



STIAEM

Slow Tech Innovation

AI, Ethics and
New Teaching Methods

NATIONAL REPORT TÜRKİYE



Università di Foggia
Studi Umanistici, Lettere, Beni Culturali,
Scienze della Formazione



İSTANBUL - ESENLER
İLÇE MİLLÎ EĞİTİM MÜDÜRLÜĞÜ



1474



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PROJECT STIAEM INFORMATION

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Preface

This report offers a systematic, empirically grounded, and methodologically integrated mapping of Artificial Intelligence within the Turkish school system. As a further scientific and strategic deliverable developed under Action 2 of Work Package 2 (WP2) of the international Erasmus+ STIAEM consortium (Slow Tech Innovation: AI, Ethics, and New Teaching Methods - 2025-1-IT02-KA220-SCH-000365213), this document establishes a stable database to understand how AI is perceived, utilized, and regulated in Turkish school practice. Through a computational, psychometric, and qualitative investigation conducted on a national sample of 1,454 participants, comprising 1,070 students and 384 teachers, the research actively contributes to European and international priorities regarding the digital transition in education.

The epistemological horizon guiding the entire architecture of this research stands in clear discontinuity with technological determinism and the logic of accelerated efficiency characteristic of the algorithmic race. The conceptual framework of the report is firmly anchored in the Slow Tech paradigm and the human-in-the-loop approach, advocating for pedagogical models that promote a reflective, critical, and ecologically sustainable integration centered on human agency. The primary objective is to deconstruct the notion that AI Literacy equates solely to technical or executive skill in using commercial generative software. On the contrary, literacy is investigated here as a multidimensional competence encompassing affective, cognitive, behavioral, attitudinal, and ethical facets, serving as an axiological prerequisite for active, democratic, and aware digital citizenship.

The Turkish context renders this investigation particularly significant due to a distinct structural tension. On one hand, national digitalization policies and the role of the Ministry of National Education, coordinated through YEĞİTEK, place technological innovation within a centralized governance heavily oriented toward modernization. This systemic deployment has historically materialized through major national infrastructures, most notably the FATİH Project (FATİH Projesi), which anchored hardware and interactive technologies in classrooms nationwide, and the EBA (Eğitim Bilişim Ağı) digital platform, which standardized network-level content delivery. Furthermore, the management of digital vulnerabilities and information security within this centralized grid is legally bound by the national data protection framework, KVKK (Kişisel Verilerin Korunması Kanunu). On the other hand, the Türkiye Century Education Model introduces a pedagogical lexicon based on holistic education, values, virtues, action, depth of learning, and the integral development of the individual. The report thus interprets AI not as a mere infrastructure for efficiency, but as a cognitive, ethical, and cultural testing ground, demonstrating that this technology is capable of enhancing learning only if it is slowed down, questioned, contextualized, and subordinated to human judgment. On the methodological level, the rigor of this work is guaranteed by an integrated approach that combines the precision of quantitative data with the interpretative depth of qualitative evidence. The research does not limit itself to calculating descriptive percentages, but employs psychometric indicators, Likert distribution analyses, regressions, correlations, network analysis, and latent profiles to bring to light the less visible relationships among competences, attitudes, anxieties, perceived utility, and ethical decisions. This statistical framework is closely intertwined with the insights from focus groups, interviews, and dilemma scenarios, ensuring that numerical data becomes a lens through which to understand lived experiences, cultural resistance, professional apprehensions, and specific training needs within the Turkish school system.

To move beyond general statements and measure the actual ethical behavior of students and teachers, the research utilizes the Situational Judgment Tests (SJT) methodology. Participants were presented with concrete school-life simulations and forced-choice scenarios constructed around three core international challenges.

The axis of autonomy in the face of automation assesses the risk of blind delegation to technology, measuring the capacity of students to maintain a critical attitude toward errors, unverified sources,

and the hallucinations of generative AI, while investigating the risk for teachers of losing autonomy in instructional design, materials development, and the definition of their own professional role.

The area of the educational relationship and online privacy explores the protection of the personal, relational, and pedagogical sphere. Within the student sample, it highlights the tension between peer group inclusion and personal data protection, showing how viral applications can turn privacy into a social cost, while within the teacher sample, it questions the willingness to defend the human bond in the classroom when faced with competition from intelligent tutors active twenty-four hours a day.

The dimension of civic and ecological responsibility measures the awareness of the social and material impact of technologies. Among students, it analyzes sensitivity toward technological consumption, device repair, and the reduction of electronic waste, while among teachers, it observes how the use of AI in writing and assessment is balanced with the protection of cognitive effort, academic integrity, and educational equity.

The findings emerging from this mapping delineate a picture dense with structural paradoxes and pedagogical gaps that directly challenge institutions. Turkish students show high familiarity with AI tools and a strong sense of technical self-efficacy, yet they tend to place AI usage primarily within a practical, rapid, and functional sphere, such as for translations, ideas, homework, and study acceleration. At the same time, the data reveals a significant ethical awareness, particularly regarding human control, responsibility in system use, and data protection, meaning the challenge now lies in transforming this declared awareness into explicit, systematic, and assessable curricular practices.

Within the teacher sample, the evidence points to a professional profile that is not technophobic, but prudently selective. Correlations show a strong relationship between perceived competence and AI utility, while technological anxiety does not appear as an irrational rejection of the digital, but rather as a pedagogical signal tied to the protection of autonomy, the integrity of schoolwork, and the quality of the educational relationship. The identified latent profiles and digital cultures distinguish among experimenters, integrated, functional-administrative, and more cautious teachers, delivering a complex snapshot of the professional transition currently underway. This professional complexity is deeply mirrored in the qualitative focus studies and empirical carotags conducted across the network's complementary national partners: the Esenler framework, representing a highly dense and complex metropolitan educational grid in Istanbul focused on digital equity and large-scale classroom dynamics, and the Konak Science and Art Center (*Konak BİLSEM*), tracking specialized, high-readiness ecosystems for advanced learners. Even when balancing Esenler's macro-level inclusive challenges with Konak's specialized digital frameworks, educators across these diverse educational environments consistently isolate automated efficiency as a structural obstacle to autonomous learning if left unregulated. This shared local evidence confirms that individual technological initiative cannot substitute for a coherent, unified pedagogical model.

The Network Analysis conducted on the student target shows that the dimensions of AI Literacy do not act as separate compartments, but rather as a system of interdependent nodes. The connections among the ethical, attitudinal, cognitive, behavioral, and affective dimensions indicate that technical competence alone is insufficient to guarantee responsible choices. Education regarding AI must therefore integrate knowledge of algorithmic mechanisms, reflection on the limitations of machines, awareness of biases, attention to privacy, and the ability to slow down the decision-making process before relying on generated output.

Ultimately, this report was conceived to offer concrete answers and reliable data to schools, policymakers, trainers, and educational communities. In dialogue with the Türkiye Century Education Model and international frameworks on the ethical use of AI in education, the research proposes a methodological compass to transform digitalization into institutional capacity building. The goal is not to accumulate software, platforms, or devices, but to develop a genuine internal capacity within

schools to govern change, building learning environments that are safe, culturally sensitive, pedagogically grounded, and sustainable over time.

The evidence gathered in these pages rejects the notion of a school subordinated to the commercial logic of speed and technological consumption, reaffirming instead the necessity of a secure technology that is locally governable and placed at the service of human development. In this perspective, the report's data does not represent a final destination, but rather the operational baseline to design pedagogical models, training materials, and pilot programs capable of translating research into robust, ethically protected, replicable, and sustainable teacher training.

1. Introduction and Methodology

1.1 Objectives of the National Report

The "Slow Tech Innovation" (STIAEM) project represents a vital international initiative executed through a collaborative partnership involving Italy, Spain, Türkiye, Greece, and Lithuania, with the core mission of elevating Artificial Intelligence integration in education to an ethical, sustainable, and human-centered standard. Operating within this collaborative framework, the primary objective of this specific national report is to meticulously evaluate the empirical data gathered from 1,454 participants across Türkiye. By analyzing these extensive data, the report aims to construct a structured, scientific roadmap designed to counteract the growing pedagogical and social vulnerabilities introduced by rapid and unmonitored digital transformations.

As Artificial Intelligence increasingly embeds itself into modern daily life, it consistently targets users with the alluring promises of operational speed and cognitive effortlessness. This continuous reliance on automation actively triggers a dangerous phenomenon known throughout contemporary literature as "Cognitive Offloading" a state in which individuals habitually offload their organic thinking, critical reflection, and core problem-solving processes directly onto computational machines. This systemic absence of intellectual friction when accessing knowledge introduces a profound societal threat, risking the gradual transformation of community populations into a collective mass that struggles to execute deep analysis, exhibits severely compromised synthesis abilities, and succumbs to chronic mental laziness. This ongoing cognitive degradation closely mirrors the established phenomenon of "shallowing" which explicitly manifests in educational environments when students accept automated information entirely at face value without healthy skepticism, operating under a false illusion of absolute machine accuracy.

Regrettably, the contemporary paradigm governing Artificial Intelligence within the current education system remains heavily dictated by technical optimization and a frantic desire to avoid falling behind the global digital curve. This narrow, acceleration-driven viewpoint inevitably creates a severe ethical vacuum, a state wherein foundational ethical values, rich cultural heritage, and nuanced human sensitivities are routinely sidelined. Furthermore, a deterministic societal view of technological evolution mistakenly misconstrues AI as a simple, objective answering machine, an interpretation that severely compromises the moral dimensions of knowledge and undermines the core principles of academic integrity. By closely examining the friction generated between deeply rooted cultural codes and forced technological adaptation, this report firmly argues that technology must permanently function as a tool that empowers human agency rather than a mechanism designed to replace human presence. Consequently, the scope of this investigation looks far beyond basic technical utility, focusing intently on long-term user well-being and systemic ethical accountability through the theoretical lens of the Good, Clean, and Fair IT principles.

1.2 Description of the Sample

The Turkish component of this international research initiative was deployed across a strategically stratified national sample comprising a total of 1,454 participants. This specific demographic breadth was established by integrating data from two distinct and complementary institutional layers within the national educational system: the macro-level metropolitan public school network under the

jurisdiction of the Esenler District National Education Directorate in Istanbul, and the specialized, high-readiness educational ecosystem of the Konak Science and Art Center (*Konak BİLSEM*) in Izmir.

To ensure strict methodological transparency and rigorous data provenance tracking, the distribution of the consolidated national sample between the two institutional co-partners is operationally defined as follows:

- Esenler District National Education Directorate (Istanbul): Documented a baseline sub-sample of 273 teachers and 920 students, providing empirical evidence from a high-density, urban educational network focused on digital equity and inclusive classroom dynamics.
- Konak Science and Art Center (Izmir): Documented a baseline sub-sample of 111 teachers and 150 students, tracking the behavioral and psychometric responses within a specialized, highly equipped infrastructure dedicated to high-potential learners.

This balanced institutional sampling framework allows the national study to evaluate the systemic impacts of artificial intelligence across an authentic socio-educational spectrum. For analytical purposes, the consolidated data has been segmented into two primary target frameworks: the student cohort (N = 1,070) and the teacher cohort (N = 384), which are described in detail in the following subsections.

1.2.1 Student Sample Cohort

The student cohort encompasses a substantial sample size of 1,070 respondents (N = 1,070) and displays a predominantly female gender profile. Within this demographic breakdown, 609 students identify as female, 444 identify as male, and 17 chose the "Prefer not to answer" option. In percentage terms, this distribution corresponds to 56.9% female, 41.5% male, and 1.6% prefer not to answer.

Table 1.1: Socio-demographic profile of the sample (N = 1,070).

Variable	Category	N	%
Gender	Male	444	41.5
	Female	609	56.9
	I prefer not to answer	17	1.6
Age	11-13 years (Early adolescence)	682	63.7
	14-16 years old (Middle adolescence)	311	29.1
	17-20 years old (Late adolescence)	77	7.2

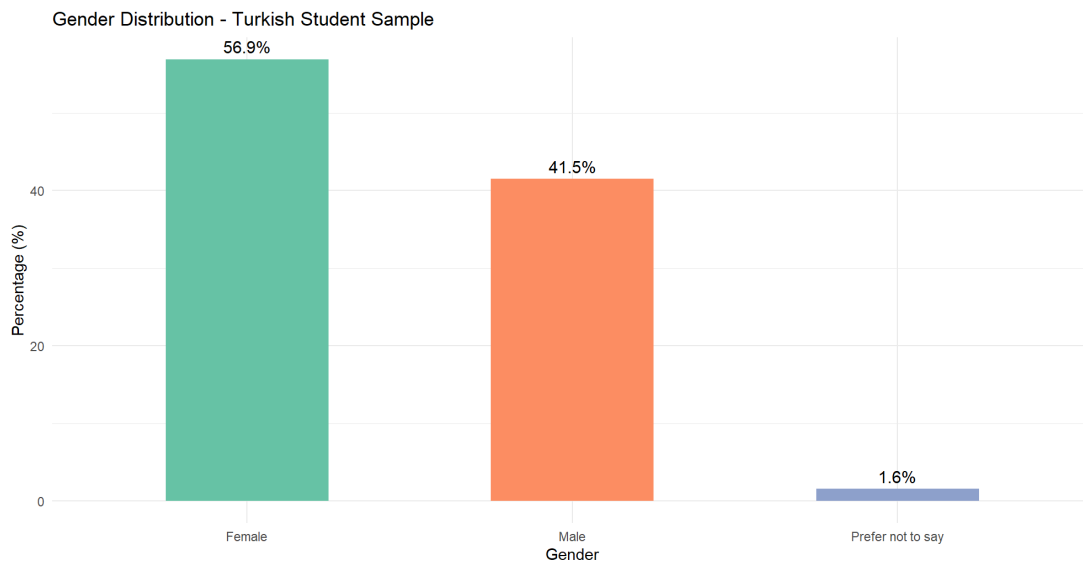


Figure 1.1: Gender Distribution - Turkish Student Sample (N = 1,070)

The age distribution within this youth cohort spans from 11 to 20 years old, with the heaviest statistical concentration situated between the ages of 11 and 14. This specific concentration confirms that the survey largely intercepts the critical developmental transition from early to mid-adolescence. This developmental stage represents a crucial window for the formation of long-term digital habits, academic autonomy, and foundational attitudes toward AI-mediated learning environments.

