Faculty development programs should address technical operation, facilitation skills, scenario design, after-action review methodologies, and performance data interpretation.

Continuous improvement requires systematic collection of performance data, regular scenario updating based on evolving requirements, instructor feedback mechanisms, and research programs investigating learning effectiveness and transfer.

Conclusion Interactive educational and training complexes represent a significant methodological opportunity for officer training. By creating immersive environments enabling repeated deliberate practice of complex competencies, these technologies address fundamental limitations of traditional methods. The directions outlined—simulation integration, team coordination development, adaptive tutoring, blended environments, assessment transformation, and instructor role evolution—provide a comprehensive framework.

Success requires sustained commitment to infrastructure, curriculum integration, faculty preparation, and continuous improvement. The investment is warranted by the imperative of preparing officers for increasingly complex operational environments. Interactive training complexes, methodologically integrated within comprehensive development programs, offer a proven pathway for meeting this challenge.

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THE ROLE OF HUMANITY IN TRAINING FUTURE ENGINEERS

Dimitrova N., PhD, Associate Professor,VUM,
Voronova Ye. M., Associate Professor,
Gerasymchuk T. V., PHD, Associate Professor,
Gubareva O. S., PHD, Associate Professor,

Kharkiv National Automobile and Highway University

A paradox defines contemporary engineering education. Employers, accreditation bodies, and professional societies increasingly emphasize competencies beyond technical knowledge—communication, ethical reasoning, teamwork, cultural awareness, critical thinking—as essential to professional success. The U.S. National Academy of Engineering's Engineer of 2020 report identified "strong communication skills," "principles of business and management," and "understanding of the societal context of engineering" as defining attributes of future engineers. ABET accreditation criteria require demonstrated capacity for ethical reasoning, effective communication, and understanding engineering's global and social impacts.

Yet the institutional structures of engineering education remain largely organized around a model inherited from the mid-twentieth century: intensive technical coursework in mathematics, sciences, and engineering sciences, with humanities and social sciences relegated to "general education" distribution requirements—typically a scattering of introductory courses lacking coherence or connection to engineering concerns. Students receive the implicit message that these courses are obligations to be discharged rather than resources for professional development.

This structural marginalization rests on an outdated premise: that technical and humanistic knowledge occupy separate domains, and that engineering competence is fundamentally technical competence with soft skills as supplementary enhancements. This article challenges that premise, arguing that humanities education contributes distinctively and irreplaceably to capacities at the core of engineering professionalism. The argument proceeds through four sections: identifying specific soft skills essential to contemporary engineering, demonstrating how humanities disciplines cultivate these capacities, examining evidence of humanities' contribution to engineering competence, and proposing models for meaningful curricular integration.

The Soft Skills Landscape: What Engineers Need Beyond Technical Knowledge

The Changing Nature of Engineering Work Engineering practice has undergone fundamental transformation. The model of the engineer working individually on well-defined technical problems within hierarchical organizations has given way to

collaborative, cross-functional teamwork addressing ambiguous challenges with significant social, ethical, and organizational dimensions. Engineers must communicate across disciplinary boundaries, negotiate with diverse stakeholders, understand user contexts and cultural factors, anticipate ethical implications, and exercise judgment in situations where technical criteria alone are insufficient.

Analysis of employer surveys, professional standards, and educational research identifies several clusters of competencies that humanities education is uniquely positioned to develop:

Interpretive judgment refers to the capacity to analyze complex, ambiguous situations—involving technical, human, organizational, and ethical dimensions—and identify what is salient, what requires attention, and what frameworks are appropriate. This goes beyond algorithmic problem-solving to encompass the hermeneutic dimension of professional practice: the ability to "read" situations and understand their meaning.

Ethical imagination denotes the capacity to envision the consequences of technical decisions for diverse stakeholders, to recognize ethical issues that are not obvious, and to reason through novel ethical challenges not addressed by existing codes or precedents. This requires more than knowledge of ethical principles; it requires practiced ability to inhabit perspectives different from one's own and to trace causal chains through complex socio-technical systems.

