 9]. Where design output once required years of training with professional software, a student can now generate visual alternatives through a natural-language prompt, and a teacher can produce customised learning materials with an AI assistant. This shift invites a reconsideration of “design competence”: does it remain the domain of professionals, or does it become a component of universal digital competence?

The European Commission’s Joint Research Centre addressed this question with DigComp 3.0 [5], released in November 2025. Its notable innovation is the systematic labelling of all competence statements and learning outcomes with AI relevance tags: *AI-Explicit* (directly mentioning AI systems) and *AI-Implicit* (AI is implicitly relevant). To the author’s knowledge, this is the first digital competence framework to embed AI as a transversal dimension – not as a separate area, but as a feature that permeates all 21 competences.

This paper argues that DigComp 3.0’s AI labelling positions design competence – the ability to create, evaluate, refine, and ethically deploy digital content – as a skill expected of every citizen, not only professionals. The framework’s emphasis on content creation (Area 3), computational thinking (Competence 3.4), and creative problem-solving (Competence 5.3) maps onto what the design literature recognises as core design activities [3, 6], but at a citizen rather than professional level.

The paper addresses three research questions:

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**RQ1:** How does DigComp 3.0 distribute AI-related competence across its five areas and 21 competences?

**RQ2:** Which competences constitute “design competence for all” in the AI era?

**RQ3:** What proficiency levels and learning outcomes define this competence for citizens and students?

Section 2 describes the methodology, section 3 presents the theoretical background, section 4 the quantitative analysis, section 5 the implications, and section 6 concludes.

## 2. Methodology

This study combines document analysis [2] with quantitative content analysis of the DigComp 3.0 framework data supplement [8] and the DigComp 2.2 ESCO skills mapping [7]. Three phases were undertaken:

*Phase 1* (descriptive analysis) extracted all 362 competence statements (CS) and 523 learning outcomes (LO) from the DigComp 3.0 Data Supplement, categorising each by area, competence, proficiency level, and AI label (AI-Explicit, AI-Implicit, or unlabelled).

*Phase 2* (comparative analysis) identified structural changes from DigComp 2.2 to 3.0 by comparing area titles, competence names, and AI labelling against the 2.2 framework, where AI appeared only through examples in Dimension 4 [14].

*Phase 3* (design competence mapping) identified a “design competence cluster” using two explicit criteria: (a)  $\geq 4$  AI-Explicit competence statements *or*  $\geq 75\%$  AI-Implicit statements within the competence, *and* (b) a competence descriptor referencing content creation, evaluation, or creative problem-solving. The DigComp 3.0 Glossary definition of *design thinking* (“an approach to problem-solving and innovation focused on human-centered design”) was used to validate the cluster membership.

## 3. From professional design to citizen design: theoretical background

### 3.1. The DigComp 2.2 to 3.0 evolution

DigComp 2.2 [14] defined digital competence across five areas and 21 competences with eight proficiency levels. AI appeared only through examples of knowledge, skills, and attitudes in Dimension 4, without systematic integration. Van Audenhove et al. [13] found that DigComp 2.2 addressed AI primarily through data security and privacy, with limited attention to societal impact.

DigComp 3.0 [5] restructures the framework: four of five area titles were renamed (table 1), proficiency levels were consolidated from eight to four (Basic, Intermediate, Advanced, Highly advanced), and two new data layers were added – 362 competence statements and 523 learning outcomes, each labelled for AI relevance. The framework was developed through consultation with approximately 300 experts from 16 countries [5, p. 12].

The competence renames carry conceptual weight. The shift from “Programming” to “Computational thinking and programming” signals that logical reasoning about computational processes – a skill the design cognition literature associates with design thinking [6, 15] – now accompanies coding ability. The shift from “Creatively using” to “Identifying creative solutions” foregrounds the problem-identification phase of the design process (clarify, ideate, develop, implement, as defined in the DigComp 3.0 Glossary entry for “Design thinking”). These renames bring DigComp’s vocabulary closer to the language of design pedagogy [3, 12].

**Table 1**

Structural evolution from DigComp 2.2 to 3.0: renamed areas and competences relevant to design.