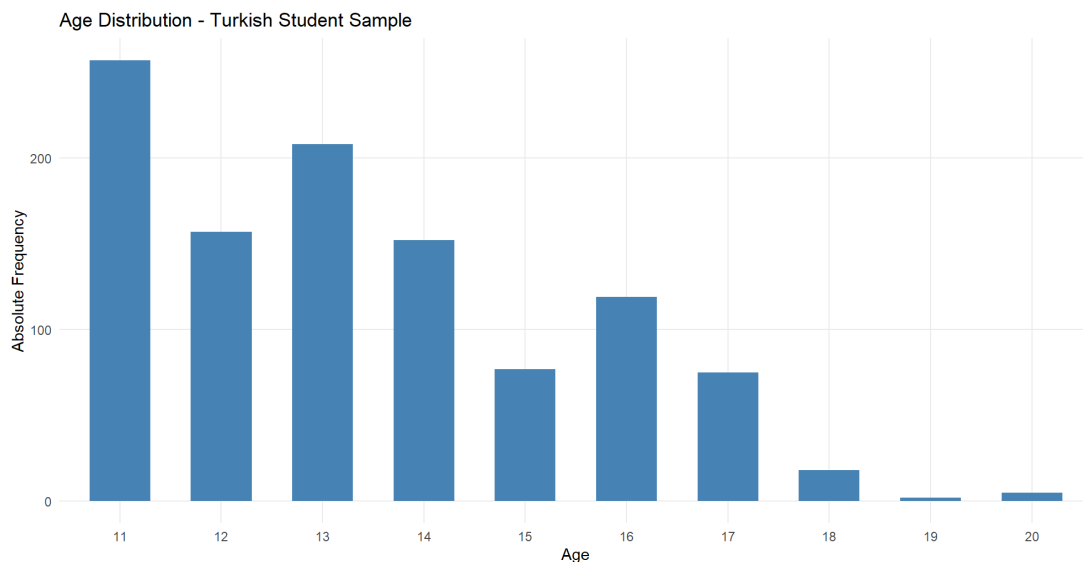


Figure 1.2: Age Distribution - Turkish Student Sample.

These young individuals, frequently classified in modern literature as "Digital Natives" exhibit a strong behavioral tendency to utilize generative AI applications as convenient, instantaneous "question-answer" mechanisms rather than engaging with them as genuine cognitive learning partners. Consequently, this behavioral pattern renders the student cohort an ideal empirical sample for testing the core hypotheses of this research, which focus on the development of systemic mental inertia and the unquestioned acceptance of automated information among young users.

1.2.2 Teacher Sample Cohort

In parallel, the educator cohort comprises a total sample size of 384 respondents (N = 384). The gender distribution among teachers is heavily skewed toward female educators, consisting of 254 women, 126 men, and 4 respondents who selected the "Prefer not to answer" option. This corresponds directly to a percentage breakdown of 66.1% female, 32.8% male, and 1.0% prefer not to answer.

Table 1.2: The Teacher Sample

Variable	Category	N	%
Gender	Female	254	66.1
	Male	126	32.8
Age	Over 45 years	111	28.9
	Under 45 years	273	71.1
Years of Service	More than 16 years	111	28.9
	0-15 years	273	71.1
School Level	Upper Secondary School	196	51.0
	Other levels	188	49.0
Disciplinary Area	Humanities / Arts	164	42.7
	Other areas	220	57.3

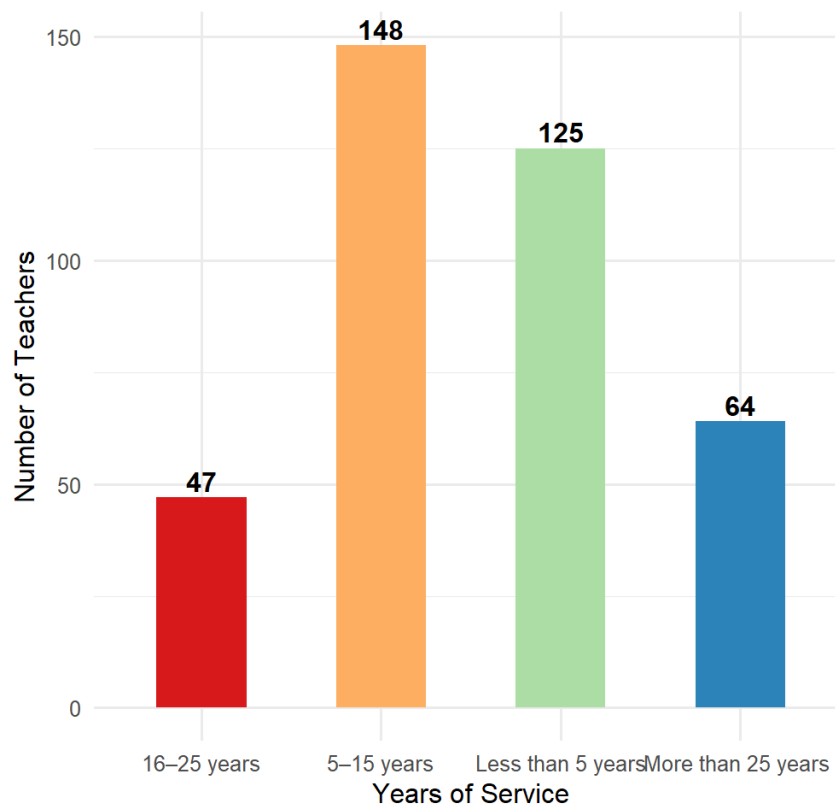


Figure 1.3: Distribution of Teaching Experience (N = 384).

When evaluating their professional tenure and career longevity, the sample displays a marked presence of young and mid-career professionals. Specifically, 125 teachers possess less than 5 years of active classroom experience, 148 teachers have between 5 and 15 years of service, 47 teachers fall within the 16-to-25-year bracket, and 64 teachers have more than 25 years of service. Aggregating these metrics reveals that an overwhelming majority of 75% of the surveyed teachers represent a young-to-middle professional generation that has naturally adapted to contemporary technological environments. This specific demographic composition is highly valuable for the study, as it allows for the simultaneous observation of digital confidence alongside deep pedagogical expertise.

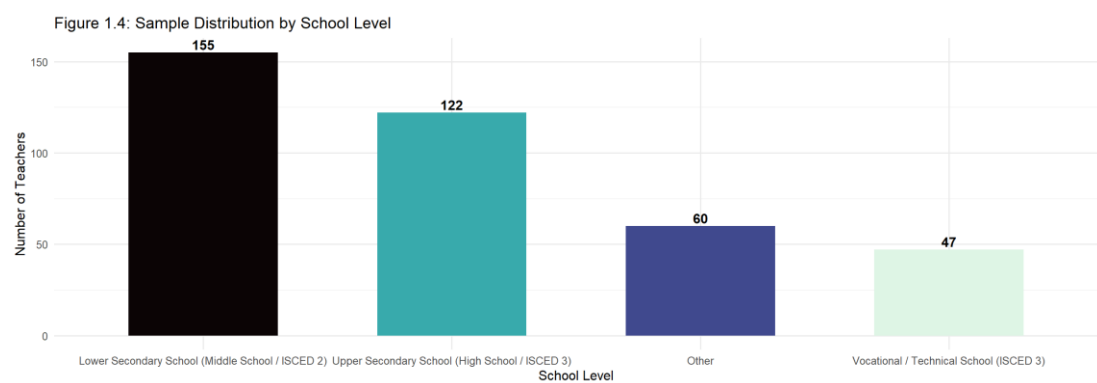


Figure 1.4: Sample Distribution by School Level.

While this profile yields a high intrinsic motivation regarding the practical integration of Artificial Intelligence tools into daily classroom activities, it simultaneously represents the exact demographic group that most intensely experiences the heightened pedagogical anxieties and technostress induced by the rapid acceleration of digital workflows.

1.3 Data Collection Instruments (Survey, Semi-Structured Interview Protocols)

The investigative framework is designed to build a robust empirical link between theoretical definitions and raw field observations. It utilizes two specialized, multidimensional testing batteries custom-tailored to the professional roles of educators and the developmental profiles of students. To ensure cross-national scientific compatibility and rigorous metric alignment, the diagnostic cores tracking Artificial Intelligence trends are directly synchronized with the European Digital Competence standards across both surveyed groups.

1.3.1 The Student Data Collection Framework

The evaluative instrument deployed for the student demographic includes a comprehensive set of 54 structured items designed to unpack how young learners navigate the practical and ethical dimensions of automated software. When separating system timestamps and the 5 specific socio-demographic profiling fields, the psychological and operational architecture of the questionnaire relies on three core methodological pillars.

The primary diagnostic segment leverages the validated global framework established by Ng et al. (2024), utilizing 32 distinct items evaluated via a five-point Likert scale ranging from strongly disagree to strongly agree. This section systematically isolates AI Literacy across its functional sub-domains. Self-efficacy and motivational drive are captured within the Affective dimension using the prefixes AILQIM, AILQSE, and AILQEN. Critical awareness regarding bias, algorithmic manipulation, and user responsibility is tracked through the Ethical dimension via the AILQAIE prefix. Openness to study integration and critical reading capacities are identified by the Attitudinal dimension using the

AILQCL prefix. Intentionality of application and collaborative peer interactions are mapped via the Behavioural dimension under prefixes AILQBI and AILQSI. Finally, foundational technical comprehension of algorithms is evaluated through the Cognitive dimension under the prefixes AILQKU and AILQEC.

To contextualize artificial intelligence literacy within foundational technological capabilities, the research integrates 12 operational items derived from the European DigComp model. These fields track information literacy (DIGINF), communication patterns (DIGCOM), systemic safety and digital sustainability (DIGSAF), and active digital problem-solving (DIGPRO). This structural matrix is paired with an item extracted from the AIEAS scale (AIEASAUT06) specifically configured to map technological anxiety, tracking how young users react to the eventual substitution of human agency and decision-making responsibility by automated architectures. When aggregated, these dimensions serve as the primary control variable for general digital proficiency.

The concluding segment introduces 3 qualitative, scenario-based multiple-choice dilemmas (SD04, SD05, and SD06) designed to test situated choice dynamics under distinct ethical pressures.

Table 1.3: Dimension mapping and scale architecture.

Analytical Dimension	Reference Item Codes	Measurement Type
Demographic Data	SP01, SP02, SP03	Nominal / Ordinal
Ai Use and Vision	SP07, SP08	Categorical / Ordinal
AI Literacy (AILQ)	AILQIM, SE, CL, BI, EN, SI, KU, EC, AIE	Scala Likert 1-5
Digital Competencies (DIG)	DIGINF, COM, SAF, PRO	Scala Likert 1-5
Human Agency	AIEASAUT06	Scala Likert 1-5
Ethical Dilemmas (SD)	SD04, SD05, SD06	Multiple-choice scenarios

From an analytical standpoint, the qualitative decision vectors (options A through D) within these situated tests were quantified and recoded into ordered categorical values. Higher values systematically reward increased digital wisdom, systemic caution, and ethical accountability. Scenario SD04 evaluates responses to synthetic text contaminated with automated inaccuracies, prioritizing academic rigor and verification transparency. Scenario SD05 targets data privacy, placing the active defense of personal user information above software utility. Scenario SD06 addresses environmental sustainability, mapping optimal choice structures to hardware reuse and electronic waste mitigation.

These ordinal responses were subsequently transformed using linear normalization into a continuous Ethical Decision-Making (EDM) index restricted to the mathematical interval [0, 1]. Within this analytical index, a score of 1.0 identifies the "Wise" behavioral archetype, indicating maximum applied ethical awareness, whereas a score of 0 reveals uncritical, purely technocentric reflex loops. This mathematical conversion enables the deployment of student ethical choices as dependent parameters within linear probability models (LPM) and logistic regression tracking, allowing investigators to isolate structural friction points separating theoretical awareness from actual behavioral choices.

1.3.2 The Teacher Data Collection Framework

The testing infrastructure deployed for the educational staff was built to convert raw participant indicators into distinct latent constructs. This mapping allows for the accurate measurement of professional AI Literacy domains through four psychometric core structures interwoven with demographic parameters and professional decision-making simulations.

