



Digital Competence Profiles in Serbia and Educational System Implications

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Abstract

The paper analyzes digital competence profiles across four thematic dimensions while simultaneously testing the measurement instrument. The research sample consisted of 750 respondents distributed across five age groups. Instead of a global index, results are grouped and analyzed by the following dimensions: (1) basic skills and information retrieval, (2) information reliability and digital communication, (3) digital platforms, content creation, and security, and (4) digital problem-solving, self-assessment, and connection to practice. Results confirmed our presumption of existing significant differences in the overall competence profile among groups, while Cronbach's alpha values in the range 0.74–0.84 confirmed that the results within each dimension were consistent and reliable. Multiple regression model identified digital content creation, digital security, and perceived connection between education and practice as significant predictors of self-assessed digital skills. The findings are aligned with EU and Serbian national strategic documents and provide the following operational guidelines by educational levels: early school age should prioritize critical thinking and security; in secondary education, the focus should be on digital content creation and functional application; and in tertiary (higher education) and transition to employment the focus should be on systemic connection between outcomes and practice.

1. Introduction

Digital competencies have become essential for education, work, and everyday life. Research shows that digital skills gradually develop as we grow and progress through education. International results indicate that progress is not uniform across all areas, making it more useful to observe skills by the domains rather than combining their index into a single general score [1]. Contemporary frameworks such as Dig Comp 3.0 and the Digital Equity Framework further support our approach in which skills are observed by the domain rather than as a single aggregated result [2, 3]. However, researchers in Serbia usually observe digital competence level as a unique "total score" instead of presenting differences by domains (e.g., technical skills, critical thinking, communication, security, etc.). This is not aligned with the European guidelines, which suggest monitoring outcomes by domains and using reliable instruments when planning educational measures [4, 5]. Previous research shows that secondary education and university students are generally more digitally skilled, and provide proof of significant differences in domains such as critical evaluation of information, digital communication, digital content creation, and self-assessment. The problem lies in the fact

that such differences are often "lost" if we only look at a single aggregate score. For example, critical information evaluation, digital security, and the connection between what students learn and what is required in their future working practice may progress at different rates and differently influence how the digital skills are assessed. This is in alignment with the results of multiple findings [6–9], as in our context digital competencies do not develop uniformly, thus the greatest differences are often detected in critical thinking skills, digital communication, and digital content production. In this paper, the terms digital skills and digital competencies are used interchangeably to denote practical ability in using digital technologies in educational, professional, and everyday contexts.

The European Digital Education Action Plan 2021–2027 sets a clear direction for the development of digital education. This document emphasized that schools and universities should have good digital infrastructure, quality teaching materials, and trained teachers, but also that outcomes should be tracked by the domains rather than as a single total score. It also highlighted the need for reliable and clearly defined instruments for measuring digital skills.

At the international level, ICILS 2023 provided comparable data on how students in various countries

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developed digital skills. The research shows that results varied considerably by the domain and that students progressed more rapidly in some domains while lagging in others. These findings support the approach we applied in this paper - analyzing digital skills across four thematic domains, rather than relying on a single total score. This disaggregation enabled clearer identification of differences between age groups and facilitated planning of concrete changes in teaching practice and teacher training programs.

2. Methodology

2.1 Research Design and Aim

The research was conducted as a cross-sectional study using a survey questionnaire. The aim was twofold: to present how digital skills develop across four domains (Dim1–Dim4); to verify how reliable and applicable the questionnaire is across different age groups (e.g., analysis of differences between groups and reliability by the dimensions).

Domain disaggregation is recommended by European documents addressing digital education, as well as by international research [1], as it provides a much clearer picture than a single "total score".

A combination of analyses that enable understanding of both differences among groups and the reliability of the instrument itself was used in this research. MANOVA was used to compare the profiles of four domains between groups, while ANOVA and post-hoc tests provided more detailed insight into differences by individual items. For interpreting the results, we relied on established standards for effect sizes [10], as well as on classical guidelines for assessing scale reliability [11]. Guidelines for using multivariate analyses, checking assumptions, and valid reporting are in accordance with the referent statistical procedures [12]. This combination of methods provided a stable and transparent framework for analyzing the obtained results. In reporting reliability, we followed classical guidelines [13, 14, 11].

