

## **TRANSVERSAL SKILLS IN PEDAGOGICAL SETTINGS: EMPIRICAL INSIGHTS FROM QUANTITATIVE AND QUALITATIVE RESEARCH**

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### **ABSTRACT**

Transversal skills, such as critical thinking, resilience, digital literacy, intercultural awareness, and health-related competencies are gaining importance in a VUCA world, which is characterized by many changes and uncertainties. The aim of this study is to explore the gap between pedagogical intention and learner uptake in the promotion of transversal competencies across educational contexts. With regard to the increasing complexity in a VUCA world and its effects on education, transversal skills are considered essential for future-related learning. Based on UNESCO's six-domain framework, this cross-national study conducted a quantitative online survey among 146 educators from school and higher education contexts in 16 European countries. The questionnaire assessed both teacher self-evaluations and their perceptions of student competencies across 24 items, using descriptive statistics to compare perceived competence levels across transversal domains. To complement these data, an exploratory qualitative strand in Germany provided practice - oriented insights using the Observe-Act-Check (O-A-C) framework. The results show that transversal competencies are already part of everyday teaching, yet clear gaps remain, especially in intrapersonal skills, critical and innovative thinking, and physical and mental health. The qualitative findings help to explain these gaps by pointing to factors such as exams that focus mainly on reproduction, teaching practices that unintentionally limit student initiative, and the uncritical adoption of AI-generated content. In contrast, practices such as regular reflection, portfolio work, and project-based tasks with authentic challenges were associated with stronger learner engagement. Overall, the findings emphasize the need for clearer instructional strategies, stronger metacognitive support, and institutional frameworks that ensure the sustainable integration of transversal skills into education.

### **KEYWORDS**

Transversal Skills, European Education, VUCA, Digital Literacy, Intercultural Awareness

## 1. INTRODUCTION

The contemporary society is characterized by profound transformations in ecological, technological, and social domains. These developments are causing fundamental changes in the world of work, education, and societal structures. This transformation is described as a VUCA-world, an acronym for a world of volatility, uncertainty, complexity, and ambiguity (see Schütte et al. 2022; Bergmann & Garrecht 2021). Educational institutions are facing an imperative to prepare learners for a reality characterized by disruption, digital transformation, and global crises. In response, the focus of modern education systems is increasingly shifting from the acquisition of technical knowledge to a targeted promotion of interdisciplinary, cross-contextual skills. Transversal competencies encompass a range of skills, including the capacity for critical and creative thinking, self-regulation, empathic and cooperative collaboration, thoughtful engagement with digital information (including emerging challenges linked to AI-based information environments), and proactive promotion of a health-conscious, responsible lifestyle. Such abilities are regarded as pivotal for successfully navigating intricate challenges within education, employment, and society at large. The competencies are associated with lifelong learning, which emphasizes the continuous acquisition of knowledge and the capacity to adapt to new contexts (see UNESCO 2015; OECD 2018). Key competencies have been anchored in education policy since the 1990s (see EU Commission 2006), while the concept of transversal competencies aims at a flexible, cross-contextual, and sustainable application of knowledge and skills. Despite the international discourse on transversal skills, there is a notable lack of empirical studies comparing teachers' self-perception with their assessment of student skills, particularly across countries and sectors. Previous research suggests that especially domains such as critical and innovative thinking, intrapersonal skills, and physical and mental health pose particular challenges, as these competencies are less visible, harder to observe, and often closely linked to stress or resilience factors. In light of societal transformations driven by the VUCA world, digitalization, and global sustainability challenges, this international study – covering 16 countries and six UNESCO-based skill domains – fills a methodological gap and offers comparative insights into teacher practice across education levels. It focuses specifically on the six dimensions of transversal competencies as defined by UNESCO: (1) critical and innovative thinking, (2) interpersonal skills, (3) intrapersonal skills, (4) global citizenship, (5) media and information literacy, and (6) physical and mental well-being. This study is guided by the following two research questions:

1. *To what extent do teachers actively foster transversal competencies in their classrooms?*
2. *How do they assess the manifestation of these competencies among their students?*

These research questions guided the quantitative strand of the study. In addition, a qualitative component was included in order to generate practice-oriented insights into how teachers observe, support, and assess transversal skills in everyday educational contexts. We use an Observe-Act-Check (O-A-C) scaffold as a pragmatic adaptation to capture practice-near evidence from teachers.

## **2. TRENDS AND SKILLS IN THE VUCA WORLD**

### **2.1 Education in the VUCA World and Megatrends as Drivers of Change**

The current educational landscape is characterized by a profound transformation fueled by technological, ecological, political, and social upheavals. The VUCA world – an acronym for volatility, uncertainty, complexity, and ambiguity – describes the conditions under which individuals learn, live, and work today (see Schütte et al. 2022; Bauer et al. 2010). These four dimensions pose fundamental challenges to established teaching and learning formats: They require not only adaptability, but also a new understanding of education as a dynamic, reflective, and context-sensitive process. In this context, the promotion of transversal skills is becoming increasingly important. They are key elements in meeting the demands of an increasingly complex world – especially because they enable people to cope with complex situations independently, creatively, and collaboratively. Megatrends such as digitalization, individualization, globalization, demographic change, and neo-ecology are having far-reaching effects on the structure and function of education systems (see Zukunftsinstitut 2022; Harwardt 2022). They not only affect content and methods, but also require a fundamental reorientation of education toward skills development rather than the mere transfer of knowledge. The ability to solve problems individually, engage in lifelong learning, and participate in society is becoming a prerequisite for personal and professional resilience (see Ameln & Wimmer 2016). Educational institutions are therefore called upon not only to respond to these structural changes, but also to play an active role in equipping learners to be forward-thinking.