No.	DigComp 2.2 name	DigComp 3.0 name	Significance for design
<i>Area-level changes</i>			
A1	Information and data literacy	Information search, evaluation and management	From passive literacy to active management
A3	Digital content creation	Content creation	Removes “digital” qualifier; now a universal activity
A4	Safety	Safety, wellbeing and responsible use	Adds wellbeing and responsibility
A5	Problem solving	Problem identification and solving	Emphasises problem <i>identification</i> – a design activity
<i>Competence-level changes (selected)</i>			
2.5	Netiquette	Digital behaviour	Broadens scope beyond etiquette
3.4	Programming	Computational thinking and programming	Adds computational thinking – a design reasoning skill [15]
4.3	Protecting health	Supporting wellbeing	From self-protection to active support
5.3	Creatively using digital technologies	Identifying creative solutions using digital technologies	Adds “identifying” – a design thinking verb
5.4	Identifying digital competence gaps	Identifying and addressing digital competence needs	From gap-finding to active need-addressing

### 3.2. The “citizen designer” argument

Generative AI tools have lowered the threshold for engaging in content creation. The term *citizen designer* is proposed here to describe a digital citizen who, through AI assistance, performs activities that share structural features with professional design work: formulating intent, generating alternatives, evaluating outputs, and iterating toward a solution. This is not to claim that such activities are equivalent to professional design practice – they differ in depth, domain knowledge, and reflective rigour – but rather that they occupy a distinct category of *foundational* design activity that the DigComp 3.0 framework now explicitly addresses.

Three observations support this reading. First, DigComp 3.0’s competence structure places content creation, evaluation, and creative problem-solving at the centre of its AI provisions. Second, the Glossary explicitly defines design thinking as a human-centred approach within Competence 5.3. Third, 22 of 49 (45%) AI-Explicit statements fall in Area 3, indicating that the framework treats content creation as the domain where AI has its greatest relevance – a domain that overlaps substantively with design activity.

### 3.3. Design competence: professional vs. citizen

Musienko [10] proposes an information-communicative competence model for professional designers with four components – information-analytical, communicative, technological, and reflective – including AI-specific descriptors. Zhang et al. [16] construct a professional framework comprising design aesthetics, design thinking, design practice, and design resilience. Both address professionals.

Citizen design competence, as derived from DigComp 3.0, operates at a different scope. It does not require aesthetic judgment, visual communication mastery, or studio-based reflective practice. Instead, it encompasses the foundational competences that enable any citizen or student to:

- **create** digital content purposefully using AI tools (Competences 3.1, 3.2);
- **evaluate** the quality, reliability, and ethical implications of AI-generated content (Competences 1.2, 3.3);

- **use** AI systems ethically and responsibly (Competences 2.4, 3.4, 4.1–4.4);
- **solve problems** creatively with digital technologies including AI (Competence 5.3).

#### 4. Results: quantitative analysis of AI-labelled competences

##### 4.1. Distribution of AI labels across competence areas

Table 2 presents the distribution of AI labels across the five DigComp 3.0 competence areas.

**Table 2**

Distribution of AI labels across DigComp 3.0 competence areas.

Area	Short name	Competence statements				Learning outcomes			
		Total	AI-E	AI-I	None	Total	AI-E	AI-I	None
1	Information	58	9	40	9	87	11	58	18
2	Communication	106	10	73	23	157	16	103	38
3	Content creation	73	<b>22</b>	44	7	117	<b>33</b>	64	20
4	Safety	75	6	50	19	97	7	57	33
5	Problem solving	50	2	39	9	65	2	48	15
<b>Total</b>		<b>362</b>	<b>49</b>	<b>246</b>	<b>67</b>	<b>523</b>	<b>69</b>	<b>330</b>	<b>124</b>
% of total			13.5%	67.9%	18.5%		13.2%	63.1%	23.7%

Two findings stand out. First, AI is now a transversal feature of digital competence: 81.5% of competence statements and 76.3% of learning outcomes carry either an AI-Explicit or AI-Implicit label. Second, Area 3 (Content creation) is the most AI-dense area, with 22 (44.9%) AI-Explicit competence statements and 33 (47.8%) AI-Explicit learning outcomes – nearly half of all explicit AI references. By contrast, Area 5 (Problem identification and solving) contains only 2 AI-Explicit statements, suggesting that the framework treats AI primarily as a content-creation technology rather than a general-purpose problem-solving methodology.

##### 4.2. AI-Explicit competence statements by competence

Table 3 presents the distribution of AI-Explicit statements across individual competences. Only competences with at least one AI-Explicit statement are listed, together with Competence 3.2 (included because 9 of its 12 statements are AI-Implicit – the highest implicit density in the framework).

Competence 3.4 (Computational thinking and programming) is the most AI-dense, with 13 AI-Explicit statements (59.1% of its total). Renamed from “Programming” in DigComp 2.2, it now covers AI system recognition, machine learning types, development and deployment processes, ethical oversight, and task automation through AI. Competence 1.2 (Evaluating information) ranks second with 8 AI-Explicit statements addressing the reliability of AI-generated outputs, black-box issues, and hallucinations. Competence 3.3 (Copyright and licences) contains 5 AI-Explicit statements on the IP challenges of AI-generated content.