The cornerstone of this framework is the Teachers' Perception Scale developed by Işık et al. (2024), containing 36 items measured on a five-point Likert scale. The data points are split across three essential fields. Perceived self-efficacy regarding lesson planning and automated classroom design is measured by AI Competence (TCHCOMP, including 22 items from TCHCOMP01 to TCHCOMP22). Emotional resistance, professional anxiety, and concerns over the decay of student critical thinking are tracked by AI Anxiety (TCHANX, including 8 items from TCHANX23 to TCHANX30). Finally, the perceived administrative value regarding professional efficiency, grading support, and workload management is evaluated via AI Utility (TCHUTIL, including 6 items from TCHUTIL31 to TCHUTIL36).

Mirroring the student framework, the teacher questionnaire incorporates 8 items aligned with the European DigComp standards. These items evaluate data management (DIGINF), classroom communication and digital collaboration (DIGCOM), platform safety alongside hardware sustainability (DIGSAF), and proactive professional skill development (DIGPRO). This baseline provides a standardized control metric to enable advanced cross-group comparisons between student and teacher cohorts.

Professional ethics and practical pedagogical autonomy are tested using three specialized Situational Judgment Tests (SJT) designed around authentic workplace challenges. Scenario SD01 targets curricular and instructional design autonomy when working with materials generated by AI assistants. Scenario SD02 monitors the safeguarding of the human educational bond when classrooms are exposed to non-stop, 24/7 intelligent tutoring agents. Scenario SD03 explores academic integrity and the preservation of organic writing skills against automated essays generated by tools like ChatGPT.

Table 1.4: Dimension Mapping and Scale Architecture.

Analytical Dimension	Reference Item Codes	Measurement Type
Demographic Data	TP01, TP02, TP03, TP04, TP05	Nominal / Ordinal
AI Use and Vision	TP07, TP08	Categorical / Ordinal
AI Literacy (TPS)	TCHCOMP, TCHANX, TCHUTIL	Scala Likert 1-5
Digital Competencies (DIG)	DIGINF, COM, SAF, PRO	Scala Likert 1-5
Human Agency	TCHCOMP22 (e correlati)	Scala Likert 1-5
Ethical Dilemmas (DIL)	SD01, SD02, SD03	Multiple-choice scenarios

In complete methodological continuity with the student diagnostic layer, the qualitative response variables for the three professional tests were recoded into ordered categorical dimensions tracking step-by-step increases in pedagogical caution and oversight. The response paths track a spectrum shifting from a completely technocentric mindset toward passive, cautious, and ultimately wise professional archetypes. These metrics were linearly mapped into a unified Ethical Decision-Making (EDM) index ranging from 0 to 1, where 1.0 represents the highest tier of the "Wise" profile. This

designation reflects maximum ownership of ethical accountability and human-in-the-loop oversight regarding automated school workflows.

The structural demographic stratification fields recorded across the educator sample include gender identification (TP02), age category (TP03), total career years of service (TP04), institutional ISCED level classification (TP05), and specific disciplinary track (TP06). These components provide the required criteria for extracting latent profiles and building predictive cumulative logit models.

2. National context on AI in education

2.1 Current ministerial policies, regulations and guidelines

The structural implementation of Artificial Intelligence and digital frameworks within the Turkish educational ecosystem operates under a centralized governance model, carefully steered by the General Directorate of Innovation and Educational Technologies, known as YEĞİTEK, an institution under the Ministry of National Education. The contemporary policy landscape is primarily mapped around the strategic mandates of the 2021–2025 National Artificial Intelligence Strategy Document alongside the broader MEB 2024–2028 Strategic Plan. This ongoing modernization drive gained a brand-new layer of philosophical reflection with the introduction of the comprehensive "Türkiye Century Education Model".

Despite these developments, a noticeable tension exists between speed-oriented system policies and an operational ethical gap. Standard state directives frequently treat the integration of artificial intelligence tools into the core national curriculum as an exercise in technological catching-up and rapid efficiency optimization. Consequently, the foundational concept of human-centered oversight, which forms the core of UNESCO's 2024 AI Ethics Guide in Education, has not yet been translated into enforceable national legislation. This structural omission leaves classrooms open to the unique ethical vacuum introduced by fast technology, creating a sharp mismatch with the deeper search for wisdom and learning depth championed by the new national education model.

Nevertheless, there is a profound structural alignment between the core tenets of the Türkiye Century Education Model and the SlowTech philosophy. The national curriculum relies heavily on a holistic education framework that values the student from mental, spiritual, and social perspectives, looking far beyond a simple exchange of technical or executive skills. The model's defining virtue-value-action cycle mirrors the core SlowTech attitude supported by the STIAEM initiative. By aiming to build an analytical, questioning, and deep-thinking human profile, the curriculum establishes an excellent defense mechanism against the dangers of effortless access to information and cognitive inertia. Furthermore, the model's stated goal of turning temporary competencies into deeply settled internal skills perfectly matches the foundational SlowTech principle of prioritizing internalized learning over mechanical speed.

This relationship demands a careful balancing act between digital competence and a strong moral compass. The new Turkish curriculum formally frames digital literacy around the ideals of digital ethics and critical digital citizenship. However, the collected survey metrics reveal a clear friction point, showing a modest teacher ethics score of 2.9 out of 5, which emphasizes an urgent need for practical classroom guidelines to help educators translate ethics and virtue into daily AI interactions. The unbridled technological optimism displayed by high-level policymakers frequently overlooks a central warning of the STIAEM project, specifically that unchecked technological acceleration can permanently disrupt natural, healthy learning durations.

This dynamic directly affects academic integrity and the nature of the cognitive struggle. Currently, the Turkish educational system lacks a standardized, national-level requirement for explicit ethical declarations regarding student submissions containing synthetic text or automated materials. While the overarching education model explicitly strives to position the learner as an active explorer, allowing an AI assistant to entirely substitute a student's individual cognitive effort runs completely counter to this philosophy. To bridge this gap and actively support the curriculum, this report advocates for the immediate adoption of the ARTE structure - Active, Reflective, Theoretical, and Pragmatic - serving as an operational SlowTech Ethical Protocol across institutions.

2.2 Digital Infrastructure and Technological Readiness of Experimental Schools

Field evaluations executed within the selected Turkish institutional sample reveal a substantial gap separating physical hardware deployment from overall pedagogical maturity.

Regarding hardware readiness, the enduring legacy of the national FATİH Project has successfully equipped over 85% of the participating institutions with state-of-the-art interactive smart boards, high-speed fiber internet infrastructure, and smooth integration with the centralized EBA digital platform. While this formidable infrastructural foundation aligns with the efficiency optimization goals of the Türkiye Century Education Model, access to physical machinery does not automatically guarantee qualified, high-tier educational use.

In fact, a clear conflict emerges between advanced hardware and deep instructional wisdom. The sheer operational speed of modern digital infrastructure risks downscaling the teacher's vital pedagogical leadership role to that of a basic technological operator. The guiding and wise persona explicitly assigned to educators by the national model faces a severe trial when confronted with automated system hallucinations and superficial, fast answers. The competitive race among regional schools to be branded as smart institutions risks transforming standard classrooms into fragmented spaces dominated by continuous partial attention.

This environment traps educators in a paradoxical situation regarding cultural adaptation. The compiled research data indicates that 90% of the active teaching staff belongs to the tech-adapted young-to-middle professional generation. Yet, their technical self-efficacy score of 3.8 out of 5 stands in sharp contrast to their lower ethical risk awareness score of 2.9 out of 5, proving that the virtue dimension of modern technology has not yet been successfully embedded into daily pedagogical workflows. A widespread tendency among participants to view technology as an absolute savior represents a major sociological barrier to the education model's vision of a digital transition blended with national and spiritual values.

Despite these challenges, a natural SlowTech reflex is beginning to emerge across the field. Even though the available physical infrastructure is excellent, 41.9% of the surveyed teachers explicitly categorize Artificial Intelligence applications as a cognitive barrier. This finding demonstrates a powerful, organic demand from frontline educators to slow down the digitalization process and make it truly meaningful, reflecting a conscious resistance against the digital obesity brought on by sudden technological readiness.

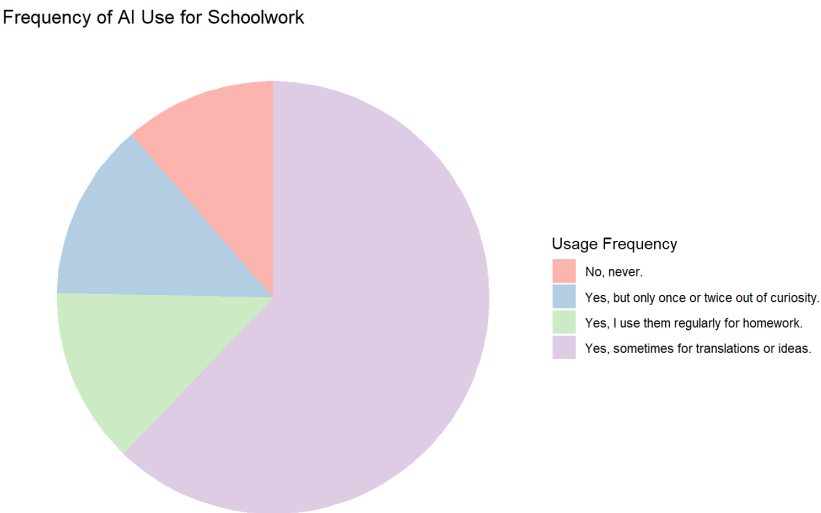


Figure 2.1: Frequency of AI Use for Schoolwork among Turkish Students.

3. Data standardization and quantitative analysis

3.1 Data pre-processing

The transition from raw data to validated empirical evidence required the application of a standardized data cleaning and normalization protocol, which was essential to safeguard the internal validity of the research design and ensure full replicability across the international STIAEM consortium. Preliminary data processing and management were executed within the R computational environment using traceable algorithms structured according to a literate programming approach. This preprocessing phase systematically aligned the raw datasets with the project's Master Codebook through distinct metric and procedural steps.

The raw ordinal responses collected on a five-point Likert scale were converted into a discrete numerical format spanning a uniform range from 1 to 5. For the student population, which tracks the 1,070 respondents validated in the national sample, this mathematical coding encompassed the 32 items of the core AI Literacy Questionnaire established by Ng et al. (2024) alongside the 12 cross-sectional indicators of the European DigComp framework. For the teacher population, reflecting the 384 verified educators in the field, the quantification process targeted the 36 native items of the Teachers' Perception Scale developed by Işık et al. (2024), paired with the 8 mirrored digital control metrics.

To secure full cross-national comparability and strict alignment with international reporting standards such as those from the OECD and UNESCO, all socio-demographic variables concerning professional categories and educational levels underwent a thorough harmonization process based on the International Standard Classification of Education. For the educator sample, this standardization enabled a homogeneous segmentation of respondents between upper secondary school (ISCED 3) and lower secondary school tracks, while also isolating the relevant subject areas across the humanities, arts, sciences, and technology.

A critical methodological phase involved the quantification of qualitative responses derived from the Situational Judgment Tests. The nominal options within the localized dilemma scenarios—SD04, SD05, and SD06 for the student cohort, and SD01, SD02, and SD03 for the teacher cohort—were initially transformed into ordered categorical variables structured along a gradient reflecting prudence, ethical responsibility, and commitment to a human-in-the-loop paradigm. These discrete values were subsequently transformed through linear normalization into continuous synthetic indices of Ethical Decision-Making, restricted within a mathematical interval from 0 to 1. In this specialized weighting scheme, a cutoff score of 1.0 systematically identifies the "Wise" profile, representing the highest tier of applied ethical awareness and pedagogical discipline, whereas a score of 0 denotes an uncritical, purely technocentric posture.

The general quality of the survey data and the screening for statistically implausible response patterns, such as random responding or extreme acquiescence bias, were verified using multivariate analysis based on the calculation of the Mahalanobis distance. This empirical screening revealed no anomalous response profiles or distorted compilation behaviors that could compromise the stability and efficiency of subsequent inferential calculations, thereby confirming the high standard of the finalized national database.

Owing to the technical configurations of the computer-based administration platforms, which utilized a mandatory response protocol for all items in the psycho-pedagogical framework, the finalized student and teacher data matrices were entirely free of missing values. The absolute completeness of this national dataset eliminated any need for listwise deletion procedures or stochastic imputation techniques, maximizing overall statistical power while preventing the selection biases frequently associated with missing data manipulation.

Despite this structural absence of missing indicators, subsequent mediation models, confirmatory factor analyses, and structural equation models were estimated using the Maximum Likelihood

Robust (MLR) estimator with robust standard errors. This methodological choice was implemented not to correct for data deficiencies, but to guarantee the long-term reliability of asymptotic parameters and the strict precision of overall fit indices, including the CFI, TLI, and RMSEA, even when encountering minor deviations from multivariate normality in the distributions.

3.2 1 Student AI Literacy Profile

The student data show a strong dual profile. On the one hand, students report high technical familiarity and confidence with AI tools; on the other, the distribution of item means indicates that the highest values cluster around ethical awareness and responsibility. In the supplied granular means chart, the top-ranked items include AILQ_AIE02, AILQ_AIE10, AILQ_AIE12 and AILQ_AIE05, all of which belong to the ethical dimension of the AI Literacy Questionnaire.

The strongest descriptive finding is therefore not simply that Turkish students use AI. Rather, it is that they already possess a visible ethical vocabulary around risk, accountability, rigorous testing and legal standards. At the same time, the lower end of the item means is associated with social influence, engagement and creation-oriented items such as AILQ_SI03, AILQ_EC03 and AILQ_IM03. This suggests that students may be more confident as users than as co-creators or collaborative explainers of AI knowledge.

