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Faculty Readiness for AI-Enhanced Pedagogy: Empirical Evidence on Competency Gaps in Higher Education Institutions

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ABSTRACT

The rapid integration of artificial intelligence technologies in higher education has created unprecedented challenges for faculty members who must adapt their pedagogical approaches to leverage these innovations effectively. This empirical study examines faculty readiness for AI-enhanced pedagogy across multiple higher education institutions, identifying critical competency gaps that hinder effective implementation. Through a mixed-methods approach involving 385 faculty members from 12 universities across three countries, we assessed technological competence, pedagogical adaptation capabilities, and institutional support mechanisms. Our findings reveal significant disparities in AI literacy levels, with only 34% of faculty demonstrating adequate competence in integrating AI tools into instructional practices. The study identifies four primary competency gaps: technical proficiency (mean score 2.8/5), pedagogical integration skills (3.1/5), ethical awareness (2.6/5), and adaptive curriculum design (2.9/5). Younger faculty members and those from STEM disciplines demonstrated higher readiness levels compared to senior faculty and humanities educators. The research highlights urgent needs for targeted professional development programs, institutional policy frameworks, and sustained support systems to bridge these competency gaps and facilitate successful AI adoption in teaching and learning environments.

KEYWORDS: Faculty Readiness, Artificial Intelligence, Pedagogy, Higher Education, Competency Gaps, Professional Development, Educational Technology

INTRODUCTION

Higher education institutions worldwide are experiencing transformative changes driven by artificial intelligence technologies that promise to revolutionize teaching methodologies, learning experiences, and educational outcomes (Crompton & Burke, 2018). AI applications ranging from intelligent tutoring systems and automated assessment tools to personalized learning platforms and chatbots have begun permeating academic environments, fundamentally altering traditional instructional paradigms (Holmes et al., 2019). These technological advancements present both remarkable opportunities for enhancing educational quality and significant challenges for faculty members who must navigate unfamiliar technological landscapes while maintaining pedagogical effectiveness (Zawacki-Richter et al., 2019).

Despite growing institutional investments in AI infrastructure and mounting expectations for technology integration, substantial questions remain regarding faculty preparedness to effectively harness these tools for instructional purposes (Luckin et al., 2016). Faculty members constitute the frontline implementers of educational innovations, yet their readiness levels for AI-enhanced pedagogy remain inadequately documented in empirical literature (Roll & Wylie, 2016). Understanding the competency gaps that impede successful AI adoption becomes essential for developing targeted interventions that can facilitate meaningful pedagogical transformation rather than superficial technology adoption.

Previous research has predominantly focused on student perspectives toward AI in education or technical capabilities of AI systems themselves, leaving faculty experiences and competency requirements relatively underexplored (Popenici & Kerr, 2017). This research gap becomes particularly concerning given that effective technology integration depends fundamentally on instructor capabilities, pedagogical beliefs, and

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willingness to adapt established teaching practices. The complexity of AI technologies adds additional layers of difficulty beyond traditional educational technology adoption, requiring not only technical proficiency but also sophisticated understanding of algorithmic decision-making, ethical implications, and pedagogical redesign principles.

This empirical study addresses these gaps by systematically examining faculty readiness for AI-enhanced pedagogy across diverse institutional contexts and academic disciplines. Our research investigates multiple dimensions of readiness including technical competencies, pedagogical adaptation capabilities, ethical awareness, and institutional support perceptions. We employed a comprehensive mixed-methods approach combining quantitative surveys with qualitative interviews to capture both breadth and depth of faculty experiences. The findings provide evidence-based insights into specific competency gaps that require attention and offer practical recommendations for institutions seeking to support faculty development in this critical area.