We divided digital competence into four domains in order to precisely identify where differences occur:

Dim1: Digital skills and online search - Q1: basic digital operations (working with files, applications, etc.); Q2: information finding and queries formulation.

Dim2: Critical Evaluation and Communication - Q3: digital source reliability assessment; Q4: digital communication (tone, channel, privacy)

Dim3: Digital platforms, Creation, and Security - Q5: using digital platforms for education or work; Q6: digital content creation; Q7: digital security-

Dim4: Problem-solving, Self-assessment, and Practice - Q8: solving technical/procedural problems; Q9: digital skills self-assessment; Q10: the relations between what is learned and the real practice requirements.

Rationale for our division:

When we observe the results by domains, we obtain a much clearer picture – where students are strongest, in which areas they progress more slowly, and what needs to be adapted in teaching practice. This is in alignment with

the EU recommendations to track outcomes by the domains rather than as a single total score, as well as with the ICILS approach that disaggregates individual domains of digital competencies.

2.2 Research Questions (RQ)

How did the four domains of digital competencies (Dim1–Dim4) differ among five age groups (younger primary school students, older primary school students, secondary school students, university students, and employed individuals)?

- RQ1 – Instrument reliability. Did the questionnaire demonstrate sufficient internal consistency ($\alpha \geq 0.70$) within each of the four domains, considering the following items:
- Dim1: Q1–Q2 (basic digital operations; information search),
- Dim2: Q3–Q4 (critical evaluation; digital communication),
- Dim3: Q5–Q7 (digital platforms use; content creation; digital security),
- Dim4: Q8–Q10 (problem-solving; self-assessment; connection with practice)?
- Additionally, are there significant differences in the domain profiles (Dim1–Dim4) between the observed age groups?

RQ2 – What influenced self-assessment the most? Which domains (platforms – Q5, content creation – Q6, digital security – Q7, connection between education and practice – Q10) most influenced how respondents assessed their digital competencies (Q9)? This investigation is important because ICILS and DEAP (Digital Education Action Plan) emphasized that the development of digital skills should be observed by the domain, not as a single entity.

2.3 Hypotheses (H)

H1 – Differences between groups. We expect that the profiles of four domains will differ significantly between groups: secondary school and university students will have higher scores than primary school students; there will be a noticeable decline in the domain of connection between education and practice (Q10) among employed individuals, compared to university students.

H2 – Results reliability. All four domains (Dim1–Dim4) will have satisfactory reliability ($\alpha \geq 0.70$), and MANOVA will show that significant differences exist in domain profiles between groups.

H3 – The most important self-assessment predictors. We expect that the strongest predictors of self-assessment (Q9) will be: content creation (Q6); digital security (Q7); connection between what is learned and actual practice (Q10); while use of platforms (Q5) will have weaker or minimal influence.

2.4 Research Sample and Context

The study included 750 participants across five groups: primary students grades 1–4 (n=60) and 5–8

(n=140); secondary students (n=250); university students (n=220); and employed adults with ≥ 2 years' experience (n=80). Participation was voluntary, with parental/school consent obtained for younger students. Data were collected at schools, university premises, and participating organizations.

2.5 Research Instrument

A 10-item questionnaire (Q1–Q10) with five-point Likert scales was used. Items were based on existing digital competency frameworks (technical, critical, communication, security, etc.) and reviewed by three experts from university, school, and industry to ensure clarity, validity, and age-appropriateness. A pilot study with ~30 respondents checked comprehensibility, suggested revisions, and measured completion time.

2.6 Data Collection, Processing, and Curation

The survey was conducted in schools, at the university, and in organizations where employed participants work. The schedule was adapted to teaching and working timetables. The group of lower grades primary school students completed the questionnaire in the presence of a teacher or a parent, with a brief explanation.