### **2.2 Future Skills and 21<sup>st</sup> Century Skills**

In the wake of digital and social transformation, a paradigm shift in the focus on skills is emerging. In addition to technical knowledge, interdisciplinary, cross-cutting skills are becoming increasingly relevant. These so-called ‘21<sup>st</sup> century skills’ include critical thinking, creativity, collaboration, and communication (Voogt & Pareja Roblin 2012; Schleicher 2018). These skills are defined by international organizations such as the OECD, the EU Commission, and the World Economic Forum as cornerstones of a future-oriented education agenda (OECD 2018; EU 2019). They are considered central to innovation, social participation, and employability in the 21st century. The literature also increasingly points to the need to anchor these skills not only selectively but systematically in everyday teaching (see Scharnhorst 2021). While 21<sup>st</sup> century skills highlight innovation and collaboration for employability (Voogt & Pareja Roblin 2012, OECD 2018), transversal competencies as defined by UNESCO broaden this scope to include ethics, media literacy, and well-being, thereby promoting lifelong, cross-contextual learning (UNESCO 2016).

### **2.3 The Six UNESCO Dimensions of Transversal Competencies**

UNESCO offers a particularly differentiated framework with its definition of transversal skills, as formulated by the ERI-Net (Education Research Institutes Network) in 2016. Transversal

skills are characterized by their cross-contextual applicability and are therefore not limited to specific subject areas (cf. UNESCO 2016). The six central dimensions are:

1. Critical and innovative thinking → Problem-solving skills, creative idea development, reflection
2. Interpersonal skills → Communication, teamwork, empathy, conflict resolution
3. Intrapersonal skills → Self-awareness, self-discipline, emotion regulation, resilience
4. Global citizenship → Ethical thinking, social responsibility, intercultural sensitivity
5. Media and information literacy → Critical engagement with digital information, use of technologies
6. Physical and mental health → Stress management, healthy lifestyle, mental resilience

The dimensions form the conceptual backbone of the present study. They were used to systematically record educators' self-assessment of their teaching practice and the assessment of its implementation by learners. The six UNESCO dimensions align closely with international competence frameworks developed by the OECD (2018) and the European Commission (2019), both of which emphasize transversal abilities such as creativity, resilience, self-regulation, and digital literacy as essential skills for the future.

## 2.4 Transversality and Competence Transfer

Transversal skills are characterized by their applicability across contexts — they are effective not only in a specific subject area, but also in everyday situations, social contexts, and new learning situations (Hart et al. 2021). The question of when skills are actually 'transversal' is closely linked to the concept of transfer. According to Scharnhorst & Kaiser (2018), transversality exists when individuals are able to flexibly transfer existing knowledge or skills to new contexts. It is not the skill itself that is transversal, but rather the ability to shift contexts – in other words, adaptive transfer. However, empirical findings show that transfer does not automatically succeed. Competencies acquired in specific situations often remain tied to the learning context (Weinert 1998). Transfer is particularly successful when learning processes offer a wide range of application possibilities — e.g., through project-based or research-based learning, interdisciplinary tasks, or reflection phases. This study therefore examines not only the presence of individual skills, but also their perceived transferability to different areas of life and learning – a central feature of transversal competence development.

## 3. METHODOLOGY

This study follows a quantitative, cross-sectional research design to explore how teachers from diverse educational settings across Europe perceive the promotion and implementation of transversal skills in their teaching practice. The investigation is guided by two central research questions: (1) *To what extent do teachers actively foster transversal competencies in their classrooms?* (2) *How do they assess the manifestation of these competencies among their students?* The research focuses on the six domains of transversal skills as defined by the UNESCO ERI-Net framework (UNESCO 2016), encompassing critical and innovative thinking, interpersonal skills, intrapersonal skills, global citizenship, media and information literacy, and physical and mental well-being. In line with the varying terminology in international discourse, the terms transversal skills and transversal competencies are used

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interchangeably in this study, both referring to cross-contextual abilities that foster adaptability and lifelong learning. Data collection from October to December 2024 was carried out via an online questionnaire. Participation was voluntary, anonymous, and preceded by a detailed information sheet explaining the purpose of the study and the university's data protection policies. To ensure a diverse and representative sample, we recruited participants through various channels including institutional mailing lists from Erasmus+ projects, regional teacher networks, higher education consortia, and professional development associations. Additional outreach was conducted via social media platforms. The questionnaire was available in English to facilitate cross-national participation. 182 responses were received, 146 of which were included in the analysis. The sample represents teachers from 16 European countries and encompasses all major educational sectors: 45.2% of participants were employed in higher education, 31.5% in secondary schools, 16.4% in vocational training institutions, and 6.9% in primary education.

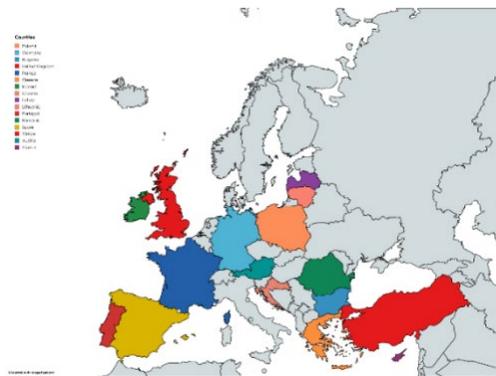


Figure 1. Participating teachers from 16 European countries

Gender distribution was nearly balanced, with 50% identifying as female, 48.6% as male, and 1.4% as non-binary or diverse. The age distribution ranged from under 30 to over 50, ensuring generational diversity in professional perspectives. Teaching experience varied considerably: approximately one-third of respondents had more than 20 years of professional practice, while another third had fewer than ten years. Subject representation was broad, with a concentration in STEM fields (54.8%), followed by language education (19.9%), humanities (15.8%), and other disciplines (9.6%).

The instrument used in this study was a structured questionnaire divided into two parts, both aligned with the six UNESCO domains. Part A focused on teachers' self-assessment regarding their ability to foster transversal skills. Part B asked teachers to evaluate how well their students apply these skills in academic or everyday contexts. Each of the six dimensions was measured using four items per section, for a total of 48 statements. Responses were collected on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), allowing for nuanced insights into attitudes and perceptions. Sample items from Part A (teacher self-assessment) included statements such as "I actively integrate problem-solving strategies into my teaching" or "I frequently use modern technologies in the design and implementation of my teaching."

