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SELF-EDUCATION IN THE DIGITAL ENVIRONMENT: VECTORS OF CONTINUOUS PROFESSIONAL DEVELOPMENT FOR ACADEMIC STAFF AT A UKRAINIAN TECHNICAL UNIVERSITY

This article examines the role of self-education in sustaining continuous professional development among academic staff at Ukrainian technical universities amid the combined pressures of digital transformation and wartime disruption. It focuses on how lecturers adapt their professional learning practices to air-raid alerts, power outages, unstable internet connectivity and unequal access to digital infrastructure. Drawing on relevant academic literature and reported professional experiences, the study identifies several interconnected vectors of self-directed learning, including artificial intelligence (AI) tools, informal collegial exchange, open educational resources, asynchronous webinars, independent academic reading and low-technology reflective activities. Particular attention is devoted to AI-assisted learning and its potential to facilitate lesson planning, academic writing, information synthesis and pedagogical innovation. Simultaneously, the article highlights significant challenges associated with inaccurate AI-generated content, excessive technological dependence and the potential deterioration of critical reading, analytical reasoning and independent scholarly judgement. Furthermore, it considers how disparities in electricity supply, internet connectivity and technological resources may exacerbate existing inequalities in professional development opportunities. The findings indicate that professional learning under wartime conditions is characterised not merely by disruption but also by adaptive strategies integrating digital technologies with interpersonal interaction and offline knowledge acquisition. The study emphasises the importance of developing institutional frameworks that promote critical AI literacy, acknowledge informal and low-technology educational practices, and ensure equitable access to professional learning opportunities. Ultimately, the article contributes to understanding how Ukrainian technical university lecturers maintain professional competence, intellectual autonomy and educational resilience under extraordinary circumstances, offering practical recommendations for establishing more flexible, inclusive and sustainable systems of continuous academic professional development. Keywords: self-directed learning; continuous professional development; artificial intelligence; digital resilience; wartime higher education.

The continuous professional development of academic staff has become increasingly significant in the context of rapid digital transformation and the unprecedented challenges facing Ukrainian higher education during wartime. At technical universities, self-education plays a crucial role in maintaining pedagogical competence, fostering professional adaptability and ensuring the continuity of educational practices despite infrastructural disruptions. The growing

integration of artificial intelligence, digital learning platforms and open educational resources has created new opportunities for autonomous professional learning while simultaneously raising concerns regarding digital inequalities, critical thinking and intellectual independence.

Under conditions of prolonged uncertainty, academic staff are compelled to develop flexible self-directed learning strategies that combine technological innovation with informal knowledge exchange and traditional forms of scholarly engagement. This article aims to identify and analyse the principal vectors of self-education in the digital environment, highlighting their potential, limitations and implications for establishing sustainable frameworks of continuous professional development at Ukrainian technical universities.

Problem formulation and its connection with scientific and practical tasks. Academic staff at Ukrainian technical universities currently face two major challenges: rapid digital innovation and the institutional disruption caused by russia's invasion. These forces interact in complex ways that require further research. This paper explores how lecturers use self-education to maintain their digital professional development during wartime.

While self-directed learning – such as attending workshops or reading literature – is essential for academics, war-related issues like air-raid alerts and power cuts make traditional methods difficult. Current professional development models are not designed for such instability. Consequently, artificial intelligence (AI) tools have emerged as vital resources. Because these platforms are often accessible without constant internet, they provide flexible support for staff. This study examines relevant literature and empirical data to discuss the implications of these findings for university policy and individual practice.

Analysis of recent research and publications. Scholarly engagement with self-directed professional learning in digital environments has expanded considerably in the past decade. Littlejohn, Milligan, and Margaryan [1], in their foundational work on self-regulated learning in the workplace, demonstrated that self-regulatory capacity and metacognitive awareness are central determinants of professional development quality – findings of direct relevance to lecturers navigating unpredictable wartime schedules. Crompton and Burke [2] in their systematic review documented the rapid proliferation of AI applications in higher education and identified critical digital literacy – the capacity to evaluate and judiciously deploy AI-generated content – as lagging behind adoption rates, generating a substantive competence gap. In the specifically Ukrainian context, Lavrysh et al. [3] provided early empirical evidence of the adaptive pedagogical strategies employed by Ukrainian academic staff during the initial stages of the full-scale invasion, whilst Matviichuk, Ferilli, and Hnedko [4], writing in Future Internet, documented the accelerated implementation of e-learning practices in Ukrainian higher education institutions under wartime conditions – with power outages and connectivity disruptions identified as the most acute structural impediments. Selwyn [5], approaching the question from a critical educational studies perspective, offers a broader conceptual caution against uncritical techno-optimism, arguing that the social and political dimensions of AI integration in education must be foregrounded in any institutional policy discussion.