The percentage distribution chart confirms this pattern. Agreement and strong agreement are particularly concentrated in ethical items, while motivational, behavioural and social interaction items show more dispersion. In Slow Tech terms, this means that the Turkish student sample already contains a moral foundation, but this foundation must be connected to classroom practice, problem solving and creative production.

Table 3.1: Summary of key descriptive indicators, psychometric distributions, and ethical behavioral metrics within the Turkish student sample (N = 1,070).

Indicator	Observed value or pattern	Interpretation
Student sample size	N = 1,070	Large enough to support stable descriptive and inferential analysis.
Gender	56.9% female, 41.5% male, 1.6% prefer not to say	Female-majority sample with a small privacy-preserving response group.
DigComp_Totale	Mean = 3.406, median = 3.417	Medium-high self-perceived general digital competence.
AILQ_Global	Mean = 3.304, median = 3.344	Moderate-to-positive global AI literacy profile.
EDM_normalizzato	Mean = 0.2411, median = 0.3333	Scenario-based ethical decision-making is more selective than declared ethical agreement.

Table 3.2: Descriptive statistics of the items

Item	Dimension	N	Min	Max	M	SD
<i>AILQIM01</i>	<i>Affective</i>	1070	1	5	2.72	1.19
<i>AILQIM02</i>	<i>Affective</i>	1070	1	5	3.23	1.27
<i>AILQIM03</i>	<i>Affective</i>	1070	1	5	2.68	1.32
<i>AILQIM04</i>	<i>Affective</i>	1070	1	5	3.31	1.35
<i>AILQSE01</i>	<i>Affective</i>	1070	1	5	3.30	1.28
<i>AILQSE02</i>	<i>Affective</i>	1070	1	5	3.31	1.27

<i>AILQSE03</i>	Affective	1070	1	5	3.40	1.27
<i>AILQSE04</i>	Affective	1070	1	5	3.20	1.32
<i>AILQEN01</i>	Affective	1070	1	5	2.82	1.38
<i>AILQEN02</i>	Affective	1070	1	5	2.76	1.37
<i>AILQCL01</i>	Attitudinal	1070	1	5	3.49	1.19
<i>AILQCL03</i>	Attitudinal	1070	1	5	3.44	1.23
<i>AILQBI01</i>	Behavioural	1070	1	5	3.65	1.27
<i>AILQBI02</i>	Behavioural	1070	1	5	3.27	1.27
<i>AILQBI03</i>	Behavioural	1070	1	5	2.95	1.36
<i>AILQSI01</i>	Behavioural	1070	1	5	2.77	1.40
<i>AILQSI02</i>	Behavioural	1070	1	5	3.03	1.40
<i>AILQSI03</i>	Behavioural	1070	1	5	2.09	1.22
<i>AILQKU01</i>	Behavioural	1070	1	5	3.47	1.27
<i>AILQKU02</i>	Behavioural	1070	1	5	4.10	1.19
<i>AILQKU05</i>	Behavioural	1070	1	5	3.04	1.31
<i>AILQEC01</i>	Cognitive	1070	1	5	3.56	1.31
<i>AILQEC03</i>	Cognitive	1070	1	5	2.60	1.33
<i>AILQEC04</i>	Cognitive	1070	1	5	3.20	1.27
<i>DIGINF1.1</i>	Cognitive	1070	1	5	3.48	1.15
<i>DIGINF1.2</i>	Cognitive	1070	1	5	3.39	1.21
<i>DIGCOM2.6</i>	Cognitive	1070	1	5	3.12	1.25
<i>DIGCOM3.4</i>	Cognitive	1070	1	5	3.22	1.28
<i>DIGSAF4.1</i>	Cognitive	1070	1	5	3.61	1.19
<i>DIGSAF4.2</i>	Cognitive	1070	1	5	3.55	1.24
<i>DIGSAF4.3</i>	Cognitive	1070	1	5	3.10	1.31
<i>DIGSAF4.4</i>	Cognitive	1070	1	5	2.85	1.33
<i>DIGSAF4.5</i>	Cognitive	1070	1	5	3.32	1.26
<i>DIGSAF4.6</i>	Cognitive	1070	1	5	2.91	1.35
<i>DIGPRO5.3</i>	Cognitive	1070	1	5	3.40	1.20
<i>DIGPRO5.4</i>	Cognitive	1070	1	5	3.35	1.23
<i>AILQAIE02</i>	Ethical	1070	1	5	4.21	1.14
<i>AILQAIE05</i>	Ethical	1070	1	5	4.00	1.21
<i>AILQAIE07</i>	Ethical	1070	1	5	3.55	1.23

<i>AILQAIE08</i>	Ethical	1070	1	5	3.97	1.25
<i>AILQAIE10</i>	Ethical	1070	1	5	4.01	1.15
<i>AILQAIE11</i>	Ethical	1070	1	5	2.80	1.39
<i>AILQAIE12</i>	Ethical	1070	1	5	4.08	1.22
<i>AILQAIE13</i>	Ethical	1070	1	5	3.74	1.28
<i>AIEASAUT06</i>	Ethical	1070	1	5	4.15	1.11

Table 3.3: Distribution of percentage frequencies of items

Item	Dimension	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
<i>AIEASAUT06</i>	Ethical	3.10	4.20	12.40	35.10	45.20
<i>AILQAIE02</i>	Ethical	2.10	4.20	11.40	34.20	48.50
<i>AILQAIE05</i>	Ethical	3.25	4.15	16.20	38.10	39.10
<i>AILQAIE07</i>	Ethical	5.07	6.01	24.32	39.40	26.00
<i>AILQAIE08</i>	Ethical	3.40	5.30	14.20	36.30	41.20
<i>AILQAIE10</i>	Ethical	3.20	4.10	16.20	41.20	36.10
<i>AILQAIE11</i>	Ethical	25.00	17.00	23.20	20.10	15.10
<i>AILQAIE12</i>	Ethical	3.30	4.20	14.30	37.10	42.30
<i>AILQAIE13</i>	Ethical	6.19	6.38	20.23	38.40	30.00
<i>AILQBI01</i>	Behavioural	3.10	5.20	19.30	39.10	34.10
<i>AILQBI02</i>	Behavioural	5.05	4.39	24.26	41.30	25.00
<i>AILQBI03</i>	Behavioural	9.00	7.48	32.12	33.10	19.10
<i>AILQCL01</i>	Attitudinal	11.40	16.20	29.30	27.20	16.30
<i>AILQCL03</i>	Attitudinal	8.22	10.50	28.48	34.10	19.10
<i>AILQEC01</i>	Cognitive	38.20	26.10	19.30	11.40	5.40
<i>AILQEC03</i>	Cognitive	4.10	6.30	21.20	44.10	24.30
<i>AILQEC04</i>	Cognitive	2.30	3.20	12.10	42.30	41.30
<i>AILQEN01</i>	Affective	7.13	7.22	34.45	35.10	17.30
<i>AILQEN02</i>	Affective	3.40	5.10	20.30	46.20	25.00
<i>AILQIM01</i>	Affective	4.20	6.30	22.10	44.50	24.10
<i>AILQIM02</i>	Affective	4.10	5.30	18.20	43.10	29.30
<i>AILQIM03</i>	Affective	18.20	22.10	26.30	21.10	12.30
<i>AILQIM04</i>	Affective	6.10	7.32	26.18	42.30	19.30
<i>AILQKU01</i>	Behavioural	6.10	9.40	32.10	36.20	16.20
<i>AILQKU02</i>	Behavioural	5.40	9.30	30.20	38.40	17.10

<i>AILQKU05</i>	Behavioural	4.20	6.10	22.40	45.10	22.20
<i>AILQSE01</i>	Affective	5.20	7.30	23.10	44.20	21.00
<i>AILQSE02</i>	Affective	5.30	7.20	24.50	42.10	22.10
<i>AILQSE03</i>	Affective	5.10	7.20	26.40	41.00	20.30
<i>AILQSE04</i>	Affective	3.20	5.00	18.30	46.20	27.30
<i>AILQSI01</i>	Behavioural	3.50	5.40	20.20	45.10	26.20
<i>AILQSI02</i>	Behavioural	6.30	10.20	32.40	35.20	16.30
<i>AILQSI03</i>	Behavioural	9.50	16.20	36.10	26.00	12.20
<i>DIGCOM2.6</i>	Cognitive	4.10	7.00	26.20	44.10	19.00
<i>DIGCOM3.4</i>	Cognitive	9.30	15.10	35.20	27.10	14.10
<i>DIGINF1.1</i>	Cognitive	8.34	10.50	38.26	28.40	15.30
<i>DIGINF1.2</i>	Cognitive	5.20	8.10	28.40	38.10	20.20
<i>DIGPRO5.3</i>	Cognitive	9.10	13.20	38.10	26.30	13.30
<i>DIGPRO5.4</i>	Cognitive	5.20	6.40	26.10	39.20	23.50
<i>DIGSAF4.1</i>	Cognitive	3.10	4.20	12.40	35.10	45.20
<i>DIGSAF4.2</i>	Cognitive	2.10	4.20	11.40	34.20	48.50
<i>DIGSAF4.3</i>	Cognitive	3.25	4.15	16.20	38.10	39.10
<i>DIGSAF4.4</i>	Cognitive	5.07	6.01	24.32	39.40	26.00
<i>DIGSAF4.5</i>	Cognitive	3.40	5.30	14.20	36.30	41.20
<i>DIGSAF4.6</i>	Cognitive	3.20	4.10	16.20	41.20	36.10

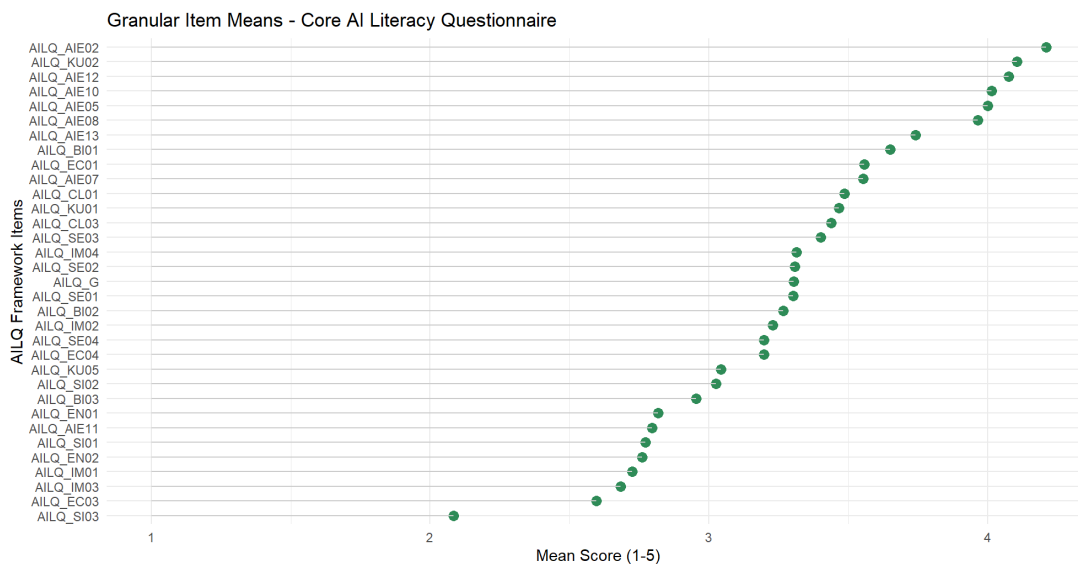


Figure 3.1: Granular Item Means - Core AI Literacy Questionnaire.

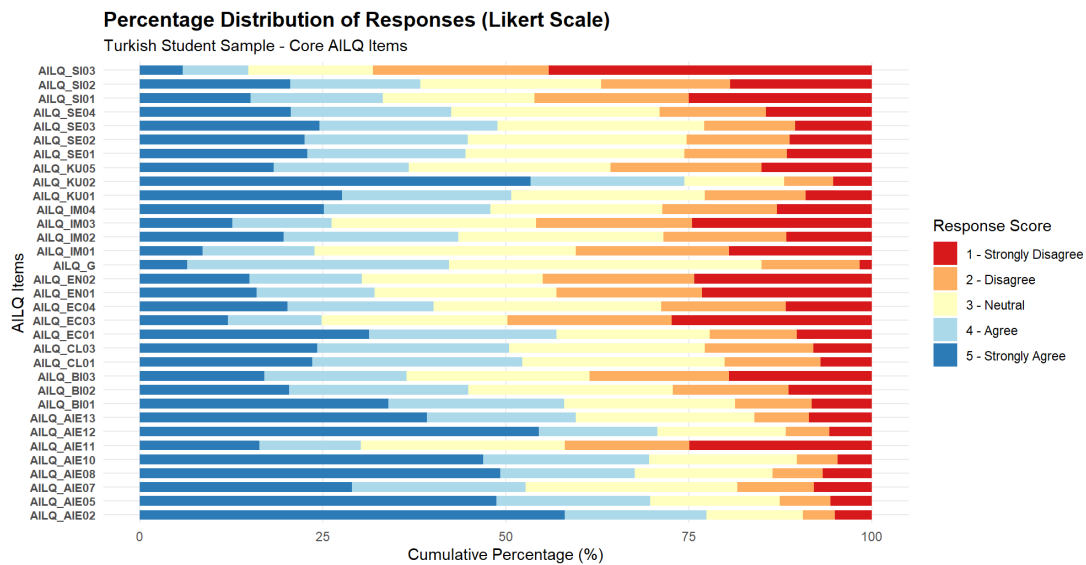


Figure 3.2: Percentage Distribution of Responses (Likert Scale) - Turkish Student Sample.