Table 1. Sample Items from Part A – Teacher Self-Assessment

<b>Dimension</b>	<b>Sample Items</b>
<b>Critical and Innovative Thinking</b>	“I actively integrate problem-solving strategies into my teaching.”
<b>Interpersonal Skills</b>	“I establish an open and ongoing culture of communication between everyone involved in my teaching.”
<b>Intrapersonal Skills</b>	“I know the strengths and weaknesses of my teaching personality.”
<b>Global Citizenship</b>	“In my teaching, I place a high value on ethical thinking in my students.”
<b>Media and Information Literacy</b>	“I frequently use modern technologies in the design and implementation of my teaching.”
<b>Physical and Mental Health</b>	“I attach great importance to teaching my students a balanced way of life and to setting a good example.”

Sample items from Part B (student competence perception) included “Your students communicate effectively with each other” or “Your students reflect on their own thinking.” The item construction was theory-driven and operationalized based on descriptors from the UNESCO framework.

Table 2. Sample Items from Part B – Student Competence Perception

<b>Dimension</b>	<b>Sample Items</b>
<b>Critical and Innovative Thinking</b>	“Your students reflect on their own thinking.”
<b>Interpersonal Skills</b>	“Your students communicate effectively with each other.”
<b>Intrapersonal Skills</b>	“Your students can regulate their emotions appropriately.”
<b>Global Citizenship</b>	“Your students recognize their responsibility to the community.”
<b>Media and Information Literacy</b>	“Your students are able to interpret digital information appropriately.”
<b>Physical and Mental Health</b>	“Your students take care of their physical well-being.”

The data were analyzed using descriptive statistics, including mean values and standard deviations. This analytical approach was chosen due to the heterogeneity of the sample and the exploratory nature of the research. Rather than aiming to generalize to the population through inferential statistics, the analysis focused on identifying patterns, distributions, and potential discrepancies between teachers’ self-assessments and their perceptions of student competencies. All analyses were conducted using the statistical software JASP (JASP Team, 2024).

To provide supplementary, context-sensitive insights that complemented the findings of the broad survey, a second, qualitatively oriented data collection was conducted. From February to September 2025, an open online questionnaire was disseminated to teachers and lecturers in Germany. The instrument applied an Observe–Act–Check (O–A–C) scaffold as a pragmatic adaptation to capture practice-near evidence from teachers and was aligned with the six UNESCO ERI-Net domains of transversal skills (UNESCO 2016). For the domain of media and information literacy, an additional component was included addressing the critical evaluation of AI-generated content. The qualitative sample consisted of 10 teachers and lecturers from general education schools, vocational training institutions, and higher education. Eligibility criteria required a minimum of three years of professional teaching experience and an ongoing teaching position. Participation was voluntary and anonymous, and – as in the quantitative phase – was preceded by an information sheet outlining the study’s objectives and data protection policies. To protect confidentiality, respondents are referenced as P1–P10 in the results section,

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with the respective institutional context specified in brackets (e.g., “P7, higher education”). The completion time ranged from 30 to 45 minutes, depending on the level of detail provided in the responses.

The study employed a convergent mixed-methods design. The quantitative survey provided broad descriptive patterns across Europe, while the qualitative exploration generated in-depth, context-sensitive insights into the fostering, hindering, and assessment of transversal competencies in practice.

#### 4. RESULTS

For each of the six UNESCO domains of transversal skills, mean values ( $M$ ) and standard deviations ( $SD$ ) were calculated in order to describe central tendencies and variances across the responses. This descriptive approach aligns with the study’s objective to capture both the self-assessment of teachers and their perceptions of how learners demonstrate transversal competencies in various educational contexts. Across all six domains, teachers rated their own ability to promote transversal competencies consistently higher than their assessment of the students’ actual application of these skills. The largest discrepancies were found in the domains of critical and innovative thinking, intrapersonal skills, and media and information literacy. Table 3 summarizes mean scores ( $M$ ) and standard deviations ( $SD$ ) for each item across all six UNESCO dimensions, reporting both teachers’ self-assessed ability to promote transversal skills and their evaluation of how well students demonstrate these skills.

Table 3. Descriptive Statistics ( $M$ ,  $SD$ ) for Teachers' and Students' Ratings by UNESCO Skill Domain

Domain	Item	Teachers $M$ ( $SD$ )	Students $M$ ( $SD$ )
<b>Critical and Innovative Thinking</b>	Critical Reflection	4.01 (0.81)	3.82 (0.76)
	Problem-solving strategies	3.98 (0.88)	3.75 (0.72)
	Creativity	4.05 (0.78)	3.68 (0.81)
	Innovative Thinking	4.00 (0.78)	3.75 (0.80)
<b>Interpersonal Skills</b>	Communication	3.96 (0.87)	3.88 (0.74)
	Teamwork	3.87 (1.00)	3.87 (0.78)
	Conflict resolution	4.03 (0.83)	3.78 (0.85)
	Empathy	4.10 (0.85)	3.86 (0.84)
<b>Intrapersonal skills</b>	Self-discipline	3.82 (0.78)	3.61 (0.75)
	Self-awareness	4.04 (0.84)	3.63 (0.81)
	Emotional regulation	3.95 (0.79)	3.70 (0.80)
	Resilience	3.96 (0.80)	3.68 (0.79)
<b>Global Citizenship</b>	Ethical thinking	3.91 (0.87)	3.69 (0.72)
	Intercultural understanding	4.02 (0.75)	3.68 (0.82)
	Social responsibility	3.99 (0.76)	3.74 (0.78)
	Global perspective	3.72 (0.91)	3.67 (0.81)

<b>Media and Information Literacy</b>	Ethical Use of Digital Media	3.98 (0.83)	3.68 (0.90)
	Critical evaluation of information	4.08 (0.81)	3.86 (0.82)
	Using Media Tools	3.98 (0.96)	3.79 (0.83)
	Awareness of Media Influence	4.12 (0.78)	3.85 (0.84)
<b>Physical and Mental Health</b>	Digital interpretation	3.60 (0.95)	3.39 (0.77)
	Stress management	3.87 (0.82)	3.38 (0.82)
	Physical and Mental Health	3.99 (0.88)	3.52 (0.80)
	Mental health support	3.85 (0.83)	3.56 (0.77)

To visualize these discrepancies, Figure 2 presents the item-level gaps across all domains.