Purpose of the article. The article aims to identify and analyse the principal vectors of self-education among academic staff at Ukrainian technical universities, with particular emphasis on the role of digital technologies, artificial intelligence and adaptive learning strategies in sustaining continuous professional development under wartime conditions. It further seeks to examine the opportunities, challenges and structural inequalities associated with these practices and to propose recommendations for developing flexible, inclusive and sustainable institutional frameworks for professional learning.

Presentation of the main research material. The analysis of self-educational practices among academic staff at Ukrainian technical universities reveals several interconnected dimensions of continuous professional development shaped by digital transformation and wartime challenges. To establish a clear relationship between the research objectives and the findings, Table 1 systematically categorises these dimensions according to the identified learning practices, associated challenges and implications for professional development. This analytical framework demonstrates how different forms of self-directed learning contribute to maintaining academic competence under conditions of infrastructural instability and institutional uncertainty. In particular, AI-assisted self-education offers opportunities for personalised professional learning and pedagogical innovation, although its effectiveness depends on critical evaluation, digital literacy and the preservation of intellectual autonomy.

Complementing these technological approaches, informal collegial exchange, asynchronous educational resources and offline reflective practices provide alternative mechanisms for sustaining professional engagement when conventional learning opportunities are disrupted. The comparison of these dimensions further reveals that critical and metacognitive competence constitutes a cross-cutting requirement, influencing the quality and reliability of various self-educational activities. Equally important, disparities in technological accessibility and institutional support highlight structural inequalities that may restrict the effectiveness of otherwise promising professional development strategies. Consequently, the relationships presented in Table 1 provide an analytical foundation for the study's recommendations concerning responsible AI integration, institutional recognition of informal and low-technology learning, and equitable access to educational resources. Rather than offering a quantitative assessment of individual practices, the table synthesises the qualitative findings into a coherent framework that connects self-educational strategies, their limitations and their broader implications for the resilience and sustainability of continuous professional development in Ukrainian higher education.

Table 1

Principal findings on self-educational practices and continuous professional development under wartime conditions

Self-educational dimension	Identified practices and findings	Challenges and limitations	Implications for professional development
AI-assisted self-education	Using AI tools for academic writing, lesson planning, information synthesis and pedagogical innovation.	Inaccurate AI-generated content, technological dependence and reduced intellectual autonomy.	Enhances learning flexibility but requires critical AI literacy.
Informal collegial learning	Exchanging professional knowledge through messaging applications, peer discussions and spontaneous workplace interactions.	Limited opportunities for structured communication and institutional recognition.	Strengthens professional solidarity and collaborative knowledge construction.
Open educational resources and asynchronous learning	Participating in recorded webinars, consulting academic repositories and independently studying methodological literature.	Unstable internet connectivity, restricted access to resources and fragmented learning schedules.	Supports autonomous learning and continuity of professional competence development.
Offline and low-technology learning	Reading downloaded materials, maintaining reflective journals and practising independent conceptual analysis.	Restricted access to digital resources and limited opportunities for immediate feedback.	Promotes adaptability and maintains learning continuity during infrastructural disruptions.
Critical and metacognitive competence	Evaluating digital information, reflecting on professional learning and maintaining independent scholarly judgement.	Cognitive overload, excessive reliance on AI and diminished engagement with primary sources.	Preserves intellectual independence and strengthens self-regulated learning.
Equity of digital access	Adapting professional learning to differences in electricity supply, internet availability and personal technological resources.	Unequal infrastructure, geographical disparities and limited technological accessibility.	Highlights the necessity of inclusive institutional professional development policies.

Source: created by authors.

The analysis of self-educational practices among academic staff at Ukrainian technical universities reveals several interconnected dimensions of continuous professional development under wartime conditions. As presented in Table 1, these dimensions encompass AI-assisted learning, informal professional interaction, asynchronous educational engagement, offline learning strategies, critical competence development and equitable access to digital resources.

The study identifies AI tools as the most common and complex method of self-education. Lecturers use these platforms [6] to summarise academic texts, design lesson plans, improve their English writing, and explore new

teaching methods. These tools are especially useful during wartime because they are accessible on mobile devices and provide instant, personalised support in areas with poor connectivity.