##### 4.3. The design competence cluster

Applying the criteria defined in Phase 3 (section 2), five competences form the design competence cluster (figure 1). Competence 3.2 qualifies via criterion (a): 9 of 12 statements (75%) are AI-Implicit. The remaining four qualify via criterion (a) with  $\geq 4$  AI-Explicit statements, and all five satisfy criterion (b) through their descriptors.

The cluster maps to three dimensions:

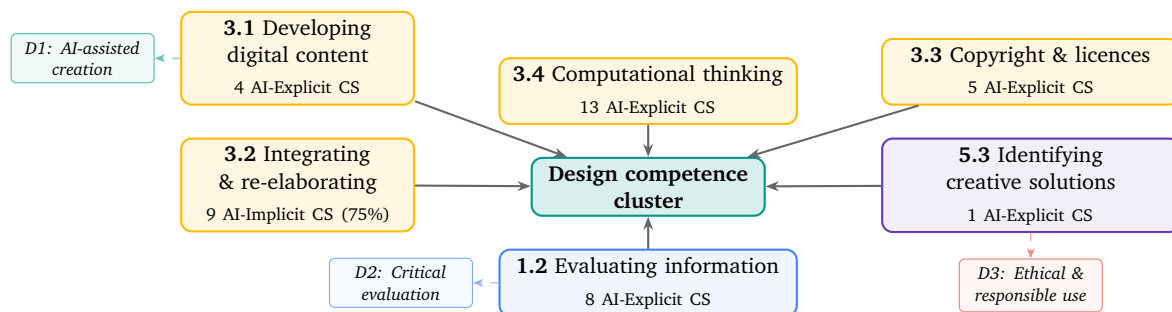
**D1: AI-assisted creation** (3.1, 3.2): developing and refining digital content with generative AI.

**Table 3**

AI-Explicit competence statements by competence. Shaded rows indicate the design competence cluster.

No.	Competence name	Total CS	AI-Explicit	AI-E %	Primary AI focus
3.4	Computational thinking and programming	22	13	59.1%	AI system development and deployment
1.2	Evaluating information	21	8	38.1%	AI output reliability and bias
3.3	Copyright and licences	17	5	29.4%	AI-generated content and IP
2.4	Collaborating through digital technologies	14	5	35.7%	Human-AI collaboration
3.1	Developing digital content	19	4	21.1%	Generative AI for content creation
2.1	Interacting through digital technologies	21	2	9.5%	Prompt engineering for AI systems
4.1	Protecting devices	15	2	13.3%	AI in cyberattacks and cybersecurity
4.2	Protecting personal data and privacy	21	2	9.5%	AI training data privacy risks
1.1	Browsing, searching and filtering information	15	1	6.7%	AI-driven search tools
2.2	Sharing through digital technologies	16	1	6.3%	AI-mediated content sharing
2.3	Engaging in citizenship	21	1	4.8%	High-risk and prohibited AI systems
2.6	Managing digital identity	19	1	5.3%	AI in identity management
3.2	Integrating and re-elaborating content	12	0	0.0%	(9 of 12 CS are AI-Implicit)
4.3	Supporting wellbeing	22	1	4.5%	AI wellbeing support limitations
4.4	Environmental impacts	17	1	5.9%	AI data centre environmental impact
5.2	Identifying needs and responses	13	1	7.7%	AI in digital assistance tools
5.3	Identifying creative solutions	12	1	8.3%	AI and human-centric design

Competences with zero AI-Explicit statements and below 75% AI-Implicit density (2.5, 5.1, 5.4) are omitted.



**Figure 1:** The design competence cluster within DigComp 3.0. Six competences map to three dimensions of citizen design competence.

**D2: Critical evaluation** (1.2, 3.3): assessing the reliability of AI-generated information and understanding copyright implications of AI-generated content.

**D3: Ethical and responsible use** (3.4, 5.3): ensuring human oversight, understanding AI system operation, and applying human-centric approaches to AI-assisted creative work.

Table 4 presents selected AI-Explicit learning outcomes for the cluster by proficiency level.

The learning outcomes show a progression from foundational awareness at Basic level (recognising what AI is, that AI-generated content should be labelled) through operational competence at Intermediate level (describing benefits and limitations, interacting purposefully) to evaluative capacities at Advanced and Highly advanced levels (assessing ethical aspects, leading complex projects). Knowledge-type outcomes (K) dominate at Basic and Intermediate levels, while Skills (S) and Attitudes (A) emerge primarily at Advanced and Highly advanced levels.