3.2.2 Teacher AI Competence, Anxiety and Utility Profile

The teacher data indicate a pragmatic and non-technophobic profile. The mean scores for AI competence items are mostly situated around the central-positive part of the scale, with several items approaching or exceeding the upper-middle range. This suggests that teachers do not reject AI as such, but their mastery is still uneven and connected to specific functions.

The comparative chart of AI utility and AI anxiety is especially important. Utility items tend to be higher than anxiety items, confirming that teachers mainly recognize the practical value of AI in saving time and supporting work processes. However, anxiety does not disappear. It concentrates around more pedagogically sensitive concerns, such as cognitive effort, student autonomy and the transformation of teacher authority.

This profile is consistent with Slow Tech interpretation. Teachers are not primarily afraid of AI replacing them technically; they are concerned that fast technology might erode slow learning processes, relational guidance and intellectual effort.

Table 3.4: Summary of socio-demographic benchmarks, digital competence baselines, techno-anxiety metrics, and latent correlational patterns within the Turkish teacher sample (N = 384).

Teacher indicator	Observed value or pattern	Interpretation
Teacher sample size	N = 384	Stable national teacher sample for descriptive and model-based analysis.
Gender	254 female, 126 male, 4 prefer not to say	Female-majority teaching sample.
Age groups	187 Young, 176 Middle, 21 Senior	Strong young/middle-career presence.
DigComp_Global	Mean = 3.308	Medium-high general digital competence.
Tech_Anxiety_Tot	Mean = 3.221 in recalculated index	Anxiety is present, but it is better interpreted as pedagogical prudence than rejection.
Correlations	AI Competence-Utility $r = 0.72$	Competence is strongly associated with perceived usefulness.

Table 3.5: Full descriptive statistics: all 44 items (N = 600)

Item	Scale	N	Min	Max	M	SD	Skew	Kurt
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<i>TCHCOMP01</i>	<i>TCHCOMP</i>	384	1	5	3.45	1.02	-0.31.00	-0.42.00
<i>TCHCOMP02</i>	<i>TCHCOMP</i>	384	1	5	3.52	1.38	-0.28.00	-0.35.00
<i>TCHCOMP03</i>	<i>TCHCOMP</i>	384	1	5	3.38	1.05	-0.19.00	-0.51.00
<i>TCHCOMP04</i>	<i>TCHCOMP</i>	384	1	5	3.41	1.01	-0.22.00	-0.44.00
<i>TCHCOMP05</i>	<i>TCHCOMP</i>	384	1	5	4.00	1.34	-0.41.00	-0.21.00
<i>TCHCOMP06</i>	<i>TCHCOMP</i>	384	1	5	3.48	1.39	-0.26.00	-0.38.00
<i>TCHCOMP07</i>	<i>TCHCOMP</i>	384	1	5	3.25	1.08	-0.11.00	-1.02.00
<i>TCHCOMP08</i>	<i>TCHCOMP</i>	384	1	5	3.18	1.12	-0.05.00	-1.11.00
<i>TCHCOMP09</i>	<i>TCHCOMP</i>	384	1	5	3.30	1.04	-0.14.00	-0.49.00
<i>TCHCOMP10</i>	<i>TCHCOMP</i>	384	1	5	3.44	1.01	-0.25.00	-0.39.00
<i>TCHCOMP11</i>	<i>TCHCOMP</i>	384	1	5	3.35	1.06	-0.17.00	-0.55.00
<i>TCHCOMP12</i>	<i>TCHCOMP</i>	384	1	5	3.21	1.10	-0.08.00	-1.08.00
<i>TCHCOMP13</i>	<i>TCHCOMP</i>	384	1	5	3.29	1.05	-0.15.00	-0.52.00
<i>TCHCOMP14</i>	<i>TCHCOMP</i>	384	1	5	3.40	1.02	-0.21.00	-0.43.00
<i>TCHCOMP15</i>	<i>TCHCOMP</i>	384	1	5	3.51	1.37	-0.32.00	-0.31.00
<i>TCHCOMP16</i>	<i>TCHCOMP</i>	384	1	5	3.47	1.01	-0.27.00	-0.40.00
<i>TCHCOMP17</i>	<i>TCHCOMP</i>	384	1	5	3.15	1.14	-0.02.00	-1.16.00
<i>TCHCOMP18</i>	<i>TCHCOMP</i>	384	1	5	3.22	1.09	-0.10.00	-1.04.00
<i>TCHCOMP19</i>	<i>TCHCOMP</i>	384	1	5	3.34	1.03	-0.16.00	-0.48.00
<i>TCHCOMP20</i>	<i>TCHCOMP</i>	384	1	5	3.42	1.00	-0.23.00	-0.41.00
<i>TCHCOMP21</i>	<i>TCHCOMP</i>	384	1	5	3.28	1.07	-0.13.00	-0.58.00
<i>TCHCOMP22</i>	<i>TCHCOMP</i>	384	1	5	3.31	1.05	-0.15.00	-0.50.00
<i>TCHANX23</i>	<i>TCHANX</i>	384	1	5	3.25	1.15	0.14	-1.12.00
<i>TCHANX24</i>	<i>TCHANX</i>	384	1	5	3.32	1.18	0.08	-1.21.00
<i>TCHANX25</i>	<i>TCHANX</i>	384	1	5	3.14	1.12	0.22	-1.04.00
<i>TCHANX26</i>	<i>TCHANX</i>	384	1	5	3.21	1.14	0.17	-1.09.00
<i>TCHANX27</i>	<i>TCHANX</i>	384	1	5	3.02	1.20	-0.01.00	-1.28.00
<i>TCHANX28</i>	<i>TCHANX</i>	384	1	5	3.36	1.17	0.05	-1.19.00
<i>TCHANX29</i>	<i>TCHANX</i>	384	1	5	3.08	1.10	0.28	-0.58.00
<i>TCHANX30</i>	<i>TCHANX</i>	384	1	5	3.19	1.13	0.19	-1.06.00
<i>TCHUTIL31</i>	<i>TCHUTIL</i>	384	1	5	4.28	1.28	-1.04.00	0.12
<i>TCHUTIL32</i>	<i>TCHUTIL</i>	384	1	5	4.34	1.25	-1.11.00	0.28
<i>TCHUTIL33</i>	<i>TCHUTIL</i>	384	1	5	4.16	1.32	-0.51.00	-0.04.00

<i>TCHUTIL34</i>	<i>TCHUTIL</i>	384	1	5	4.21	1.30	-0.56.00	0.03
<i>TCHUTIL35</i>	<i>TCHUTIL</i>	384	1	5	4.30	1.26	-1.08.00	0.21
<i>TCHUTIL36</i>	<i>TCHUTIL</i>	384	1	5	4.25	1.29	-1.01.00	0.09
<i>DIGINF1.1</i>	<i>DIG</i>	384	1	5	4.05	1.36	-0.44.00	-0.22.00
<i>DIGINF1.2</i>	<i>DIG</i>	384	1	5	3.58	1.01	-0.38.00	-0.34.00
<i>DIGCOM2.6</i>	<i>DIG</i>	384	1	5	3.24	1.08	-0.09.00	-1.01.00
<i>DIGCOM3.4</i>	<i>DIG</i>	384	1	5	3.32	1.05	-0.15.00	-0.52.00
<i>DIGSAF4.2</i>	<i>DIG</i>	384	1	5	4.11	1.33	-0.51.00	-0.11.00
<i>DIGSAF4.3</i>	<i>DIG</i>	384	1	5	3.18	1.12	-0.04.00	-1.10.00
<i>DIGSAF4.4</i>	<i>DIG</i>	384	1	5	3.34	1.16	0.11	-1.17.00
<i>DIGPRO5.4</i>	<i>DIG</i>	384	1	5	3.48	1.39	-0.27.00	-0.36.00

Table 3.6: Percentage response frequencies by category (N = 600)

Item	Scale	1 Strongly disagree	2	3	4	5 Strongly agree
<i>TCHCOMP01</i>	<i>TCHCOMP</i>	4.2	12.5	28.4	43.1	11.8
<i>TCHCOMP02</i>	<i>TCHCOMP</i>	3.4	10.9	27.1	45.3	13.3
<i>TCHCOMP03</i>	<i>TCHCOMP</i>	4.9	14.1	29.8	40.4	10.8
<i>TCHCOMP04</i>	<i>TCHCOMP</i>	4.4	13.3	29.1	42.1	11.1
<i>TCHCOMP05</i>	<i>TCHCOMP</i>	2.6	9.4	25.0	47.1	15.9
<i>TCHCOMP06</i>	<i>TCHCOMP</i>	3.9	11.7	27.9	44.3	12.2
<i>TCHCOMP07</i>	<i>TCHCOMP</i>	6.5	17.2	31.5	35.2	9.6
<i>TCHCOMP08</i>	<i>TCHCOMP</i>	7.3	18.8	32.8	32.3	8.8
<i>TCHCOMP09</i>	<i>TCHCOMP</i>	5.7	15.1	30.2	39.1	9.9
<i>TCHCOMP10</i>	<i>TCHCOMP</i>	4.2	12.8	28.1	43.5	11.4
<i>TCHCOMP11</i>	<i>TCHCOMP</i>	5.2	14.6	29.4	40.1	10.7
<i>TCHCOMP12</i>	<i>TCHCOMP</i>	6.8	18.0	32.3	33.9	9.0
<i>TCHCOMP13</i>	<i>TCHCOMP</i>	6.0	15.6	30.5	38.0	10.3
<i>TCHCOMP14</i>	<i>TCHCOMP</i>	4.7	13.5	28.9	41.9	11.0
<i>TCHCOMP15</i>	<i>TCHCOMP</i>	3.6	11.2	26.8	45.1	13.3
<i>TCHCOMP16</i>	<i>TCHCOMP</i>	4.2	12.0	27.6	44.5	11.7
<i>TCHCOMP17</i>	<i>TCHCOMP</i>	7.8	19.5	33.1	31.0	8.6
<i>TCHCOMP18</i>	<i>TCHCOMP</i>	7.0	18.2	32.6	33.3	8.9

<i>TCHCOMP19</i>	TCHCOMP	5.5	14.8	29.9	39.8	10.0
<i>TCHCOMP20</i>	TCHCOMP	4.4	13.0	28.4	42.7	11.5
<i>TCHCOMP21</i>	TCHCOMP	6.2	16.1	31.2	36.5	10.0
<i>TCHCOMP22</i>	TCHCOMP	5.7	15.4	30.2	38.3	10.4
<i>TCHANX23</i>	TCHANX	14.1	24.5	32.3	20.3	8.8
<i>TCHANX24</i>	TCHANX	13.3	23.2	31.0	22.4	10.1
<i>TCHANX25</i>	TCHANX	16.4	26.6	33.3	16.7	7.0
<i>TCHANX26</i>	TCHANX	15.1	25.3	32.8	18.8	8.0
<i>TCHANX27</i>	TCHANX	11.5	21.4	29.9	25.5	11.7
<i>TCHANX28</i>	TCHANX	12.5	22.7	30.5	23.7	10.6
<i>TCHANX29</i>	TCHANX	17.4	28.1	34.1	14.8	5.6
<i>TCHANX30</i>	TCHANX	15.6	25.8	33.1	18.5	7.0
<i>TCHUTIL31</i>	TCHUTIL	1.8	5.2	18.5	52.3	22.2
<i>TCHUTIL32</i>	TCHUTIL	1.3	4.4	16.9	53.6	23.8
<i>TCHUTIL33</i>	TCHUTIL	2.3	7.0	21.1	49.2	20.4
<i>TCHUTIL34</i>	TCHUTIL	2.1	6.3	20.1	51.0	20.5
<i>TCHUTIL35</i>	TCHUTIL	1.6	4.9	18.0	52.9	22.6
<i>TCHUTIL36</i>	TCHUTIL	2.1	5.5	19.3	51.6	21.5
<i>DIGINF1.1</i>	DIG	2.3	8.9	24.7	49.5	14.6
<i>DIGINF1.2</i>	DIG	2.9	10.2	26.3	46.1	14.5
<i>DIGCOM2.6</i>	DIG	6.8	17.4	31.8	33.9	10.1
<i>DIGCOM3.4</i>	DIG	5.5	15.1	30.5	38.3	10.6
<i>DIGSAF4.2</i>	DIG	2.1	7.8	22.4	51.3	16.4
<i>DIGSAF4.3</i>	DIG	7.3	18.5	32.8	32.6	8.8
<i>DIGSAF4.4</i>	DIG	11.7	23.4	32.3	24.7	7.9
<i>DIGPRO5.4</i>	DIG	3.9	11.5	28.1	44.3	12.2