To ensure reliable analysis, gathered data was curated:

- responses where more than 30% of questions were null or where all responses were identical (indicating insufficient engagement) were excluded;
- in cases that only a few responses were missing (less than 5% per question), the data was handled using standard statistical procedures;
- it was verified that all responses were in the acceptable range and whether extreme values existed.

This initial verification was necessary for the results analysis to be reliable and meaningful.

2.7 Scale Reliability, Statistical Analyses and Assumptions

The reliability of each of the four domains (Dim1–Dim4) was assessed using Cronbach's α , one of the most commonly measures used in social science research. Values of α of 0.70 and above are considered sufficiently good for research purposes, and all our dimensions met this criterion [11]. If any question "compromised" the reliability of a dimension, its removal or reformulation was considered — but this was not necessary in this case. Recent findings [13] conclude that reporting the α -coefficient should not be observed as a single unique measure of reliability.

(a) MANOVA – Comparison of profiles by domain

To determine whether the five groups (lower grade primary school students, higher grade primary school students, secondary school students, university students, and employed individuals) differ in their digital skills profile, we used the MANOVA analysis. This allows us to simultaneously compare all four domains (Dim1–Dim4). Before the analysis, we verified basic assumptions — whether data were sufficiently normally distributed and whether groups had similar "dispersion" of results. MANOVA is quite robust, so minor deviations are acceptable, especially with larger samples, as in our case. If there were any major deviation, we also relied on simpler univariate analyses [12].

(b) ANOVA for each item (Q1–Q10)

Separate ANOVA analyses were performed for each question to pinpoint key domain differences. Variances were checked (Levene test), using Games–Howell if unequal, and effect sizes reported to indicate practical significance [10].

(c) Regression – What influenced the self-assessment (Q9)

To determine what influenced respondents' self-assessment of digital competencies (Q9), a multiple regression model was developed using four predictors: Q5 (platform use), Q6 (content creation), Q7 (digital security), and Q10 (education–practice link). Standard conditions were verified (no strong multicollinearity, homogeneous residuals), and β -coefficients, p-values, and R^2 were reported in line with recommended practices [12].

Effect sizes (η^2 for MANOVA/ANOVA, standardized β for regression) were calculated to establish practical significance, helping identify which domains offer the most room for improvement in teaching or training. Dividing skills into four domains and analyzing reliability by dimension allowed clear alignment with EU and ICILS frameworks, which track competencies by domain rather than as a single overall score.

3. Results

3.1 Profiles by Domain and Instrument Reliability

MANOVA analysis revealed that the observed five groups significantly differed in their digital competence profile. The result (Wilks' $\Lambda = 0.71$; $F(40, 2620) = 4.85$; $p < .001$; $\eta^2 p = 0.069$) indicated that groups did not progress uniformly across all four domains of digital skills. An overview of the mean values by domain and group is presented in Figure 1.