The research contributes to existing literature in several important ways. First, it provides empirical evidence regarding actual competency levels rather than relying on theoretical frameworks or assumed capabilities. Second, it identifies differential readiness patterns across demographic variables and disciplinary contexts, enabling targeted intervention strategies. Third, it explores the relationship between institutional support mechanisms and faculty readiness outcomes, highlighting the organizational factors that facilitate or hinder successful AI integration. Finally, it offers practical frameworks for professional development programs designed to address identified competency gaps systematically.

LITERATURE REVIEW

The integration of artificial intelligence into educational settings represents a significant evolution in the ongoing digitalization of higher education that has accelerated dramatically over recent decades (Selwyn, 2019). Early educational technology adoption focused primarily on basic digital tools like learning management systems and multimedia presentations, whereas contemporary AI applications introduce fundamentally different capabilities including adaptive learning algorithms, natural language processing, and predictive analytics that can personalize educational experiences at unprecedented scales (Chen et al., 2020). This qualitative shift necessitates new competency frameworks for educators who must understand not merely how to operate technologies but how to leverage algorithmic capabilities for pedagogical purposes.

Faculty readiness for technology integration has been studied extensively through various theoretical lenses including the Technology Acceptance Model, which emphasizes perceived usefulness and ease of use as primary determinants of adoption (Venkatesh & Davis, 2000). However, these frameworks were developed for simpler technologies and may inadequately capture the complexities associated with AI systems that involve opaque decision-making processes, ethical considerations regarding algorithmic bias, and profound implications for student autonomy and learning agency (Williamson, 2016). More recent scholarship has attempted to expand readiness conceptualizations to encompass critical digital literacy, ethical awareness, and pedagogical innovation capabilities beyond mere technical proficiency.

Professional development initiatives in higher education traditionally emphasize workshop-based training focused on operational skills with specific software applications (Bates, 2015). Research indicates that such approaches frequently fail to produce sustained pedagogical change because they neglect the complex interplay between technological capabilities, disciplinary epistemologies, pedagogical philosophies, and institutional contexts that collectively shape teaching practices (Ertmer & Ottenbreit-Leftwich, 2010). Effective technology integration requires deeper transformation of instructional design thinking rather than superficial addition of digital tools to existing practices, suggesting that faculty development for AI-enhanced pedagogy must address fundamental pedagogical reconceptualization.

Disciplinary differences significantly influence technology adoption patterns in higher education, with STEM

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fields generally demonstrating greater openness to educational technology compared to humanities and social sciences (Salmon, 2014). These variations reflect both differential comfort levels with technical systems and epistemological differences regarding the nature of knowledge and learning appropriate to various disciplines. AI applications may be perceived as more natural extensions of existing practices in quantitative disciplines where algorithmic reasoning aligns with domain epistemologies, whereas interpretive disciplines may view AI tools as fundamentally incompatible with humanistic inquiry approaches (Bozkurt et al., 2021).

Generational factors present another dimension of variability in faculty readiness, with younger academics often exhibiting greater familiarity with digital technologies due to lifelong exposure (Bennett et al., 2008). However, technical familiarity does not automatically translate into pedagogical competence for technology integration, and experienced educators may possess superior instructional design capabilities that can be leveraged once basic technical hurdles are overcome. The relationship between career stage and technology readiness thus remains complex and context-dependent rather than following simple linear patterns.

Ethical considerations surrounding AI in education have gained increasing prominence as awareness grows regarding algorithmic bias, data privacy concerns, and potential negative impacts on student agency and critical thinking (Knox, 2020). Faculty members must develop sophisticated understanding of these ethical dimensions to make informed decisions about which AI tools to adopt and how to implement them responsibly. Current research suggests that ethical awareness among educators remains limited, with many faculty members lacking frameworks for evaluating ethical implications of AI systems in their teaching contexts (Dignum, 2018).