Communicative versatility involves adapting communication strategies to diverse audiences, purposes, and contexts—explaining technical concepts to non-specialists, writing clearly for different genres and readers, presenting persuasively to decision-makers, facilitating productive team interactions. This is not a single skill but a repertoire of rhetorical capacities.

Contextual awareness encompasses understanding how historical, cultural, social, and organizational contexts shape both engineering problems and the consequences of engineering solutions. Technologies that succeed in one cultural context may fail in another; solutions that appear technically optimal may prove socially or politically infeasible.

The Limitations of Technical Pedagogy These competencies share a characteristic that explains why they are difficult to develop through traditional technical coursework: they involve capacities that cannot be reduced to explicit rules or procedures. They require development through engagement with complex, ambiguous materials that resist formulaic treatment—precisely the kinds of materials that humanities disciplines have developed sophisticated methods for addressing.

Humanities as Soft Skill Pedagogy: Disciplines and Their Contributions

Philosophy: Ethical Reasoning and Analytical Precision Philosophy cultivates capacities directly relevant to the interpretive and ethical demands of engineering practice. The analytical tradition develops precision in argument construction, identification of assumptions, recognition of logical fallacies, and evaluation of evidence—capacities essential for technical reasoning but also for critical analysis of claims and proposals.

Ethics as a philosophical subdiscipline provides frameworks—consequentialist, deontological, virtue-based, care ethics, justice theories—that enable systematic reasoning about moral dimensions of engineering decisions. More fundamentally, philosophical ethics cultivates habits of recognizing ethical dimensions of situations that might initially appear purely technical. The philosopher's practice of analyzing cases, identifying competing principles, and constructing reasoned positions transfers directly to engineering ethics contexts.

Political and social philosophy addresses questions of justice, rights, the distribution of benefits and burdens, and the relationship between technology and power—providing frameworks for analyzing the social dimensions of engineering work that extend beyond individual professional conduct.

Literature and Narrative Arts: Perspective-Taking and Ethical Imagination Narrative engagement develops capacities for understanding human experience from perspectives different from one's own. The reader of fiction practices entering unfamiliar consciousnesses, understanding motivations and values unlike their own, and tracing how individual actions unfold within social contexts. This cultivation of empathy and perspective-taking is directly relevant to the engineer seeking to

understand diverse stakeholders, anticipate user responses to technologies, or collaborate across cultural boundaries.

Literature also develops interpretive sophistication. Literary texts reward—indeed require—attention to ambiguity, multiplicity of meaning, and the relationship between form and content. The interpretive practices developed through literary study—close reading, attention to context, recognition that texts support multiple valid interpretations—transfer to the "reading" of complex professional situations requiring interpretive judgment.

Narrative competence also supports communication. Understanding how narratives function—how they create meaning, engage audiences, structure experience—enables engineers to communicate technical information within compelling frameworks that connect with audience concerns and values.

History: Contextual and Systems Thinking Historical study develops appreciation for the contingency of technological development, the complex causal chains through which technologies interact with social forces, and the unintended consequences that often accompany technological change. The historian's practice of analyzing how multiple factors—technical, economic, political, cultural—converge to produce historical outcomes develops systems-thinking capacities directly applicable to engineering.

History of technology and science reveals that technical decisions are always also social decisions. Studying how past technologies have succeeded or failed not primarily on technical grounds but because of social, cultural, or organizational factors develops capacities for anticipating and navigating such factors in contemporary engineering practice.

Rhetoric and Communication Studies: Communicative Versatility Rhetoric, the ancient discipline of effective communication, provides systematic frameworks for analyzing communicative situations, adapting messages to audiences, constructing persuasive arguments, and deploying appropriate styles. The rhetorical tradition's emphasis on kairos—timeliness and appropriateness—develops sensitivity to context that formulaic approaches to communication instruction cannot provide.

Contemporary communication studies extend rhetorical analysis to visual, digital, and multimodal communication increasingly central to engineering practice. Understanding how visual representations, data visualizations, and multimedia presentations communicate—and how they can mislead—is essential for engineers who increasingly communicate through these media.