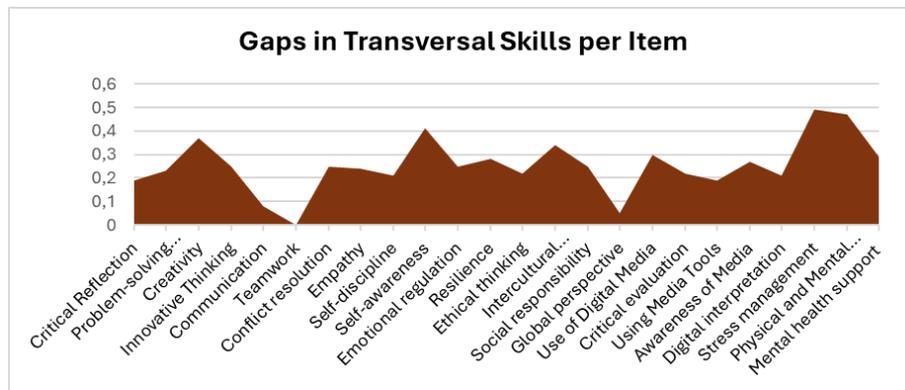


Figure 1. Gaps in Transversal Skills per Item

Figure 3 summarizes the average gap per UNESCO dimension to highlight overarching trends in teacher – student discrepancies.

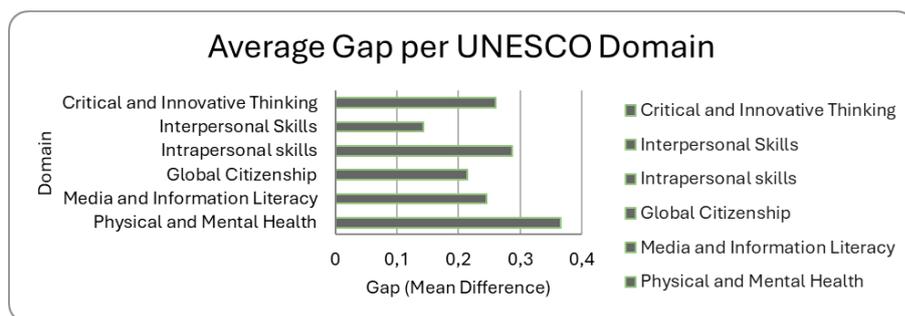


Figure 2. Average Gap per UNESCO Domain

To complement the descriptive findings, qualitative data from ten teachers and lecturers were analyzed and presented alongside the quantitative results for each domain. To ensure comparability, the qualitative results are structured according to the same six UNESCO

domains. These results focus on specific teaching and learning scenarios, highlighting the conditions under which transversal skills were either promoted or hindered.

**Notation:** Interview participants are coded as P1–P10. In the first mention, the educational setting is specified (S = school; H = higher education). Subsequent references use only the participant code (e.g., P3, P7).

## 4.1 Critical and Innovative Thinking

This domain encompasses skills such as critical reflection, creativity, problem-solving, and innovative thinking. According to Scriven and Paul (1987), critical thinking involves reasoned judgment and reflective analysis. Teachers reported high engagement in fostering such skills, particularly creativity ( $M = 4.05$ ) and critical reflection ( $M = 4.01$ ). However, students were rated notably lower in these areas (e.g., creativity:  $M = 3.68$ ), indicating a gap in transfer. This suggests that while instructional practices are in place, learners may struggle to apply these cognitive skills autonomously, particularly in unfamiliar or complex scenarios.

Qualitative data illustrate similar patterns. P1 (S) reported that critical thinking becomes visible when students are encouraged to question everyday issues and transfer knowledge to new contexts. P5 (H) and P10 (H) highlighted that project-based formats are particularly effective in eliciting creative approaches. In contrast, P3 (S) and P4 (S) noted that tightly structured exams focused on reproduction inhibit critical and innovative thinking. Several participants (P7, P9, P10) critically reflected that their own teaching behaviors — such as presenting model solutions too early or adhering strictly to a narrow canon — may unintentionally stifle innovative approaches. A best-case example (P9) documented how two student groups developed different but equally viable solutions, while a worst-case scenario (P7) described learners reproducing predetermined patterns without reflection.

## 4.2 Interpersonal Skills and Intrapersonal Skills

Interpersonal skills involve the ability to interact constructively with others through communication, empathy, and collaboration. Here, the gap was comparatively small. Teachers and students provided almost identical ratings for teamwork ( $M = 3.87$ ), and communication ratings were closely aligned. Minor differences in empathy ( $\Delta M = 0.24$ ) and conflict resolution ( $\Delta M = 0.25$ ) suggest that interpersonal skills are not only promoted but also meaningfully perceived by learners in classroom contexts.

This domain includes internal abilities such as self-awareness, resilience, and emotional regulation. Teachers rated themselves highly, especially on self-awareness ( $M = 4.04$ ) and resilience ( $M = 3.96$ ), but perceived student competencies were substantially lower (e.g., resilience:  $M = 3.68$ ). This reveals a pronounced self-regulation gap, reflecting the difficulty of externally assessing and fostering metacognitive and emotional competencies in learners. As such, more explicit support structures like mentoring or reflective practices may be needed. This may be attributable to the internal and less observable nature of such competencies, which renders them challenging to assess externally. Intrapersonal skills such as resilience and self-awareness frequently elude external observation and are often underrepresented in conventional evaluation frameworks (Spitzberg & Cupach, 2011; UNESCO 2016).