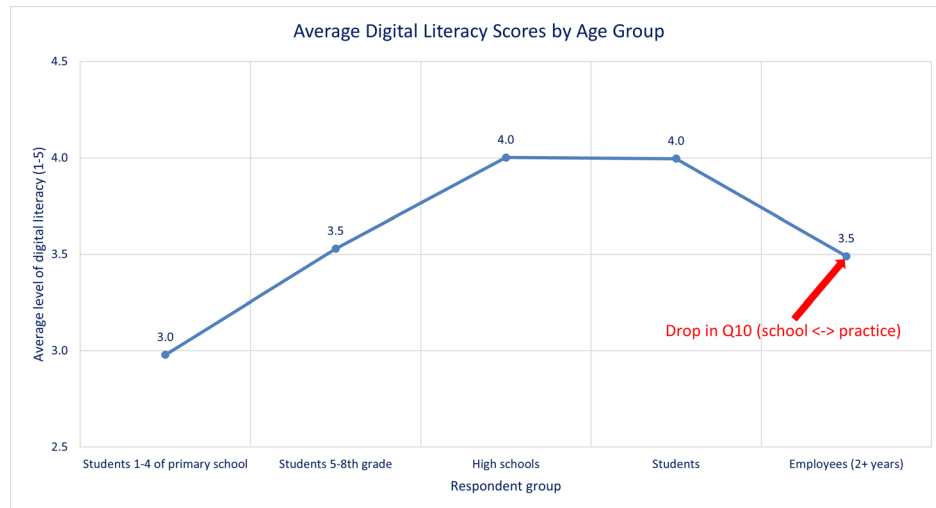


Figure 1. Mean values of four dimensions of digital competencies by age-educational groups (Dim1–Dim4)

The reliability of each domain, assessed using Cronbach's α , was good across all four domains (Dim1 = 0.74; Dim2 = 0.77; Dim3 = 0.81; Dim4 = 0.84), indicating

strong internal coherence and reliable interpretation. Results are shown in Table 1.

Table 1. Cronbach's α by domains (Dim1–Dim4)

Domain	Cronbach's alpha
Dim1 – Digital skills and online search (Q1–Q2)	0.74
Dim2 – Critical Evaluation and Communication (Q3–Q4)	0.77
Dim3 – Digital platforms, Creation, and Security (Q5–Q7)	0.81
Dim4 – Problem-solving, Self-assessment, and Practice (Q8–Q10)	0.84

3.2 Dim1 — Digital skills and online search (Q1–Q2)

In the Dim1 domain, older participants scored higher: younger primary students had the lowest values, higher-grade primary students performed better, and secondary and university students the highest. Employed participants'

results slightly "level off," suggesting later development comes more from routine use than formal learning (Table 2.)

ANOVA analyses for Q1 and Q2 demonstrated that differences among groups are significant ($p < .001$). Effect sizes ($\eta^2 \approx 0.16$ – 0.17) indicate differences are practically meaningful, with the largest gaps between younger primary and secondary/university students.

Table 2. Dim1 – Digital skills and online search ($M \pm SD$)

Group	Q1		Q2	
	M	SD	M	SD
Primary school students in grades 1–4 (n=60)	3.07	0.80	3.00	0.86
Primary school students in grades 5–8 (n=140)	3.51	1.08	3.40	1.19
Secondary school students (n=250)	3.98	0.80	3.96	0.80
University students (n=220)	3.96	0.80	3.95	0.85
Employed ≥ 2 years working (n=80)	3.60	1.09	3.51	1.15

3.3 Dim2 — Critical Evaluation and Communication (Q3–Q4)

Dim2 showed the largest increase from primary to secondary education, indicating that critical source

evaluation and digital communication develop mainly during adolescence (Table 3.). Tukey HSD results showed a substantial difference of about 1.00–1.13 points between younger primary and secondary/university students ($p < .001$), confirming that Dim2 is highly age-sensitive and best differentiates younger and older groups.

Table 3. Dim2 – Critical Evaluation and Communication ($M \pm SD$)

Group	Q3		Q4	
	M	SD	M	SD
Primary school students in grades 1–4 (n=60)	3.00	0.82	2.98	0.77
Primary school students in grades 5–8 (n=140)	3.52	1.12	3.58	1.11
Secondary school students (n=250)	4.12	0.80	3.98	0.79
University students (n=220)	3.96	0.81	4.08	0.80
Employed ≥ 2 years working (n=80)	3.56	1.12	3.30	1.19

3.4 Dim3 – Digital platforms, Creation, and Security (Q5–Q7)

In the Dim3 domain, we detected an interesting pattern (Table 4.). Digital content creation (Q6) reached its highest level among secondary school students, while university students achieved the best results in platform use (Q5) and digital security (Q7).

On the other hand, younger primary school students significantly lagged behind in all three domains, which was expected as these skills develop more intensively in higher grades. The differences were statistically significant ($p < .001$), and in practical terms indicated that security practices and basic models of content creation should be introduced earlier and more gradually.