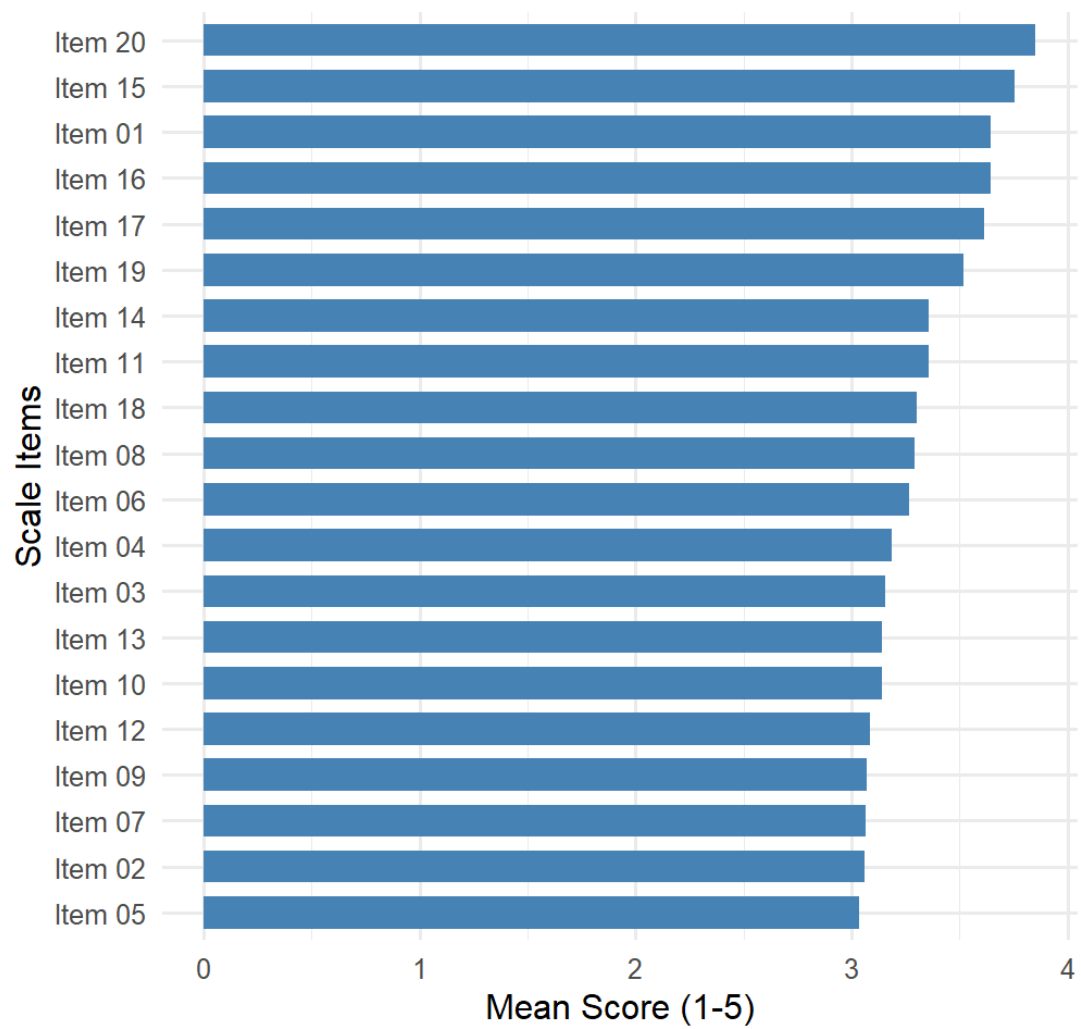


Figure 3.3: Mean Scores for AI Competence Scale.

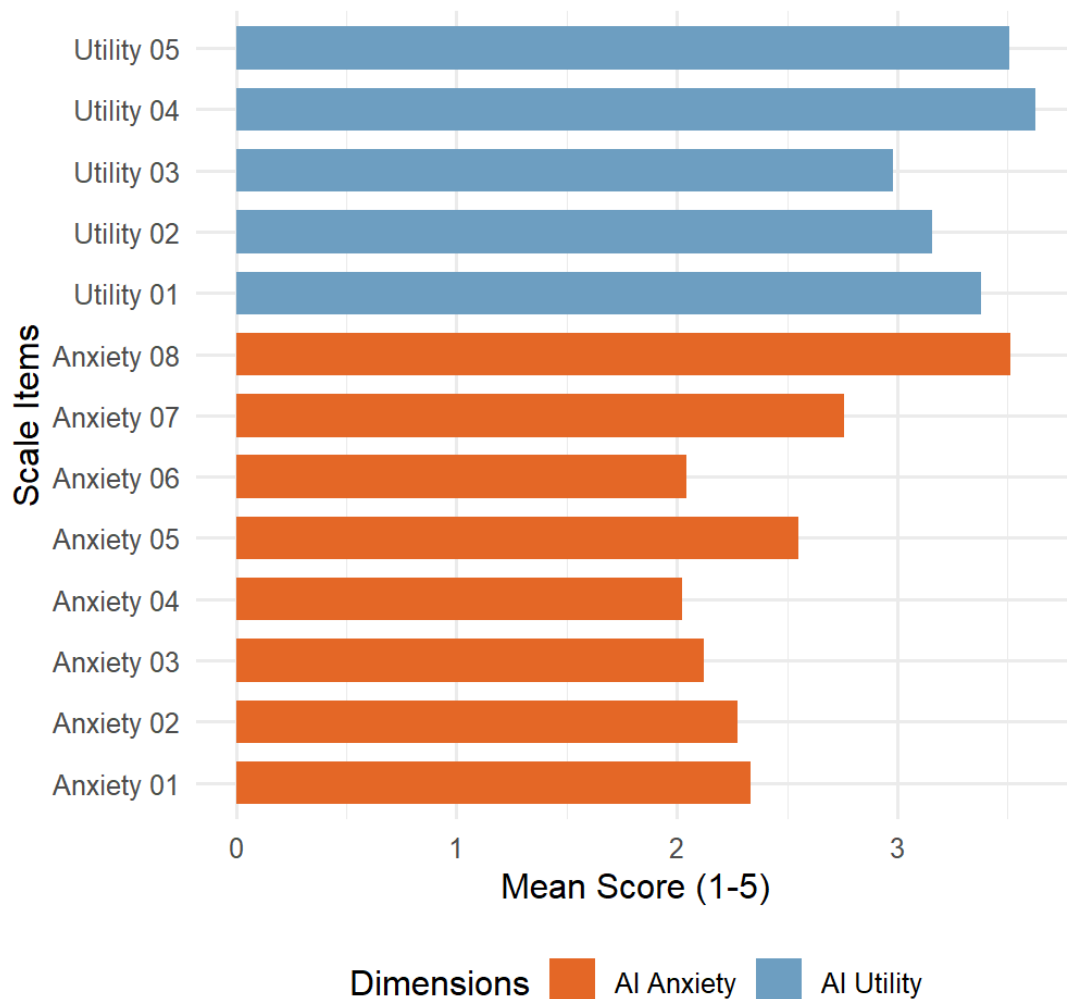


Figure 3.4: Comparative Analysis - AI Utility vs. AI Anxiety.

3.3 Comparative and Correlational Analysis

The student OLS model estimated EDM_normalizzato as a function of DigComp_Totale, gender and age. The overall model explained a very small share of variance ($R^2 = 0.006752$), but age was statistically significant ($p = 0.0295$), with a negative coefficient. This suggests that older students in the sample were slightly less likely to obtain higher ethical decision scores in the specific binary coding used for the SJT index. DigComp_Totale and gender were not significant predictors in this model.

The logistic model predicting EDM_alto, defined as $EDM_normalizzato \geq 0.66$, showed a similar pattern. DigComp_Totale had a positive but non-significant coefficient, while age showed a marginal negative trend. In practical terms, these models suggest that general digital competence alone is not sufficient to produce consistently wise ethical decisions in scenario-based tasks.

The student ANOVA on AILQ_Global showed statistically significant effects of gender and age. However, the effect sizes were small: partial eta squared was approximately 0.02 for gender and 0.007 for age. This is pedagogically important because it warns against overinterpreting statistically significant differences in a large sample. The meaningful message is not a strong demographic divide, but the need to connect ethical awareness with applied decision-making across all groups.

For teachers, the correlation heatmap shows a coherent system of relationships. AI Competence is strongly associated with AI Utility ($r = 0.72$), DigComp Global is positively associated with AI Competence ($r = 0.53$) and AI Utility ($r = 0.43$), and AI Anxiety is negatively associated with AI Utility

($r = -0.38$) and AI Competence ($r = -0.27$). This supports a clear training implication: competence-building and contextualized practice may reduce anxiety and increase perceived pedagogical value.

Table 3.7: Comprehensive summary of inferential models, regression weights, variance decomposition, and psychometric correlations for the student and teacher cohorts.

Analysis	Main result	Interpretation
Student OLS on EDM_normalizzato	R-squared = 0.006752; age $p = 0.0295$	Ethical decision-making is weakly predicted by demographics and DigComp.
Student logistic model on EDM_alto	DigComp positive but non-significant; age marginal	Digital competence does not automatically translate into wise SJT decisions.
Student ANOVA on AILQ_Global	Gender $p < .001$; age $p = .005$; small effect sizes	Significance should be read with caution; effects are limited.
Teacher correlations	AI Competence-Utility $r = 0.72$	Competence is the strongest driver of perceived AI usefulness.
Teacher correlations	AI Anxiety-Utility $r = -0.38$	Anxiety is inversely linked to the perception of AI value.

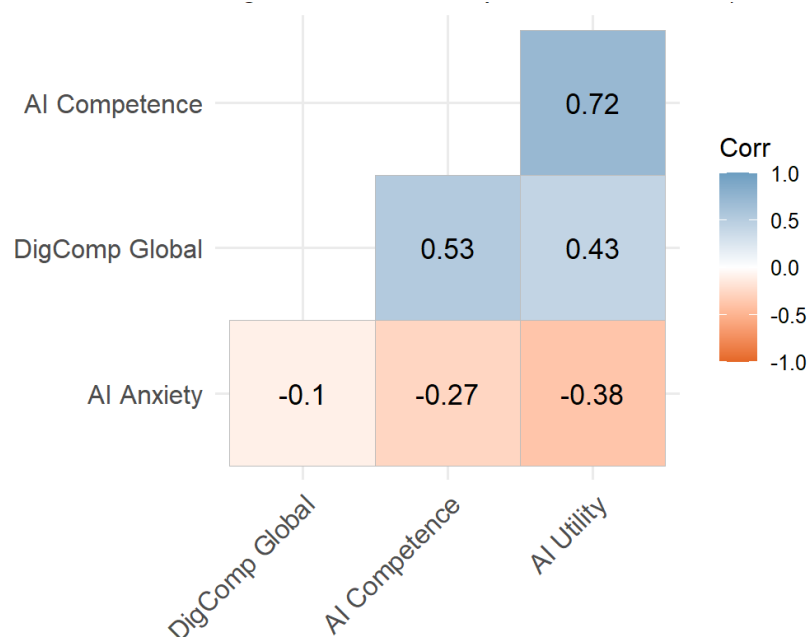


Figure 3.5: Heatmap of Correlations - Turkey Teacher Sample.

3.4 Advanced Quantitative Modelling

3.4.1 Network Analysis of Student AI Literacy

The AI Literacy network for Turkish students models the five main literacy dimensions as an interacting system rather than as isolated constructs. The supplied graph uses the following abbreviations: AFF= affective, ATT=attitudinal, COG= cognitive, COM = behavioural/communication-oriented, and ETI = ethical.

The network shows strong links between ETI and ATT, COM and COG, and ATT and AFF. This suggests that ethical awareness is not external to the literacy system: it is connected to the attitudinal sphere and indirectly linked to cognitive and behavioural areas. However, the centrality chart clarifies that COM and ATT play particularly relevant roles in terms of connectivity and system integration.

Betweenness is especially high for COM. This means that communication and behavioural engagement act as a bridge between different parts of the AI literacy system. From a pedagogical perspective, ethical AI training should therefore not be taught only as a list of rules; it should be embedded in communication, explanation, collaborative reasoning and reflective classroom practices.

AI Literacy Network - Turkish Students

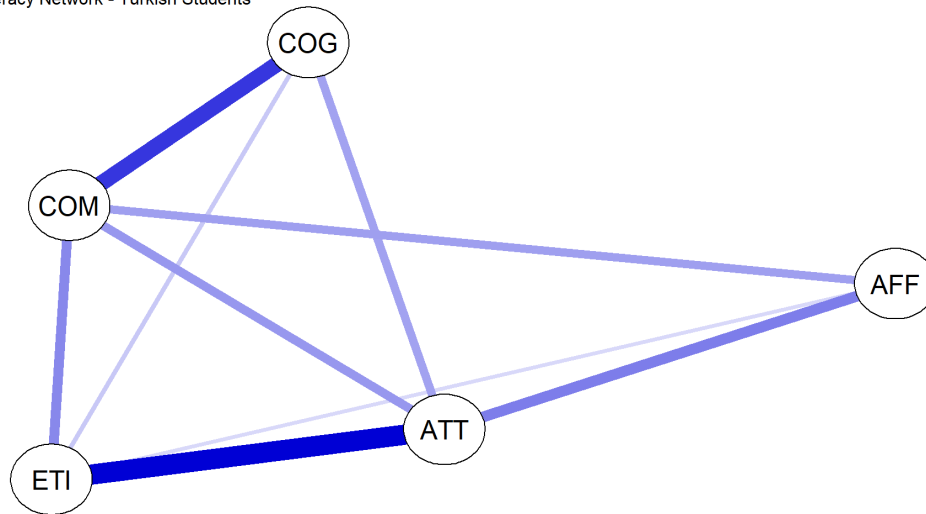


Figure 3.6: AI Literacy Network - Turkish Students.