Qualitatively, participants emphasized that cooperation thrives when structures are clear and roles rotate regularly (P2, H; P6, S). P8 (S) noted that implicit expectations by teachers can fix roles and hinder collaboration. University lecturers (P5, P7, P10) described how their own discussion dominance or early interventions sometimes disrupted negotiation processes, rendering students passive. Conversely, P4 (S) reported that team charters and rotating roles fostered active participation.

Regarding intrapersonal skills, nearly all participants (P1, P2, P6, P9) observed that stressors such as exams, time pressure, or competing demands often led to withdrawal and demotivation. P7 and P10 reflected that their own insecurities or high expectations could exacerbate these effects. Supportive strategies mentioned include micro-reflections (P9), logbooks (P6), intermediate goals (P1), and e-portfolios (P10). While P9 described worst-case scenarios of withdrawal under overload, P7 provided best-case examples where students actively applied previously learned coping strategies.

### **4.3 Global Citizenship**

Global citizenship is the idea that individuals are not just members of their local or national communities, but also of a broader global community. A global citizen is aware of the wider world, respects and values diversity, and acts responsibly to make the world more just, sustainable, and peaceful (Wintersteiner 2022). Global citizenship encompasses ethical awareness, social responsibility, and intercultural understanding. While teachers perceived themselves as strongly integrating these values (e.g., intercultural understanding:  $M = 4.02$ ), student ratings lagged behind (e.g., global perspective:  $M = 3.67$ ). This engagement gap may stem from a lack of authentic learning opportunities that allow students to experience civic and ethical issues in tangible ways. These findings point to the need for authentic learning environments that allow students to actively engage with real-world ethical, intercultural, and civic challenges.

The qualitative findings underscore the importance of authenticity. P9 (S) described a sustainability project in which student suggestions were directly implemented by the school. P10 (H) emphasized service-learning as a way to foster responsibility. In contrast, P3 (S) reported that abstract tasks without real-world relevance had little effect. P7 and P8 noted that unexamined assumptions by teachers - such as using stereotypical examples or framing global issues from a solely Western viewpoint - blocked perspective-taking. Effective practices included collaborations with external partners (P4) and the use of impact statements (P10) that prompted ethical reflection. Worst-case scenarios (P3) involved tokenistic projects with no meaningful outcomes.

### **4.4 Media and Information Literacy**

Media and Information Literacy is the ability to create, use, access, analyze, and evaluate information and media in a critical and ethical way. It is designed to empower individuals and especially media creators to make informed decisions as users and creators of media and information (Koltay 2011).

This domain reflects the capacity to access, evaluate, and ethically use media. Despite high teacher ratings for media use (e.g., awareness of media influence:  $M = 4.12$ ), students were rated lower across all items (e.g., ethical use:  $M = 3.68$ ), indicating a digital literacy gap. This points

to an implementation challenge commonly noted in international studies, underlining the importance of structured digital education that moves beyond tool use toward critical understanding. This mismatch reflects a wider implementation gap observed in international studies. OECD TALIS (2018) reported that many teachers still feel underprepared for digital instruction, despite high political and curricular emphasis. This underscores the importance of explicitly embedding media literacy in the curriculum.

The qualitative results offer supplementary information. Learners frequently accepted information from social media without critical evaluation, yet they demonstrated critical evaluation when explicitly prompted or when success was contingent upon it (P1, P2). P5, P7, and P10 acknowledged that their own narrow subject focus might restrict students' evaluative skills. A central challenge pertained to the utilization of AI-generated content: P8, P9, and P10 reported that learners frequently accepted chatbot outputs as valid due to their fluent style, without checking sources or evidence. The proposed interventions encompass transparency requirements, joint in-class evaluations, and ethical discussions concerning authorship, bias, and responsibility (P7, P10). Evidence of progress was observed in cases where students documented the integration of artificial intelligence (AI) into their academic work (P9) and critically revised and integrated outputs into their arguments (P10). In the most unfavorable of circumstances (P8), there was an instance of unquestioningly accepting AI-generated texts as authentic sources.

#### **4.5 Physical and Mental Health**

As a transversal skill, physical and mental health refers not just to personal well-being, but to the knowledge, attitudes, and behaviors that support a healthy lifestyle and enable individuals to function effectively in all areas of life—education, work, and social settings (Weber et al. 2025). This domain yielded the lowest student ratings overall. While teachers reported solid engagement in modeling healthy behaviors (e.g.,  $M = 3.87$ ), student scores for stress management ( $M = 3.38$ ) and mental health support ( $M = 3.56$ ) were significantly lower. This well-being gap underscores the need for stronger institutional support for mental and physical health, including psychosocial resources and preventive education.

The qualitative data reveal analogous trends. The utilization of support services was predominantly in response to acute crises, as evidenced by the findings (P6, P9). Stress, overload, and exam anxiety have been identified as significant factors that have shaped both school and university contexts. P7 and P10 acknowledged that their own behaviors, including constant availability and inadequate rest periods, contributed to these patterns. The effective measures that emerged from this analysis included low-threshold coping routines (P1, P6), mindfulness practices (P9), preventive counseling (P10), and clear communication rules (P7). P6 delineated the most unfavorable possible outcomes associated with the tabooing of stress and the escalating rate of student attrition. P7 emphasized optimal scenarios in which learners proactively employed support resources and transferred coping strategies to subsequent challenges.

Taken together, the findings across domains highlight that transversal competencies are not only shaped by task design and context, but also by the degree of teachers' self-reflection. Participants who critically addressed their own professional "backpack" of assumptions, perfectionism, or control tendencies (P7–P10) described more effective learning environments in which experimentation, failure, and growth were possible. To synthesize these findings, the

following O–A–C matrix condenses the observed patterns, supportive actions, and process and outcome indicators for each UNESCO domain across all ten cases (Table 4). This overview complements the narrative results and highlights both convergent tendencies and critical divergences between school, vocational, and higher education contexts.