Table 4. Dim3 – Digital platforms, Creation, and Security ($M \pm SD$)

Group	Q5		Q6		Q7	
	M	SD	M	SD	M	SD
Primary school students in grades 1–4 (n=60)	3.00	0.84	2.92	0.77	3.03	0.86
Primary school students in grades 5–8 (n=140)	3.49	1.06	3.48	1.20	3.66	1.08
Secondary school students (n=250)	3.99	0.84	4.05	0.79	3.99	0.80
University students (n=220)	4.10	0.81	3.95	0.79	4.06	0.82
Employed ≥ 2 years working (n=80)	3.59	1.14	3.43	1.08	3.66	1.10

3.5 Dim4 – Problem-solving, Self-assessment, and Practice (Q8–Q10)

In Dim4, independent problem-solving (Q8) and self-assessment of digital skills (Q9) increased with educational

level. However, Q10 (learning–practice connection) declined among employed participants compared to university students, suggesting a gap between education and workplace demands and highlighting an important signal for educational institutions (Table 5.).

Table 5. Dim4 – Problem-solving, Self-assessment, and Practice ($M \pm SD$)

Group	Q8		Q9		Q10	
	M	SD	M	SD	M	SD
Primary school students in grades 1–4 (n=60)	2.90	0.84	2.77	0.77	3.12	0.78
Primary school students in grades 5–8 (n=140)	3.49	1.19	3.54	1.14	3.64	1.13
Secondary school students (n=250)	4.03	0.84	4.00	0.82	3.92	0.81
University students (n=220)	3.93	0.82	4.00	0.80	3.96	0.81
Employed ≥ 2 years working (n=80)	3.48	1.04	3.54	1.11	3.24	1.19

3.6 Self-Assessment (Q9) Regression Model

To examine factors influencing self-assessed digital skills (Q9), a regression model included four predictors: platform use (Q5), content creation (Q6), digital security (Q7), and learning–practice connection (Q10). The model showed good explanatory power ($R^2 = 0.45$), explaining about 45% of the variance in self-assessment.

The regression coefficients are presented in Table 6, while a visual comparison of standardized effects is given in Figure 2. The strongest predictors were content creation ($\beta = 0.106$, $p = .004$), digital security ($\beta = 0.096$, $p = .008$), and learning–practice connection ($\beta = 0.100$, $p = .006$), while platform use had a weak, marginal effect ($\beta = 0.070$, $p = .054$). Overall, self-assessment increased most with

active production, security knowledge, and links to real situations, whereas mere platform use had little impact.

Table 6. Regression analysis results (Q9 as Dependent Variable)

Predictor	β	p
Q5 – using digital platforms for education or work	0.070	0.054
Q6 – digital content creation	0.106	0.004
Q7 – digital security	0.096	0.008
Q10 – the link between learning and practical requirements	0.100	0.006

The calculated $R^2 = 0.45$ implied that the model explained 45% of the variance in Q9 (digital skills self-assessment).

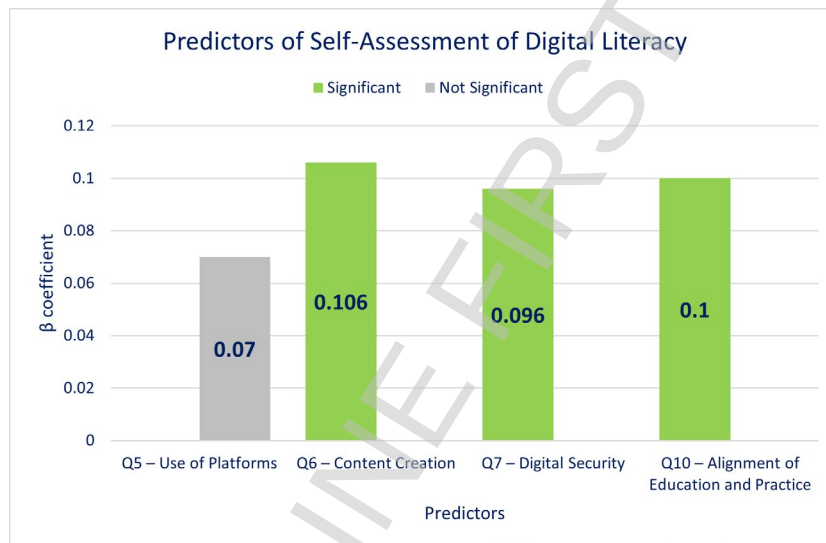


Figure 2. Standardized β -coefficients of four self-assessment predictors (Q9)