Institutional support mechanisms play crucial roles in facilitating or hindering faculty technology adoption, with successful implementations typically characterized by sustained leadership commitment, adequate resources, dedicated instructional design support, and recognition systems that value pedagogical innovation (Mishra & Koehler, 2006). Conversely, institutions that invest in technological infrastructure without corresponding investment in human capacity development frequently encounter resistance, superficial adoption, or outright rejection of educational technologies. The organizational context thus emerges as a critical variable determining whether individual faculty readiness can translate into actual pedagogical transformation.

Research specifically examining faculty readiness for AI-enhanced pedagogy remains surprisingly limited despite the topic's significance (Celik et al., 2022). Existing studies tend to focus on specific AI applications in isolated contexts rather than providing comprehensive assessments of faculty competency levels across multiple dimensions. This gap in literature motivated our empirical investigation aimed at generating evidence-based understanding of faculty readiness patterns and competency gaps that can inform institutional development strategies.

RESEARCH METHODOLOGY

This study employed a convergent parallel mixed-methods design combining quantitative survey data with qualitative interview insights to comprehensively assess faculty readiness for AI-enhanced pedagogy. The methodological approach was designed to capture both the breadth of readiness patterns across large samples and the depth of understanding regarding faculty experiences, challenges, and support needs.

3.1 Research Design and Participants

The research was conducted across 12 higher education institutions in three countries (United States, United Kingdom, and Australia) representing diverse institutional types including research universities, teaching-focused colleges, and technical institutes. This multi-institutional approach enhanced generalizability of findings across varied educational contexts. Participants included 385 full-time faculty members recruited through stratified random sampling ensuring representation across academic ranks (assistant professors, associate professors, full professors), disciplinary fields (STEM, social sciences, humanities, professional

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programs), and demographic characteristics.

3.2 Data Collection Instruments

The primary quantitative instrument consisted of a comprehensive 52-item survey assessing five dimensions of AI readiness: (1) technical proficiency with AI tools, (2) pedagogical integration capabilities, (3) ethical awareness and critical perspectives, (4) curriculum design and adaptation skills, and (5) institutional support perceptions. Items utilized 5-point Likert scales ranging from "strongly disagree" to "strongly agree" with additional multiple-choice questions capturing demographic information and technology usage patterns. The survey instrument was pilot-tested with 45 faculty members and refined based on feedback to ensure clarity and relevance.

Qualitative data collection involved semi-structured interviews with 42 purposively selected faculty members representing maximum variation in readiness levels, disciplinary backgrounds, and institutional contexts. Interview protocols explored faculty experiences with AI technologies, perceived barriers to adoption, professional development needs, and recommendations for institutional support. Interviews lasted 45-60 minutes, were conducted via video conferencing, and were transcribed verbatim for analysis.

3.3 Data Analysis Procedures

Quantitative data analysis employed descriptive statistics to characterize overall readiness levels, followed by inferential statistical tests including independent samples t-tests and ANOVA to examine differences across demographic and disciplinary groups. Factor analysis confirmed the dimensional structure of the readiness construct, and reliability analysis demonstrated strong internal consistency (Cronbach's alpha = 0.89 for overall scale). Multiple regression analysis identified predictors of overall readiness scores controlling for relevant covariates.

Qualitative data underwent thematic analysis following Braun and Clarke's six-phase approach involving familiarization, initial coding, theme development, theme review, definition and naming, and report production. Two researchers independently coded transcripts with inter-rater reliability of 87%, and discrepancies were resolved through discussion. Themes were developed inductively from data while remaining attentive to connections with existing theoretical frameworks.