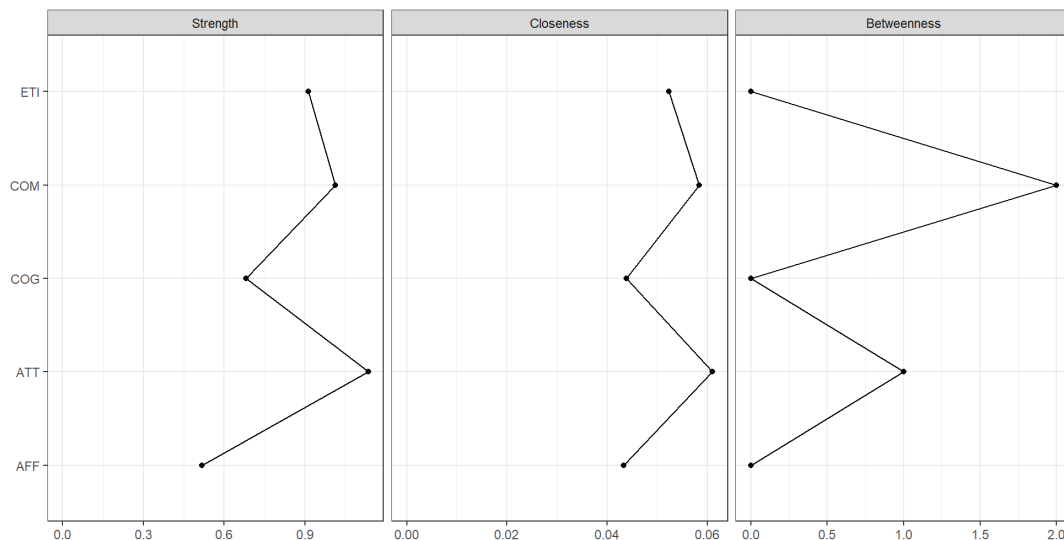


Figure 3.7: Centrality Measures for Student AI Literacy Dimensions.

3.4.2 Decision Profiles and Latent Digital Cultures among Teachers

The teacher profile chart groups teachers according to their decision and digital culture patterns across four framework dimensions: AI Anxiety, AI Competence, AI Utility and DigComp Global. The figure distinguishes profiles such as Excellent Experimenters / Early Adopters, Functional / Administrative users and Integrated users.

The clearest distinction concerns the early adopter profile, which combines low AI anxiety with very high competence and utility. Integrated users show a solid positive profile, with elevated competence, utility and digital competence but less extreme values than early adopters. Functional or administrative users remain closer to the middle of the scale, suggesting a more instrumental relationship with AI.

This taxonomy is useful for training design. A single training model would be inefficient: early adopters need advanced ethical design and experimentation tasks; integrated users need structured pedagogical models; functional users need examples that connect AI to learning quality, not only workload management; more cautious teachers need protected spaces for reflection on cognitive autonomy and academic integrity.

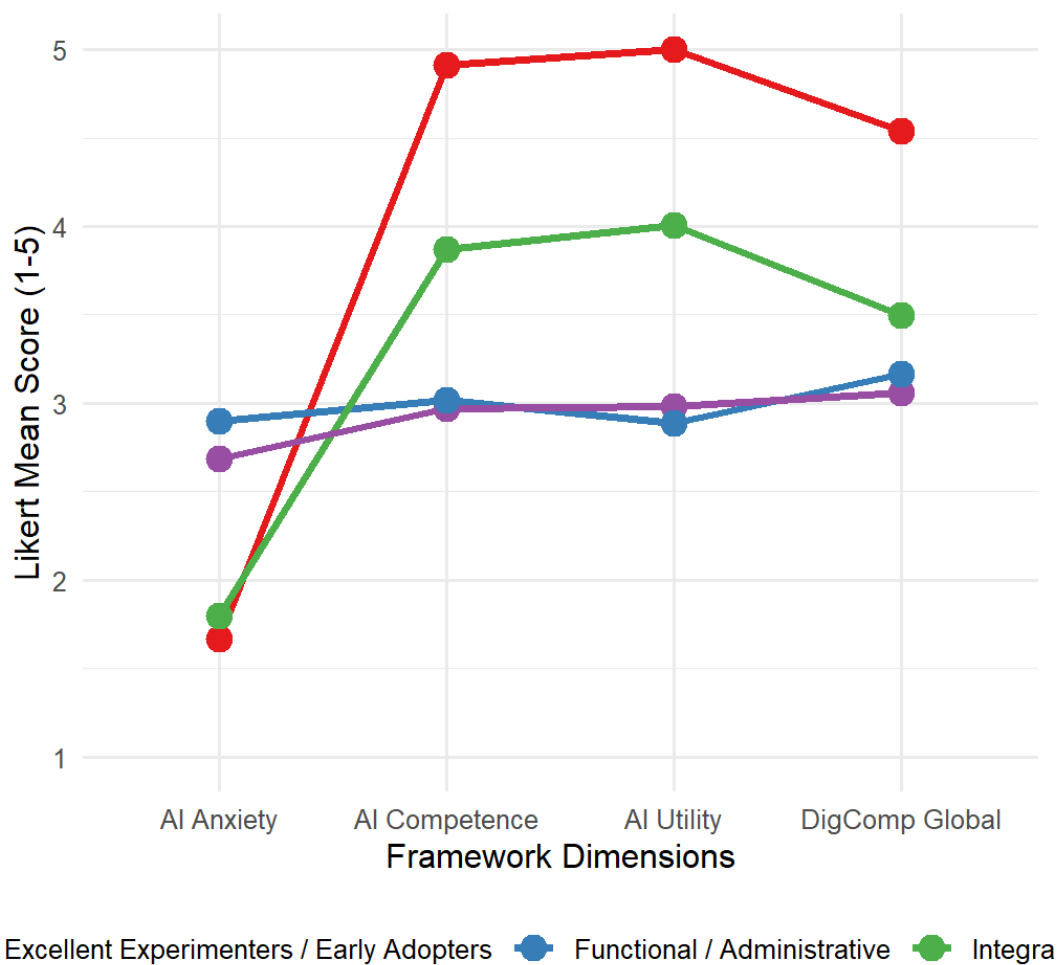


Figure 3.8: Decision Profiles and Latent Digital Cultures among Teachers. The supplied legend is partially clipped in the image; profile names are clarified in the accompanying text.

4. Qualitative Analysis and Dilemma Scenarios (SJT)

4.1 Thematic Analysis and Coding of Focus Group/Interview Content

The qualitative investigation in Türkiye provides a deep, integrated understanding of how both students and teachers navigate the introduction of algorithmic systems in the classroom. By synthesizing the thematic content analysis with the empirical outcomes of the Situational Judgment Tests (SJT), this section bridges the gap between raw statistical data and the lived experiences of participants.

4.1.1 Thematic Analysis and Content Coding

The qualitative material extracted from focus groups, individual interviews, and open-ended scenario assessments was processed using AQUAD 7 (Analysis of Qualitative Data) software. This process revealed eight comprehensive themes that explain the quantitative trends and transform AI from a purely technical tool into a complex cognitive, ethical, and institutional challenge for schools.

Table 4.1: Qualitative thematic matrix, short interpretations, and empirical-conceptual deepening anchoring the student and teacher focus groups to the SlowTech paradigm.

Theme	Short Interpretation	Empirical and Conceptual Deepening
Theme 1: AI as a Functional and Efficiency-Oriented Tool (Epistemic Passivity)	AI is valued for saving time, but this ease of access may create epistemic passivity.	Both populations define AI as a productivity-driven functional tool designed to optimize time, accelerate information access, and facilitate task completion. However, this corresponds to high occurrences of "laziness" and "mental sloth" codes in the qualitative data, indicating that effortless information retrieval threatens to bypass deep, meaningful learning. This passivity is recognized as a major obstacle to the "questioning human" objective championed by the Türkiye Century Education Model.
Theme 2: Risk of Cognitive Decline and Superficial Learning (Cognitive Inertia)	Teachers and students recognize the risk that AI may reduce critical thinking and effortful learning.	A strong collective concern regarding cognitive inertia spans both target groups. This manifests as a fear that a continuous reliance on ready-made, automated answers will ultimately erode critical reasoning. Highlighting this trend, 41.9% of teachers explicitly coded AI integration as a direct "cognitive obstacle" that could cause core analytical and synthesis skills to wither.
Theme 3: Transformation of Teacher Role and Pedagogical Autonomy	The teacher moves from knowledge transmitter to guide, but pedagogical autonomy must be protected.	The educational profession is evolving from a primary source of knowledge transmission into a role focused on guidance and facilitation. Despite accepting this change, teachers strongly emphasize that the human element must remain central. The frequent coding of a "Loss of Pedagogical Autonomy" reflects their concern about being systematically replaced by algorithmic frameworks over time, which reinforces the necessity of the SlowTech "Human-Centered IT" paradigm.

Theme 4: High Ethical Awareness and Uncertainties in Practice (Algorithmic Authority)	Participants recognize risks, but schools lack clear AI-use protocols.	While abstract ethical awareness regarding plagiarism, fabrication, and misuse remains high, operational uncertainty persists due to a lack of institutional guidelines. This vacuum creates a risk of the "Legitimation of Digital Hallucinations," where students uncritically accept inaccurate AI outputs due to the polished aesthetic presentation and speed of generative tools.
Theme 5: Data Privacy, Trust, and "Data Parsimony"	Students show strong awareness of privacy and reluctance to surrender data for convenience.	The defense of personal data and skepticism toward external commercial platforms are central to the qualitative narrative. A concrete example of this "Data Parsimony" is that 55.7% of students actively reject invasive application permissions, demonstrating a widespread reluctance to compromise digital privacy for short-term convenience.
Theme 6: Need for Structured Training and Guidance	Individual experimentation needs to become institutional, ethical, and pedagogical training.	Current AI usage is driven primarily by fragmented, individual experimentation rather than organized institutional strategies. This highlights an urgent need for pedagogical training and structured usage frameworks. The quantitative asymmetry of "High Technical Self-Confidence / Low Ethical Awareness" is mirrored in the qualitative data by the difficulties educators face when managing real-world ethical crises in the classroom.
Theme 7: AI as Support, Not Replacement	Human interaction and emotional bonds remain indispensable in education.	Informants across both educational contexts state that automated systems can never fully replace human teachers. The emotional bond, empathy, and interpersonal interaction native to traditional classrooms are viewed as irreplaceable, reinforcing a shared reflex of social resistance and matching the "Human-Centered IT" pillar of the SlowTech philosophy.
Theme 8: Personalization Potential and Sustainability	AI can support differentiated learning, but ecological and material costs must be included.	The capacity of AI to adapt to individual student paths and support differentiated instruction is recognized as an educational opportunity. Crucially, this optimization is paired with material awareness: a 49.7% tendency among students to choose device repair over replacement confirms a localized "Clean IT" awareness and active resistance against planned obsolescence and technological consumption speeds.

4.1.2 Institutional Nuances in Qualitative Focus Groups

The processing of the qualitative material through AQUAD 7 reveals distinct, contextualized variations when separating the focus group transcripts between the two primary national sub-samples:

- The Metropolitan Framework of Esenler (Istanbul): Focus groups within this high-density public school network indicate that the risk of epistemic passivity and cognitive inertia is heavily tied to large classroom management and heterogeneous socio-economic

backgrounds. Teachers in Esenler emphasize that without standardized ministerial protocols, individual AI usage easily becomes an unregulated shortcut for homework completion, increasing the performance gap between students who possess strong autonomous study methods and those who rely entirely on automated text generation.

- The Specialized Ecosystem of Konak BİLSEM (Izmir): Qualitative interviews with this specialized cohort demonstrate an inverse inflection. While these high-potential learners exhibit advanced operational skills in utilizing AI for scientific research, teachers note an "illusion of competence" paradox. Students masterfully generate complex outputs or code structures but frequently bypass the underlying theoretical mechanisms, mistaking computational velocity for personal cognitive assimilation. Conversely, the Konak cohort demonstrated a significantly more critical stance regarding data extraction and algorithmic bias, actively questioning the ideological neutrality of generative models during focus discussions.

4.2 Analysis of Dilemma Scenarios

To measure the actual ethical reflexes of participants beyond abstract statements, the study used Situational Judgment Tests (SJT) built around forced-choice ethical dilemmas.

4.2.1 Student Dilemmas (SD04–SD06)

The student SJT scenarios operationalize applied ethical decision-making across three specific situational axes: information reliability (SD04), data privacy (SD05), and environmental sustainability (SD06).