3.7 Key Findings

- MANOVA: there were significant differences in digital competence profiles among age groups.
- Dim2 (Q3–Q4): demonstrated the largest "leap" between primary and secondary school — critical evaluation and communication progress developed more rapidly during this period.
- Dim3 (Q5–Q7): secondary school students lead in content creation, university students in using digital platforms and digital security; younger primary school students lag behind. This implies the need for earlier introduction of digital security fundamentals.
- Dim4 (Q8–Q10): problem-solving and self-assessment increased with educational level; connection to practice (Q10) declined among employed individuals, implying that greater emphasis on professional internships and final integrative projects at the conclusion of studies is required.
- Regression: content creation, digital security, and connection between education and practice influence the most on self-assessment of digital skills; digital platform use had the weakest influence.

4. Discussion

4.1 Differences Between Groups

The MANOVA results (Wilks' $\Lambda = 0.71$; $p < .001$) showed clear differences among the five groups in digital competency profiles. This indicates uneven development of the four domains (Dim1–Dim4) across age groups.

The largest changes occurred in Dim2 (Q3–Q4). Critical evaluation and digital communication mainly developed during the transition from primary to secondary school.

In Dim4 (Q8–Q10), results increased with educational level. However, Q10 declined among employed individuals, suggesting a gap between education and workplace demands.

Overall, these findings support H1. Competency profiles differed by age, with the strongest changes in Dim2 and Dim4.

H2 – Instrument Reliability

All four domains showed Cronbach's α between 0.74 and 0.84, indicating good reliability.

Together with significant MANOVA results, this confirms that the instrument effectively differentiated respondents by domain. The results can therefore be interpreted reliably.

Such domain-based tracking is also recommended by EU frameworks [1]. Thus, H2 is confirmed.

H3 – The most important self-assessment predictors

The regression model ($R^2 = 0.45$) showed that the strongest predictors were: content creation (Q6), digital security (Q7), and learning–practice connection (Q10).

These domains build confidence in digital skills. In contrast, platform use (Q5) had a weaker effect.

This suggests that active use, production, secure behavior, and real-world application are more important than simple usage.

These findings are consistent with studies conducted in the broader Southeast European region, where digital competencies are also shown to develop unevenly across domains and age groups. Research from neighboring countries indicates that students generally achieve stronger results in basic technical skills, while more complex competencies—such as critical evaluation, digital communication, and content creation—show greater variability and are more sensitive to educational level. Similar to our results, these studies emphasize that domain-based analysis provides more precise and policy-relevant insights than a single aggregated score, particularly when identifying gaps between formal education and real-world digital demands [7–9]. The results also fit the DigComp 3.0 framework and trends in AI integration [2, 15].

4.2 Interpretation by Dimensions

Dim1 — Digital skills and online search (Q1–Q2)

This domain shows gradual and uniform growth. Younger students scored lowest, while secondary and university students achieved the highest results.

Employed individuals showed similar results to university students. This suggests these skills are maintained through everyday use rather than formal learning [4].

At higher levels, the focus should shift to more complex domains (Dim2–Dim4), as basic skills are already mastered [5].

Dim2 — Critical Evaluation and Communication (Q3–Q4)

The largest gap appears in this domain. It clearly separates primary and secondary education.

Critical evaluation and communication develop fastest during adolescence. Earlier introduction of these skills could reduce the gap.