**Table 4**

Selected AI-Explicit learning outcomes for the design competence cluster by proficiency level.

No.	LO ID	Learning outcome	Level	K/S/A
<i>3.1 Developing digital content</i>				
3.1	LO3.1.06	Recognise that AI systems can generate content but humans ensure ethical outputs	Basic	K
3.1	LO3.1.07	Recognise that generative AI is one of various technologies for content creation	Basic	K
3.1	LO3.1.10	Describe benefits, limitations, and ethical considerations of AI for content creation	Intermediate	K
3.1	LO3.1.16	Interact with AI purposefully, selectively, and ethically for content creation	Intermediate	S
3.1	LO3.1.22	Promote selective and ethical AI use in content creation	Highly advanced	A
<i>3.2 Integrating and re-elaborating digital content</i>				
3.2	LO3.2.04	Recognise transparent use of generative AI in content integration	Basic	K
3.2	LO3.2.11	Describe ethical and transparent practices using generative AI	Intermediate	K
3.2	LO3.2.17	Describe appropriate and inappropriate uses of AI for content integration	Advanced	K
<i>3.3 Copyright and licences</i>				
3.3	LO3.3.04	Recognise copyright applies to AI-generated content	Basic	K
3.3	LO3.3.05	Recognise that AI-generated content should be labelled as such	Basic	K
3.3	LO3.3.16	Identify legal and ethical challenges of copyright in AI training	Intermediate	K
3.3	LO3.3.21	Identify differences in copyright for AI training data vs. AI-generated content	Advanced	K
<i>3.4 Computational thinking and programming (selected)</i>				
3.4	LO3.4.01	Acknowledge the essential role of humans in how AI systems are used	Basic	A
3.4	LO3.4.04	Recognise what AI is in general terms	Basic	K
3.4	LO3.4.05	Identify what is and is not an AI system	Basic	K
3.4	LO3.4.18	Recognise machine learning as a branch of AI	Intermediate	K
3.4	LO3.4.19	Recognise steps for developing, validating, and deploying AI systems	Intermediate	K
3.4	LO3.4.25	Acknowledge human oversight in AI development and deployment	Advanced	A
3.4	LO3.4.27	Describe steps for developing, validating, and deploying AI systems	Advanced	K
3.4	LO3.4.33	Assess ethical and practical aspects of AI system deployment	Advanced	S
3.4	LO3.4.36	Promote ethical programming and AI development practices	Highly advanced	A
3.4	LO3.4.38	Lead complex projects in computational thinking and AI applications	Highly advanced	S
<i>5.3 Identifying creative solutions using digital technologies</i>				
5.3	LO5.3.07	Describe strengths, weaknesses, and ethical considerations of AI for human-centric solutions	Intermediate	K

K = Knowledge, S = Skill, A = Attitude. Selected from 34 AI-Explicit LO in the cluster. Competence 3.4 contributes 21 AI-Explicit LO; 12 are shown.

#### 4.4. AI-Explicit competence statements by proficiency level

Table 5 shows the distribution of AI-Explicit competence statements across proficiency levels.

The relatively even distribution across the first three levels (26–31%) indicates that AI competence is expected to develop progressively rather than being concentrated at a single tier. The lower count at the Highly advanced level may reflect that specialised AI system development competences fall

**Table 5**

AI-Explicit competence statements by proficiency level.

Proficiency level	AI-Explicit CS	% of total AI-Explicit
Basic	13	26.5%
Intermediate	14	28.6%
Advanced	15	30.6%
Highly advanced	7	14.3%
<b>Total</b>	<b>49</b>	<b>100%</b>

outside the citizen-level scope of DigComp and are addressed instead by professional frameworks such as the European e-Competence Framework [4].

## 5. Discussion

### 5.1. What the findings mean for the “citizen designer” thesis

The data support a qualified version of the citizen designer thesis. The concentration of AI-Explicit statements in Area 3 (45%) confirms that the DigComp 3.0 framework treats content creation as the domain where AI competence matters most – and content creation is, by definition, a design activity when performed with intentionality. The design competence cluster identified in section 4.3 shows that this concentration is not random: specific competences (3.1, 3.2, 3.3, 3.4, 5.3) form a coherent group around creation, evaluation, and ethical use.