Table 4. O-A-C Matrix across UNESCO domains

UNESCO Domain	Observe (O)	Act (A)	Check (C)
<b>Critical &amp; Innovative Thinking</b>	Creativity visible in open tasks, projects, transfer; inhibited by standardization, exams, early model solutions (P1, P3, P5, P7, P9, P10).	Scaffolding, project-based tasks, portfolio assessment, teacher withdrawal to foster iteration (P1, P4, P7, P9, P10).	<b>Process:</b> Hypothesis-building, justification depth, iterative strategies (P2, P6). <b>Outcome:</b> Competitions, innovative projects, workplace applications (P5, P9).
<b>Interpersonal Skills</b>	Collaboration succeeds with clear roles, climate, relevance (P2, P6); inhibited by barriers, dominance, lack of norms (P4, P8).	Peer feedback, rotating roles, team charters, conversational norms (P2, P4, P6, P7).	<b>Process:</b> Balanced participation, interaction quality (P6, P8). <b>Outcome:</b> Coherent results, team satisfaction, constructive conflict resolution (P2, P9).
<b>Intrapersonal Skills</b>	Self-regulation visible in stress, setbacks; inhibited by overload, tight deadlines, lack of pauses (P1, P3, P6, P7, P9).	Reflection routines, mentoring, micro-reflections, teacher transparency about limits (P6, P7, P9, P10).	<b>Process:</b> Regular reflection, timely help-seeking, persistence (P1, P6). <b>Outcome:</b> Stronger self-awareness, reduced dropouts, resilience (P8, P10).
<b>Global Citizenship</b>	Responsibility emerges in authentic, socially relevant contexts; inhibited by abstract, decontextualized tasks (P3, P9, P10).	Service-learning, NGO partnerships, inclusion initiatives, case-based projects (P4, P9, P10).	<b>Process:</b> Perspective diversity, reflection rates (P8). <b>Outcome:</b> Value awareness, ethical reasoning, institutional uptake of student initiatives (P9).
<b>Media &amp; Information Literacy</b>	Critical checks rare unless required; everyday use superficial; AI outputs often accepted uncritically for style/fluency (P1, P2, P3, P8, P9, P10).	Fact-checks, transparency obligations for AI, analysis of bias/hallucination, ethical discussions (P7, P9, P10).	<b>Process:</b> Source paths, disclosure of AI use, evidence steps (P2, P9). <b>Outcome:</b> Reasoned integration, rejection, or correction of AI outputs (P8, P10).
<b>Physical &amp; Mental Health</b>	Help-seeking often only under overload; inhibited by stigma, taboo, lack of support (P3, P6, P7, P9).	Coping routines, stress management, counseling offers, teacher role modeling (P1, P6, P7, P9, P10).	<b>Process:</b> Participation in coping routines, early help-seeking (P6). <b>Outcome:</b> Reduced test anxiety, stronger resilience, improved self-efficacy (P8, P9, P10).

## 5. DISCUSSION AND IMPLICATIONS

This study applies a convergent mixed-methods design. The quantitative component consisted of a cross-sectional survey among teachers from diverse educational settings across Europe, guided by two central research questions: (1) *To what extent do teachers actively foster transversal competencies in their classrooms?* (2) *How do they assess the manifestation of these competencies among their students?* The research focuses specifically on the six domains of transversal skills as defined by the UNESCO ERI-Net framework (UNESCO, 2016), encompassing critical and innovative thinking, interpersonal skills, intrapersonal skills, global citizenship, media and information literacy, and physical and mental well-being.

To complement these descriptive results, a qualitative component was added. This consisted of open online questionnaires with ten teachers and lecturers in Germany. The instrument followed the Observe–Act–Check (O–A–C) structure and invited participants to describe concrete classroom or teaching situations in which transversal skills were either fostered or inhibited, as well as the measures they would apply to support learners and the indicators by which progress could be observed. This approach yielded context-sensitive insights into mechanisms and conditions underlying the quantitative patterns.

### 5.1 Interpretation of Key Findings and Implications for Educational Practice

The findings of this study offer valuable insights into how transversal competencies are perceived and fostered in contemporary educational practice. The overall alignment between the self-assessed efforts of teachers and their pedagogical intentions indicates that transversal skills are widely recognized as central to modern teaching. However, the notable discrepancies between teachers' self-perception and their assessment of student competencies across several domains reveal a gap between didactic planning and actual learner integration. This pattern was particularly visible in the domains of critical and innovative thinking, intrapersonal development, physical and mental health. In all three, teachers rated their own strategies as effective, yet assessed student competencies as comparatively underdeveloped. These gaps suggest that transversal competencies, while addressed conceptually, may not yet be sufficiently internalized or activated by learners. This could be due to a lack of reflective engagement, insufficient practice opportunities, or the absence of explicit scaffolding in these areas. Conversely, the smaller gaps observed in the interpersonal domain (e.g., communication and teamwork) may be attributable to the fact that these skills are inherently practiced in collaborative classroom settings and are more visible in student interactions. These findings align with prior research indicating that visible competencies - such as teamwork or participation - are more easily observed and reinforced by educators than invisible ones, such as self-regulation or ethical reasoning (cf. Scharnhorst, 2021).