Activities such as source verification, content analysis, and communication ethics are essential. These competencies are strongly emphasized in modern frameworks [2, 16].

Dim3 — Digital platforms, Creation, and Security (Q5–Q7)

Content creation (Q6) had the strongest impact in secondary education. University students showed the highest levels of platform use and security.

Younger students lagged, as expected.

The best results come from authentic tasks: projects, teamwork, presentations, and security practice. This aligns with DEAP priorities.

Dim4 — Problem-solving, Self-assessment, and Practice (Q8–Q10)

Problem-solving (Q8) and self-assessment (Q9) increased with education. However, Q10 declined among employed participants.

This indicates a gap between education and real job demands.

Effective responses include internships, final projects, and industry collaboration. These align with EU recommendations and AI-related frameworks [14, 17, 15, 18].

4.3 What These Results Mean for Teaching and the Educational System

Primary School Grades I–IV (Early Age)

The key goal is developing critical thinking and safe internet use.

This can be achieved through simple scenarios, mini-projects, and credibility checks. These approaches align with ICILS and DEAP recommendations [5, 1] and DigComp 3.0 [2, 16].

Primary School Grades V–VIII (Older Primary Students)

Teaching communication rules, digital tone, and privacy is essential.

Structured content creation (presentations, videos) also supports self-assessment, as shown in H3 [2].

Secondary Education

Authentic tasks have the greatest impact. These include projects, teamwork, and source analysis.

Students at this level are most receptive to Dim2 and Dim3. Teachers should focus on critical evaluation and content creation. Training in modern digital pedagogies is recommended (DEAP, DigComp 3.0, DCFL - Digital Competence Framework for Learners).

Higher Education

Strengthening the link between knowledge and practice is crucial.

Internships, industry collaboration, and integrative projects reduce the gap with the labor market. They also support responsible AI use.

Transition to Work

Entering the workforce requires targeted competencies.

Short training in security, content creation, and practical skills is effective. This aligns with EU priorities for digital transformation [3].

Final results suggest that digital competencies should be developed by domain, not as a single score.

Introduce evaluation and security early, strengthen creation and communication in secondary education, and connect learning with practice at the university level. This approach follows DEAP and ICILS guidelines.

In addition to the above recommendations, the findings can be translated into concrete educational policy measures, as summarized in Table 7.



Table 7. Implications for educational policy by domain

Domain	Key finding	Policy implication
Dim1 – Basic skills	Early and stable development	Maintain through practice; shift focus to higher-order skills
Dim2 – Critical evaluation & communication	Largest gap (primary–secondary)	Introduce earlier in curriculum; integrate media literacy
Dim3 – Creation & security	Strong predictor of self-assessment	Increase project-based learning; include cyber-security basics
Dim4 – Practice connection	Decline in employed group	Strengthen internships, dual education, industry collaboration

These structured implications provide a clear basis for aligning curriculum development, teacher training, and national digital education strategies with empirically identified domain-specific needs.

5. Conclusion

Rather than using a single "total score", we defined four domains of digital competencies demonstrating that digital skills do not uniformly develop. Age/educational groups had different strengths: some skills strengthen earlier, while others develop later. Statistical analysis results and good reliability ($\alpha=0.74-0.84$) confirmed that the domain-based approach was reliable and useful for planning teaching and educational measures. This fully aligns with the EU recommendations that emphasize monitoring outcomes by domain rather than as a single aggregate indicator.

The greatest difference between groups occurred in Dim2 (critical evaluation and digital communication), where secondary school represented a crucial developmental period. Dim3 (digital platforms, creation, security) shows that secondary school students progressed best in content creation, while university students excelled in security practice. Dim4 indicated a noticeable decline in the assessment of the connection between education and practice, as employed individuals suggested that during their transition to the working environment they lacked clearer connection between what was learned and what is required in actual jobs. This is consistent with ICILS findings, which also show that domains develop at different rates.