However, AI-mediated learning involves significant risks, particularly regarding accuracy. Although AI content often sounds confident, it can be factually incorrect or imprecise. This is a serious concern during the war, as the stress and cognitive overload caused by air raids and uncertainty make it harder for lecturers to critically evaluate the information they receive.

A second cluster of concerns centres on the gradual attrition of capacities that sustained, independent intellectual effort develops: critical reading, analytical synthesis, and the tolerance of productive uncertainty that characterises genuine scholarly inquiry. Participants who report high levels of AI tool reliance [7] also tend to report reduced confidence in extended independent writing and a diminished inclination to engage with primary sources – findings that align with the competence-gap analysis offered by Crompton and Burke [2].

A third dimension of risk is structural rather than cognitive: the uneven distribution of digital access under wartime infrastructural conditions generates significant inequities in self-educational opportunity. Lecturers with reliable access to electricity, high-quality mobile data coverage, and up-to-date personal devices are able to engage [8] with AI tools and digital learning resources in qualitatively different ways from colleagues whose access is intermittent, bandwidth-constrained, or device-limited. This structural inequity maps, in complex ways, onto pre-existing professional hierarchies and geographic differentials – urban and peri-urban campuses experience different patterns of disruption from those in regions closer to active combat zones – and risks reproducing or amplifying existing professional development disparities within the academic community.

Alongside AI engagement, the study identifies several further self-educational vectors that merit consideration. Informal collegial exchange – conducted via messaging applications during alert periods, in campus corridors between disruptions, and in the improvised conversational spaces of bomb shelters – emerges as a significant and undertheorised mode of professional learning. The affective dimensions of such exchange are inseparable from its informational content: solidarity, mutual recognition, and the shared negotiation of unprecedented professional demands all contribute to a form of distributed professional knowledge-building that formal development frameworks rarely accommodate. Similarly, lecturers report [9] sustained engagement with open educational resources, international pedagogical webinars in asynchronous mode, and self-curated reading of disciplinary and methodological literature accessed through institutional repository subscriptions – a finding that underscores the continued relevance of text-based professional learning even in a landscape increasingly dominated by AI-generated content.

The temporal structure of self-education under wartime conditions also warrants attention. Alert periods and electricity outages, whilst principally experienced as disruptions, are occasionally reappropriated as windows for low-technology professional engagement: reading on e-readers with pre-downloaded content, handwritten reflective journaling, and the memorisation of linguistic and conceptual material in conditions that preclude screen-based activity. These practices, which might be dismissed as mere improvisation, represent in aggregate a meaningful and adaptive reconfiguration of professional learning time – one that speaks to the remarkable resourcefulness of the academic practitioners concerned, and that challenges [10, 11] prevailing assumptions about the necessary conditions for effective self-directed professional development.

Conclusions. The self-educational landscape of Ukrainian technical university lecturers is neither simply impoverished by wartime disruption nor uncritically enriched by digital affordance. The present analysis yields three principal recommendations. Institutions should develop systematic guidance on the critical and discerning use of AI tools, addressing the metacognitive habits necessary to sustain genuine intellectual independence alongside AI assistance. Professional development frameworks should be redesigned [12] to recognise informal and low-technology self-educational practices as legitimate and measurable forms of professional learning. Finally, structural access inequities must receive policy-level attention if equitable professional development is to be achievable across the diversity of wartime institutional contexts. The resourcefulness and professional commitment demonstrated by Ukrainian technical university lecturers under conditions of extraordinary difficulty constitute a scholarly and human legacy that demands both recognition and rigorous documentation.

Building upon the identified self-educational dimensions, future research should empirically examine how AI-assisted learning influences academic staff's critical thinking, intellectual autonomy and professional competence,

particularly in relation to the risks of technological dependence highlighted in this study. Given the demonstrated importance of informal collegial exchange, asynchronous educational resources and offline reflective practices, longitudinal investigations should assess their relative contributions to maintaining professional learning continuity during prolonged infrastructural disruptions.

Furthermore, the identified disparities in electricity supply, internet connectivity and technological accessibility warrant comparative studies across Ukrainian technical universities situated in regions experiencing different levels of wartime disruption. Particular attention should be devoted to evaluating whether critical AI literacy training and institutional recognition of informal and low-technology learning can mitigate the cognitive and structural limitations identified in the analysis. Ultimately, these research directions should facilitate the empirical validation of the proposed institutional recommendations and contribute to developing an integrated, equitable and sustainable framework for continuous professional development in wartime and post-war Ukrainian higher education.

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