The qualitative results help to contextualize and explain these quantitative gaps. In the domain of critical and innovative thinking, participants reported that examination formats emphasizing reproduction limited opportunities for creative engagement (P3, P4). Conversely, some teachers acknowledged that presenting model solutions too early inadvertently constrained student initiative (P7, P10). Best-case scenarios demonstrated that when tasks permitted multiple solutions, learners developed original and viable approaches (P9). With respect to intrapersonal skills, participants described how stress and withdrawal among learners often

emerged in high-pressure contexts, such as exams. They further described how teachers' own insecurities or high expectations could amplify these dynamics (P7, P10). Measures such as logbooks, portfolios, and structured reflection tasks were reported as effective supports (P6, P9, P10). In the domain of physical and mental health, teachers highlighted that stress, overload, and exam anxiety frequently limited students' capacity to sustain engagement. Qualitative accounts described how learners often sought support only in acute crisis situations (P6, P9), while preventive routines such as mindfulness practices or short coping exercises remained underutilized. Several participants acknowledged that their own behavior, such as constant availability or insufficient attention to breaks, inadvertently reinforced unhealthy patterns (P7, P10). At the same time, best-case examples documented that low-threshold interventions and transparent communication of support services enabled students to actively transfer coping strategies into future learning situations (P7).

Although the quantitative gap in media and information literacy was less pronounced than in the domains above, the qualitative findings revealed substantial challenges. Students frequently accepted AI-generated content without critical evaluation (P8, P9, P10), thereby compounding existing digital literacy deficits. However, cases in which learners documented and critically revised AI outputs (P9, P10) illustrated conditions under which these skills can be meaningfully fostered. This suggests that the rise of AI tools magnifies the urgency of embedding systematic critical media literacy in both school and higher education.

The findings of this study yield several significant implications for both pedagogical practice and educational policymaking. As transversal competencies increasingly constitute the foundation of education that is prepared for the future, their role within curricula must be redefined. Rather than remaining marginal or implicit, these competencies require systematic and measurable integration across disciplines. This encompasses the development of modular units that explicitly target skills such as interdisciplinary problem-solving, ethical reasoning, and digital literacy. The integration of transversal competencies in this manner guarantees congruence between the curricular objective and the instructional praxis, while concurrently cultivating coherence across educational strata and contexts.

At the level of professional development, the results indicate a clear need to strengthen teachers' capacity to operationalize transversal learning outcomes. While the participating educators demonstrated high levels of self-reported engagement, the observed discrepancy between teaching intent and perceived student uptake suggested the need for additional support. In particular, evidence-based training formats - emphasizing reflective practice, collaborative design, and context-sensitive adaptation - have the potential to empower educators to translate abstract skill frameworks into pedagogically grounded action. Furthermore, the study underscores the significance of learner activation in the cultivation of transversal competencies. Given the inherent latent or cross-contextual nature of many of these competencies, it is possible for students to engage in transversal learning without being able to recognize or articulate it. In order to address this need, the integration of metacognitive scaffolds is imperative. Such scaffolds include reflective journals, formative peer assessment, and structured feedback mechanisms. These elements not only promote learner agency and self-regulation but also render transversal learning more visible and meaningful.

Institutional support structures are indispensable for sustaining transversal skill development. Educational settings should offer enabling environments that extend beyond subject instruction, including project-based learning ecosystems, mentorship programs, and psychosocial support systems. These structures are designed to facilitate the long-term cultivation of competencies that are not only relevant for academic success but also critical for navigating social, technological, and ethical challenges in an increasingly complex world.

## 5.2 Limitations and Future Research

The present study is exploratory and based on self-reported data from a non-representative, self-selecting sample of educators, many of whom likely had a strong interest in pedagogical innovation. While the cross-national scope enhances the relevance of the findings, the exclusive reliance on teacher self-assessments introduces potential bias. Future research should therefore triangulate data sources, for example through student self-reports, classroom observations, or performance-based assessments, in order to strengthen validity. Longitudinal designs may further capture the development of transversal competencies over time. The qualitative strand was limited by its small sample size ( $n = 10$ ) and the self-selecting nature of participation, which restricts the generalizability of its insights. Moreover, its exploratory design was not guided by predefined research questions, but by a practice-oriented scaffold (O–A–C), which privileges depth and contextual richness over systematic comparability. While this approach yielded valuable, practice-near evidence, the findings remain subject to respondent subjectivity and lack external validation through independent observations. Future research should therefore expand the qualitative base through larger samples, focus groups, or classroom-based ethnographies. It should also examine transversal meta-competencies such as teacher self-reflexivity more systematically, as this factor emerged as central in shaping the conditions for transversal learning. In addition, experimental and intervention studies are needed to test the effectiveness of specific pedagogical strategies, for example portfolios, reflective routines, or AI-literacy practices, on transversal skill development. Beyond conventional classroom contexts, future studies should investigate how transversal skills are cultivated in innovative learning environments, such as game-based learning, escape rooms, role-playing scenarios (including tabletop formats), or so-called “mind arenas” (immersive settings designed for collaborative problem-solving and resilience under time pressure). These formats offer authentic opportunities for learners to engage in teamwork, critical thinking, and adaptive coping, and thus provide promising avenues for examining transversal skill transfer in action. Comparative analyses across disciplines, educational levels, and cultural contexts will further strengthen the evidence base and inform sustainable, context-sensitive integration of transversal competencies into curricula and teacher education.

## 6. CONCLUSION

This study contributes to the expanding body of research on transversal skills by offering empirical insights into how educators perceive and foster these skills across diverse European educational contexts. While the findings confirm a high level of teacher engagement, they also reveal a persistent discrepancy between pedagogical intention and perceived student application. This gap was particularly pronounced in the domains of intrapersonal skills, critical and innovative thinking, and physical and mental health, highlighting the challenges of fostering less visible, internalized skills. By contrast, more observable domains such as interpersonal collaboration showed greater alignment between teacher practice and student outcomes. These discrepancies underscore the need for more explicit instructional strategies, enhanced metacognitive scaffolding, and supportive institutional structures to ensure that transversal learning is not only addressed conceptually but also internalized by learners. In the future, the integration of transversal skills must become a strategic priority across all levels of education.