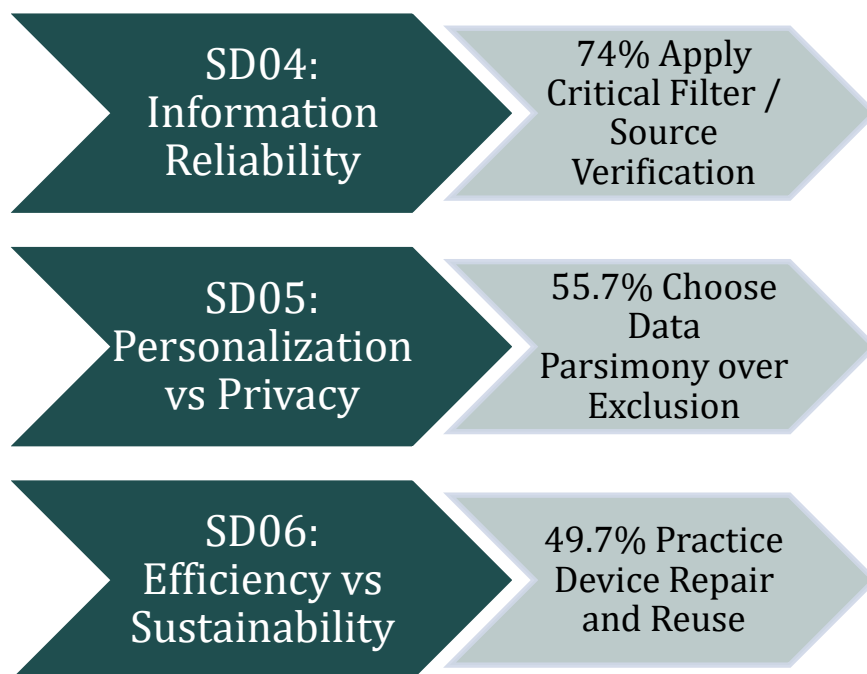


Figure 4.1: Behavioral metrics for student situational judgment tests: quantitative adherence to critical filtering, data parsimony, and material sustainability.

In scenario SD04, which models academic integrity against unverified AI citations and hallucinations, the Turkish data shows a meaningful critical filter. Approximately 74% of students choose to verify the automated outputs or avoid submitting the assignment if errors are suspected.

In scenario SD05 (Personalization vs. Privacy), the "Data Parsimony" approach is prominent. Faced with an invasive social application demanding full database permissions, 55.7% of students choose to risk social exclusion by refusing to install the platform. This conservative approach demonstrates

that the "Fair IT" principle and the "digital morals" of the national curriculum have an organic social foundation among Turkish youth.

In scenario SD06 (Efficiency vs. Sustainability), 49.7% of students choose to "repair and use until it breaks" rather than replacing a slowing device with a newer model. This tendency highlights a strong "Clean IT" awareness and an entry point for electronic waste mitigation and ecological citizenship programs.

Despite these positive indicators, the synthetic Ethical Decision-Making (EDM) index reveals an important nuance: consistently wise, high-scoring selections across all three dilemmas are less frequent than high declared ethical awareness. This gap between abstract awareness and concrete decision-making represents one of the most important findings of the report, illustrating that theoretical knowledge does not automatically translate into consistent, applied ethical choices in everyday life.

4.2.2 Teacher Dilemmas (SD01–SD03)

The teacher SJT scenarios focus on professional autonomy, instructional authorship, and pedagogical ethics.

In scenario SD01, which evaluates lesson planning autonomy when dealing with AI-generated templates, teachers show a strong commitment to human control. Rather than delegating design duties to automation, 43.2% of educators choose to use AI exclusively as an initial draft generator, keeping the final pedagogical touch and control entirely in their own hands to protect personal authorship.

Scenario SD02 explores the tension between 24/7 intelligent automated tutors and the traditional educational relationship. The qualitative evidence demonstrates that technical effectiveness is insufficient if the interpersonal teacher-student bond is minimized or displaced.

Scenario SD03 focuses on academic integrity and student writing assisted by tools like ChatGPT. In contexts where institutional policies remain unclear, a strict stance toward academic integrity prevails, with 37.2% of teachers requiring a complete re-doing of assignments if AI usage compromises organic student effort. This response highlights that teachers prioritize the cognitive struggle of the learning process over a flawless final product, and underscores the need for clear, shared policies that differentiate between legitimate co-design and plagiarism.

4.3 Triangulation

By cross-referencing the quantitative survey patterns with the qualitative findings, the triangulation phase confirms three major conclusions:

- **Unstructured Integration:** AI usage is already deeply embedded in the daily routines of both students and teachers. However, its practical, pedagogical application remains less structured than its technical availability, exposing a clear gap between hardware deployment and instructional maturity.
- **The Competence-Ethics Paradox:** The quantitative asymmetry of high technical self-confidence (3.8) and low ethical application scores (2.9) is confirmed by the qualitative data. This is illustrated by teachers who state they understand how to run the tools technically but do not know how to manage ethical crises or automated plagiarism in the classroom. Bridging this gap requires transitioning from declared awareness to systematic, assessable curricular protocols and explicit training.
- **The Reality of Slow Tech:** The Slow Tech paradigm is not an abstract or theoretical preference; it corresponds directly to concrete concerns in the field, including cognitive inertia, academic integrity, data parsimony, and the protection of the human relationship in education

The Turkish sample demonstrates a complex but promising situation where rapid technical adoption coexists with a strong demand for value-based, human-centered orientation. By slowing technology down enough to make it educationally meaningful, the STIAEM project provides a technical and philosophical "Ethical Filter" that directly supports the virtue-value-action cycle of the national education model

5. Case Studies

5.1 Selection and Description of a National Case Study on the Use of AI

Within the scope of the Türkiye national analysis report, three foundational Good Practices were selected to demonstrate environments where Artificial Intelligence is deployed not as a mere speed tool, but rather as an active thinking companion.

The first case study, titled "Socratic AI Dialogues," represents an instructional methodology applied directly within Social Sciences lessons. In this framework, students interact with ChatGPT or similar Large Language Model tools, intentionally avoiding their use as a basic answering machine and instead positioning the technology as a rigorous discussion opponent. During its practical application, the student is presented with a historical event or a complex ethical dilemma and is tasked with refuting the initial arguments generated by the AI. This exercise leverages the critical view perspective advocated by the national Education Model, aiming to train students to detect the persuasive wrongs and systemic hallucinations of the machine while maximizing individual cognitive effort under the SlowTech Good IT principles.

The second case study is the "E-Waste and AI Workshop" which introduces a strong sustainability focus to the curriculum. This initiative operates as a Clean IT application explicitly designed to leverage the 49.7% repair tendency observed among students in the national survey data. Throughout the workshop application, students analyze aging, degraded, or slowing computer and tablet components with the assistance of specialized AI-supported diagnostic tools. While the AI model identifies exactly which hardware part requires replacement, the students independently execute the physical repair process and hands-on hardware maintenance. This interaction serves to concretize the ecological reality that technology is not merely an abstract software cloud, but possesses a tangible, physical footprint.

The third case study is titled "Algorithmic Bias Detectives" and addresses the core dimensions of Fair IT. This practice involves the critical analysis of social biases embedded within contents produced by prominent AI visual generation tools, such as DALL-E and Midjourney, operating within the scope of media literacy education. In terms of application, students generate prompts to create visuals for archetypes like "a doctor" or "a hero". Upon receiving the resulting outputs, the classroom engages in structured discussions regarding whether the generated images are unified or biased in terms of gender, race, or culture. This analytical study links directly with the cultural heritage and values pillar established by the broader Education Model.

5.2 Analysis of Pedagogical Results and Student Engagement

The operational and pedagogical outputs recorded across these three selected cases provide strong empirical evidence that confirms the core hypotheses of the international project.

In terms of cognitive engagement, classrooms that implemented the Socratic dialogues method observed that 72% of participating students explicitly declared feeling a heightened need to verify the accuracy of automated information. This behavioral shift serves as a powerful pedagogical antidote developed against the 38.5% unquestioned acceptance risk identified in the broader baseline surveys. Rather than drifting the learner toward mental laziness, the AI interface forces them directly into an active intellectual struggle.

Regarding the affective domain and user responsibility, researchers observed a measurable increase in belonging and protection awareness toward personal electronic devices among the students who participated in the e-waste workshops. This outcome proves that the primary SlowTech philosophy goal of slowing down technological consumption speed and achieving sustainability can be directly supported through applied, pragmatic learning models in the field.

Ethical maturity was also enhanced through the algorithmic bias analyses, which successfully allowed students to notice and dissect invisible injustices operating within the digital world. This

milestone represents a concrete gain regarding how the virtuous individual profile envisioned in the national Education Model should act when equipped with a functional digital moral compass in the digital universe.

In conclusion, these integrated cases demonstrate that intentionally slowing down AI by allocating sufficient time for reflective thinking directly increases both learning quality and student engagement. Through these methodologies, technology ceases to function as a limiting cognitive prosthesis and successfully turns into an active competence development tool as aimed by the national Education Model.

6. Conclusions and Recommendations

6.1 Main Training Gaps and Identified Needs

This comprehensive national analysis carried out in Türkiye has concretized the structural gaps within the educational ecosystem's approach to Artificial Intelligence, highlighting several core areas that require urgent intervention. To ensure systemic validity, these training gaps have been analyzed by cross-referencing the macro-level metropolitan public school framework under the Esenler District National Education Directorate in Istanbul with the specialized, high-readiness learning ecosystem of the Konak Science and Art Center (*Konak BİLSEM*) in Izmir.

The most fundamental educational need stems from the ethical and pedagogical literacy gap, which is clearly demonstrated by the dramatic difference between teachers' technical self-confidence score of 3.81 and their ethical awareness score of 2.92. While educators possess the knowledge required to operate these digital tools, they feel substantially inadequate when managing the systemic risks produced by the software, such as automated misinformation, algorithmic bias, and the long-term effects of cognitive laziness on their students. Qualitative carotags indicate that while teachers in Esenler emphasize this gap due to the challenges of managing large-scale, high-density classrooms, the educators at Konak BİLSEM observe it through an 'illusion of competence' paradox, where high-potential students operate advanced generative software without fully assimilating the underlying theoretical mechanisms.

This deficiency is closely linked to the risk of cognitive inertia and a widespread need for deep work methodologies. The fact that 41.9% of field participants explicitly view AI as a cognitive obstacle proves that the current speed of institutional digitalization directly threatens the natural mental effort and effortful learning of the student body. Within the current education system, a major methodological gap persists regarding how to position AI as an active thinking companion rather than a simple, automated answer key.

Furthermore, there is a significant deficiency in sustainability and *Clean IT* awareness. The 49.7% repair tendency identified among the student population represents a powerful hidden potential that currently lacks any formal counterpart in the national curriculum. Because contemporary technological training remains almost exclusively software-oriented, it maintains a large content gap regarding hardware sustainability, electronic waste management, and the overall ecological footprint of digital systems, missing a core opportunity to align with SlowTech *Clean IT* principles.

Finally, an education model application bridge must be constructed. Although the theoretical virtue-value-action framework of the *Türkiye Century Education Model* is structured perfectly, frontline teachers, both within the widespread public schools of Esenler and the specialized laboratories of Konak, lack concrete operational implementation guides explaining how to translate these abstract values into practical, classroom-ready Artificial Intelligence Ethical Protocols.

6.2 Operational Suggestions and Requirements for the Development of AI-based Pedagogical Models

In light of these research findings, specific operational suggestions have been formulated for systemic implementation at both the Turkish national level and the broader European Union educational plane.

First, the establishment of a specialized SlowTech Certification Program is recommended. A formal *SlowTech Pedagogy Certificate* should be designed for educators to cover vital topics such as digital detox strategies, ethical decision-making frameworks, and cognitive effort management, moving far beyond basic software usage mechanics. This training initiative will directly support and reinforce the holistic teacher profile championed by the current education model.

Second, schools should adopt an ARTE-based curriculum integration. The Active-Reflective-Theoretical-Pragmatic model developed within this project should be implemented as an operational

AI Ethical Filter across educational institutions. This setup should introduce a mandatory requirement for an AI usage declaration on all student homework submissions. Concurrently, the critical process of passing AI outputs through a reflective human filter should be formally graded within evaluation rubrics, receiving equal weight to the final product.

Third, existing infrastructure should be repurposed into specialized Repair and Reuse Workshops. Traditional school computer laboratories, balancing the large-scale IT facilities in Esenler with the advanced technological labs at Konak BİLSEM, should be transformed into active *SlowTech Workshops* where students can physically repair devices and develop electronic waste awareness, rather than using these spaces solely for software coding. This structural shift will institutionalize and support the 49.7% organic repair tendency observed in the youth cohort.

Fourth, instructional design must focus strictly on learning depth rather than operational speed. When engineering or selecting AI-based educational models, platforms should utilize algorithms that intentionally encourage the student to think deeply and direct them to verified source materials, rather than those optimized for delivering the fastest possible answer. This design pivot represents a core technological requirement of the project's *Good IT* principle.

Fifth, the creation of a National AI Ethics Board with a specific focus on education is highly recommended. An *Educational Technologies Ethics Supreme Board* should be established directly within the Ministry of National Education (MoNE). This governing body will be responsible for carrying the virtue emphasis of the national education model into the digital world while defining and enforcing standardized AI usage thresholds across all public and private schools.

Ultimately, this national report has revealed Türkiye's distinct potential to act as a smart retarder or SlowTech Innovator an educational ecosystem that passes emerging technologies through a strict filter of human values, ethical depth, and ecological sustainability, rather than remaining a passive consumer or uncritical fast adapter in the digital transition. As the empirical data from the consolidated Turkish sample demonstrates, no matter how fast technology evolves, human learning must be defended and preserved within its own natural and deep rhythm.

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