Regression analysis provided even clearer picture: confidence in digital skills is most strongly built by digital content creation (Q6), digital security (Q7), and connecting what is learned to practice (Q10). Mere platform use (Q5) had much weaker influence. Practically speaking: for someone to truly feel they "master" digital skills, it is not sufficient to know how to use digital tools — it is important to create digital content, understand security, and had real application skills. This aligns with EU priorities that emphasize "quality digital pedagogy", not just technical use of technology.

Pedagogical Implications:

- Primary School Grades I–IV: develop critical thinking and basic security habits through simple tasks and mini-projects.
- Primary School Grades V–VIII and Secondary School: intensify digital content creation and digital communication through authentic tasks and teamwork.
- Higher Education: introduce final integrative courses/projects and more professional internships, in collaboration with industry, to improve the connection to practice.

These developmental directions align with EU guidelines on digital transformation of education and international findings on domain differences.

In summary: viewing digital skills through four domains instead of through a single number provides a much clearer and more usable picture. If this approach is connected with European guidelines and systematic investments in digital pedagogy, teacher competencies, and infrastructure, we obtain a clear pathway toward the development of critical, productive, and secure digital skills throughout the entire educational system.

Limitations and Future Research

We identified several limitations in our research: (1) cross-sectional design — we could not establish causal relationships; (2) reliance purely on self-assessment — some respondents may overestimated or underestimated their knowledge, skills or competence level; and (3) geographical limitations of the sample — although the study included participants from different educational levels, the sample was geographically concentrated within a limited regional context in Serbia. This may reduce the generalizability of the findings, as digital competence development can be influenced by regional differences in infrastructure, access to technology, and educational resources. Future research should therefore include a more geographically diverse sample, covering multiple regions and both urban and rural settings, to ensure broader representativeness and enable more robust national-level conclusions. The next steps are to track the same students and university students over time to observe how Dim1–Dim4 change in practice, introduce real tasks alongside self-assessment (source evaluation, problem-solving, content creation), examine the role of learning analytics visualization and dashboards in monitoring progress by domain, expand the sample to different regions and types

of institutions, measure the effects of specific teaching approaches by domain (project-based learning, security workshops, critical evaluation), and to deepen Q10 (connection between education and real jobs) by comparing the development of digital skills between various study programs and professions.

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Profili digitalnih kompetencija u Srbiji: rezultati po oblastima i značenje za obrazovni sistem

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Apstrakt

Rad analizira profile digitalnih kompetencija kroz četiri tematske dimenzije, istovremeno testirajući merni instrument. Uzorak istraživanja obuhvatio je 750 ispitanika raspoređenih u pet starosnih grupa. Umesto jedinstvenog (globalnog) indeksa, rezultati su grupisani i analizirani po sledećim dimenzijama: (1) osnovne veštine i pronalaženje informacija, (2) pouzdanost informacija i digitalna komunikacija, (3) digitalne platforme, kreiranje sadržaja i bezbednost, i (4) rešavanje digitalnih problema, samoprocena i povezanost sa praksom. Rezultati su potvrdili pretpostavku o postojanju značajnih razlika u ukupnom profilu kompetencija među grupama, dok su vrednosti Kronbahovog alfa koeficijenta u rasponu 0.74–0.84 potvrdile da su rezultati unutar svake dimenzije konzistentni i pouzdani. Model višestruke regresije identifikovao je kreiranje digitalnog sadržaja, digitalnu bezbednost i percipiranu povezanost obrazovanja i prakse kao značajne prediktore samoprocene digitalnih veština. Nalazi su usklađeni sa strateškim dokumentima Evropske unije i Republike Srbije i pružaju sledeće operativne smernice po obrazovnim nivoima: u ranom školskom uzrastu treba prioritet dati kritičkom mišljenju i bezbednosti; u srednjem obrazovanju fokus treba da bude na kreiranju digitalnog

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Ključne reči:
digitalna pismenost;
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sadržaja i funkcionalnoj primeni; dok u visokom obrazovanju i tranziciji ka zapošljavanju akcenat treba staviti na sistemsko povezivanje ishoda učenja i prakse.

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