This integration should not only respond to current societal challenges but also establish a foundation for resilient, reflective, and future-ready learners. To ensure long-term impact, the integration of transversal skills require scalable, age-appropriate, and pedagogically sound learning environments. Digital, modular platforms tailored to different age groups and subject areas, featuring adaptive, game-based, role-playing, or AI-assisted components, offer promising opportunities for skill development. Embedding such environments into national and international curricula can strengthen the systematic promotion of transversal skills across education systems. Comparative implementation strategies across disciplines, educational levels, and teacher profiles will further enable sustainable and context-sensitive integration. At the same time, this study lays the groundwork for a comprehensive research agenda. Future studies should not only refine quantitative measurement and triangulate perspectives but also expand qualitative inquiry into how transversal skills are fostered in practice. While the qualitative strand of this study was limited to Germany, future research should extend such practice-oriented inquiry to a broader European context in order to capture cross-national specificities and provide comparative insights into how transversal skills are cultivated in diverse educational systems. Particular attention should be given to transversal meta-skills such as teacher self-reflexivity, which emerged as a crucial factor in shaping enabling learning environments.

In conclusion, transversal skills play a critical role in shaping well-rounded, adaptable, and future-ready individuals. Unlike technical or domain-specific abilities, transversal skills, including critical and innovative thinking, interpersonal and intrapersonal skills, global citizenship, media and information literacy, and physical and mental well-being, are transferable across contexts of life and work. These skills enhance not only academic and professional performance but also personal development and social responsibility. In an increasingly complex and interconnected world, cultivating transversal skills equips learners and professionals with the tools to navigate change, solve problems, and collaborate effectively. As such, education systems, employers, and policymakers must prioritize the systematic development of these skills within curricula, workplace training, and lifelong learning initiatives. Ultimately, transversal skills are not merely complementary to traditional education; they are essential for success in the twenty-first century.

## REFERENCES

- Ameln, F. v. and Wimmer, R., 2016. Neue Arbeitswelt, Führung und organisationaler Wandel. *Gruppendynamik und Organisationsberatung*, Vol. 47, No. 1, pp. 11-21.
- Bauer, M., Knape, J., Koch, P. and Winkler, S., 2010. Dimensionen der Ambiguität. *Zeitschrift für Literaturwissenschaft und Linguistik*, Vol. 40, No. 158, pp. 7-75.
- Bergmann, R. and Garrecht, M., 2021. Organisation und Projektmanagement. In *BA kompakt*. <https://doi.org/10.1007/978-3-662-63754-8>
- European Commission, 2000. *Memorandum of lifelong learning*. Brussels, Office for Official Publications of the European Communities.
- European Union, 2019. *Key competencies for lifelong learning*. Publications Office of the European Union.
- Hart, J., Noack, M., Plaimauer, C. and Bjørnåvold, J., 2021. *Towards a structured and consistent terminology on transversal skills and competences*. Brussels.
- Harwardt, M., 2022. *Management der digitalen Transformation*. Springer Fachmedien Wiesbaden.

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- JASP Team, 2024. *JASP (Version 0.19.3)* [Computer software].
- Koltay, T., 2011. The media and the literacies: Media literacy, information literacy, digital literacy. *Media, culture & society*, Vol. 33, No. 2, pp. 211-221.
- OECD, 2018. *The future of education and skills: Education 2030*. OECD Publishing.
- OECD, 2020. *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, TALIS. Paris, OECD Publishing. <https://doi.org/10.1787/19cf08df-en>.
- Sambaiah, M. and Aneel, Y., 2016. Intrapersonal skills as core of the personality: Some home truths. *Journal of english language and literature*, Vol. 3, No. 1, pp. 225-230.
- Scharnhorst, U., 2021. Transversale Kompetenzen- notwendig, erwünscht und schwierig zu erreichen. *BWP*, Vol. 1, pp. 18-23.
- Scharnhorst, U. and Kaiser, H., 2018. Transversale Kompetenzen für eine ungewisse digitale Zukunft. In J. Schweri, I. Trede and I. Dauner (eds.) *Digitalisierung und Berufsbildung: Herausforderungen und Wege in die Zukunft* (OBS EHB Trendbericht 3, 9-12). OBS EHB.
- Schleicher, A., 2018. *World Class: How to Build a 21<sup>st</sup> – Century School System, Strong Performers and Successful Reformers in Education*. Paris, OECD Publishing.
- Schütte, R., Seufert, S. and Wulfert, T., 2022. *IT-Systeme wirtschaftlich verstehen und gestalten: Methoden-Paradoxien- Grundsätze*. Springer Gabler.
- Scriven, M. and Paul, R., 1987, March. Critical thinking. In *The 8th Annual International Conference on Critical Thinking and Education Reform, CA*, Vol. 7, No. 9.
- Spitzberg, B. H. and Cupach, W. R., 2011. Interpersonal skills. *The Sage handbook of interpersonal communication*, Vol. 4, pp. 481-527.
- UNESCO, 2015. *Transversal competencies in education policy and practice*. UNESCO Asia-Pacific Regional Bureau for Education.
- UNESCO, 2016. *ERI-Net Asia-Pacific Regional Policy Series 2014: Transversal competencies in education policy and practice*. Paris, UNESCO Publishing.
- Voogt, J. and Pareja Roblin, N., 2012. A comparative analysis of international frameworks for 21<sup>st</sup> century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, Vol. 44, No. 3, pp. 299-321.
- Weber, A. M. et al., 2025. Psychological Science and the Blind Spot in Education: Learning and Instruction of Transversal Skills in the Twenty-First Century. *Educational Psychology Review*, Vol. 37, No. 2, 41.
- Weinert, F. E., 1998. Concept of competence: A conceptual clarification. In D. S. Rychen and L. H. Salganik (eds.) *Definition and selection of competencies*, pp. 45-66.
- Wintersteiner, W., 2022. Global citizenship education. In W. Beutel et al. (Hrsg.) *Handbuch Demokratiepädagogik*. Frankfurt Main, Debus verlag, pp. 347-360.
- Zukunftsinstitut, 2022. *Das Potenzial der Megatrends für Strategie und Management*.