Cultural Studies and Anthropology: Intercultural Competence Engineering projects increasingly span cultural boundaries, with teams distributed globally and technologies deployed in diverse cultural contexts. Cultural studies and anthropology develop capacities for recognizing one's own cultural assumptions, understanding how cultural frameworks shape practices and perceptions, and navigating cross-cultural interactions effectively.

The ethnographic method—sustained, systematic attention to how people actually live, work, and make meaning—provides engineers with approaches to understanding user communities and stakeholder groups that complement technical analysis. The anthropologist's capacity to recognize that "the way we do things" is not universal but culturally specific is an essential corrective to tendencies toward technological solutionism.

Evidence of Effectiveness

Employer and Professional Body Perspectives Multiple surveys of engineering employers consistently identify communication, teamwork, ethical reasoning, and contextual understanding as among the most important yet most frequently deficient competencies among engineering graduates. The oft-cited observation that engineers who advance to leadership positions are typically distinguished not by superior technical knowledge but by superior communication and interpersonal capacities reflects the career significance of humanities-related competencies.

Pedagogical Research Research examining humanities-based interventions in engineering education provides evidence of effectiveness. Studies document that structured philosophy-based ethics instruction produces superior ethical reasoning outcomes compared to approaches focused primarily on professional codes. Writing-intensive engineering courses incorporating rhetorical instruction produce measurable

improvements in communication quality. Programs integrating substantial humanities content report enhanced student capacities for analyzing socio-technical dimensions of engineering problems.

Problem-Centered Interdisciplinary Collaboration More intensive integration involves courses organized around problems requiring both technical and humanistic analysis. An engineering and philosophy faculty member might co-teach a course on autonomous vehicles addressing both the technical challenges and the ethical frameworks for resolving dilemmas. Architecture, engineering, and history faculty might collaborate on a course addressing infrastructure renewal that integrates technical, historical preservation, and community impact dimensions.

This model creates intellectual partnership between humanities and engineering, positioning humanities disciplines as resources for addressing authentic engineering challenges rather than as requirements to be completed.

Reflective Practice Integration Integrating structured reflection on the human dimensions of technical work throughout the curriculum develops capacities for connecting technical decisions to broader contexts. Design projects can include requirements for stakeholder analysis, ethical evaluation, and communication planning. Laboratory courses can incorporate reflection on the social organization of laboratory work and the relationship between experimental practice and knowledge production. Portfolio requirements can document development of humanities-related competencies alongside technical achievements.

Conclusion The metaphor of "two cultures"—the sciences and the humanities as separate intellectual worlds with distinct languages, methods, and values—has shaped educational institutions for generations. Engineering education's marginalization of humanities reflects and perpetuates this divide. But the most pressing challenges facing contemporary societies—climate adaptation, sustainable infrastructure, equitable technological access, responsible artificial intelligence—resist categorization as purely technical or purely humanistic. They demand professionals capable of integrating technical sophistication with the capacities that humanities education cultivates:

interpretive judgment, ethical imagination, communicative versatility, and contextual awareness.

The argument of this article is not that engineering education should become less technical but that genuine technical competence for contemporary professional practice includes capacities that humanities disciplines are uniquely positioned to develop. The future of engineering education lies in transcending the two-cultures divide, creating curricula where humanities disciplines are partners in professional formation rather than peripheral obligations. This requires institutional imagination, faculty collaboration across disciplinary boundaries, and recognition that the "soft skills" cultivated by humanities education are in fact the hard-won capacities that enable technical power to serve human purposes effectively, responsibly, and wisely.

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PREPARING FUTURE PSYCHOLOGY UNDERGRADUATES TO PROVIDE SUPPORT TO WITNESSES OF WAR

Gubareva O. S.,PHD.Associate Professor,

Kharkiv National Automobile and Highway University

War creates psychological casualties on a massive scale. Beyond the direct victims of violence, millions of individuals witness atrocities, experience forced displacement, lose loved ones, and endure the systematic destruction of homes,