However, the qualification is important. The cluster also includes Competence 1.2 (Evaluating information), which has 8 AI-Explicit statements – the second highest after 3.4. This indicates that the framework treats *critical evaluation* as equally central to AI-era competence as content creation. A citizen who can generate an image with AI but cannot assess its reliability or identify its origin lacks the evaluative dimension that distinguishes design competence from mere tool use. This aligns with the design literature’s emphasis on critique as integral to design practice [12].

A counter-argument deserves acknowledgment: one might object that calling AI-assisted content creation “design competence” stretches the term beyond useful meaning. If drafting a text with ChatGPT qualifies as design activity, then much of everyday digital life qualifies, and the concept loses specificity. The response is that citizen design competence, as defined here, requires both creation *and* evaluation: the ability to generate content with AI is necessary but insufficient. What makes it “design-like” rather than mere tool use is the evaluative and ethical dimension – the capacity to judge outputs, understand their provenance, and deploy them responsibly. This tripartite structure (creation–evaluation–ethics) provides the specificity that a broader “everyone is a designer” claim would lack.

### 5.2. Implications for education

The findings suggest that educational programmes can use the DigComp 3.0 learning outcomes as a scaffold for developing AI-era competence. At the Basic level, the data show that learning outcomes focus on recognition (K): knowing what AI is, that AI-generated content should be labelled, and that copyright applies. These are foundational and can be integrated into any digital literacy course. At the Intermediate level, outcomes shift to operational competence: purposeful interaction with AI for content creation and understanding its limitations. At the Advanced and Highly advanced levels, evaluative and ethical capacities emerge: assessing deployment ethics, promoting human-centric approaches, and leading AI-related projects.

The competence renames in the 2.2-to-3.0 transition reinforce this educational scaffolding. “Programming” becoming “Computational thinking and programming” indicates that students need

reasoning about computational processes alongside coding, and “Creatively using” becoming “Identifying creative solutions” foregrounds the problem-identification phase central to design pedagogy [3].

### 5.3. Limitations

Several limitations apply. DigComp 3.0 is a citizen-level framework and lacks the depth of professional competence specification [10, 16]. The AI labelling is a categorisation by the framework developers; alternative criteria might yield different clusters. The framework reflects the European policy context and may not generalise to other educational systems. The analysis is based on the data supplement as of January 2026; subsequent updates may modify the labelling. Finally, the design competence cluster is a conceptual construct requiring empirical validation – the framework does not label any competence as “design-related”, and the mapping presented here is the author’s interpretation.

## 6. Conclusion

This analysis of DigComp 3.0’s AI-labelled competence statements and learning outcomes yields two principal contributions. First, the quantitative evidence – 82% of statements carrying AI relevance, 45% of AI-Explicit statements concentrated in Area 3 – demonstrates that AI competence is now a structural feature of the European digital competence framework, concentrated in the content creation domain. Second, the identification of a design competence cluster (3.1, 3.2, 3.3, 3.4, 5.3) with three dimensions – AI-assisted creation, critical evaluation, and ethical use – provides a conceptual tool for understanding how AI transforms digital competence from tool operation toward design-informed practice.

The DigComp 2.2-to-3.0 comparison adds a temporal dimension: the competence renames indicate a gradual shift in the framework’s vocabulary toward design-thinking language, even though the framework itself does not explicitly adopt the term “design competence.” This gap between the framework’s substance and its labelling represents an opportunity for future research: explicitly bridging the DigComp framework with design competence literature could strengthen both the framework’s practical applicability and the field’s theoretical coherence.

Empirical validation of the design competence cluster is the most urgent next step. Survey-based methodologies, such as those applied by Rubio-Gragera, de Padua Palacios-Rodríguez and Colomo-Magaña [11] for AI digital competence measurement, could test whether the three dimensions identified here correspond to distinct competence factors in practice. Adapting the cluster for specific educational contexts – pedagogical universities, secondary schools, and professional development programmes – would further strengthen its applicability.

### Declaration on Generative AI

During the preparation of this work the author used the following generative AI tools and services: GLM-5 (Z.ai) for initial data processing and exploratory analysis; Claude Code (Anthropic) powered by the Ollama for data extraction, quantitative content analysis of the DigComp 3.0 Data Supplement, LaTeX formatting assistance, and drafting support. The DigComp 3.0 data supplement (XLSX) and the DigComp 2.2 ESCO skills mapping (XLSX) were analysed programmatically using Python (openpyxl) to extract, categorise, and count competence statements and learning outcomes by area, competence, proficiency level, and AI label. All quantitative findings – including counts, percentages, and distributions reported in tables 2–5 – were verified against the original source data. The author takes full responsibility for the content of the publication.

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