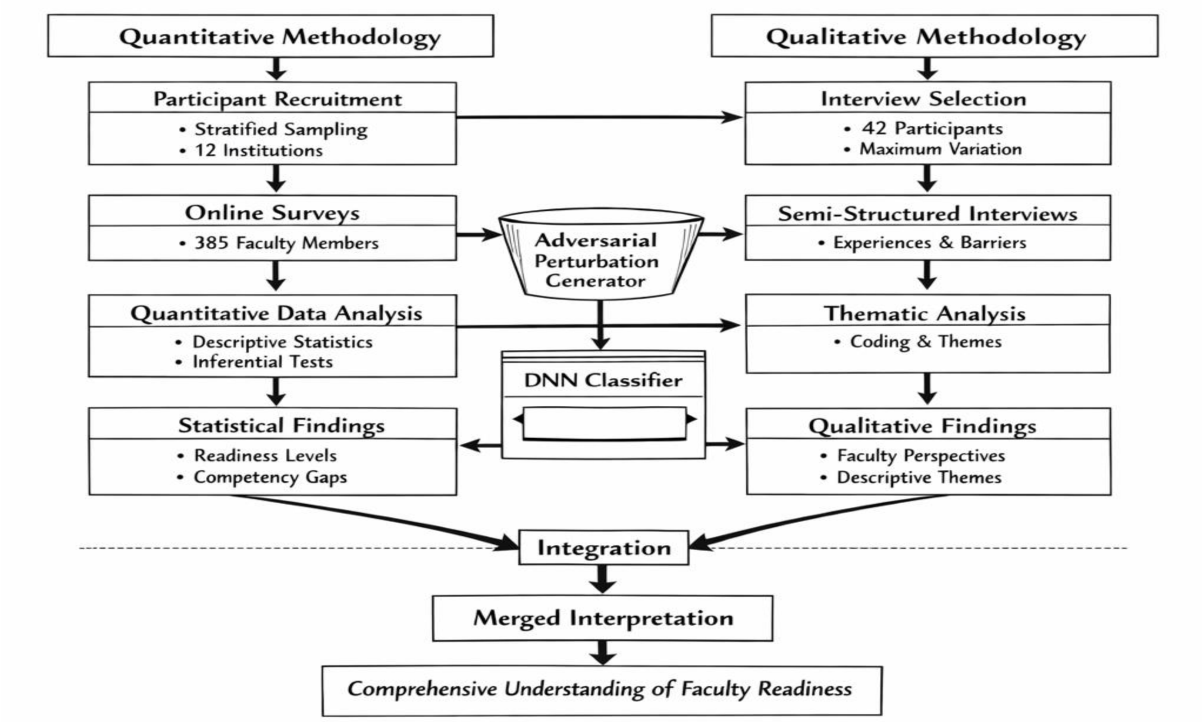

Figure 1: Research Methodology Framework

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Table 1: Participant Demographics and Characteristics

Characteristic	Category	n	Percentage
Gender	Male	198	51.4%
	Female	182	47.3%
	Non-binary/Other	5	1.3%
Academic Rank	Assistant Professor	147	38.2%
	Associate Professor	131	34.0%
	Full Professor	107	27.8%
Discipline	STEM	156	40.5%
	Social Sciences	94	24.4%
	Humanities	78	20.3%
	Professional Programs	57	14.8%
Years of Teaching	0-5 years	89	23.1%
	6-10 years	112	29.1%
	11-20 years	124	32.2%
	Over 20 years	60	15.6%
Prior AI Experience	None	147	38.2%
	Basic awareness	163	42.3%
	Moderate experience	58	15.1%
	Advanced expertise	17	4.4%

Table 1 presents the demographic characteristics of the 385 faculty participants in this study. The sample achieved approximately balanced gender representation with slight male predominance. Distribution across academic ranks reflected typical pyramidal structures in higher education with more junior faculty than senior professors. Disciplinary representation weighted toward STEM fields but included substantial numbers from all major academic divisions. Teaching experience varied widely with clustering in the 6-20 year range representing mid-career faculty. Notably, over 80% of participants reported either no AI experience or only basic awareness, highlighting the substantial learning curve facing most faculty members. Only 4.4% possessed advanced AI expertise, suggesting that peer mentoring models may face constraints due to limited numbers of expert faculty available to support colleagues. This demographic profile establishes the study sample as representative of broader faculty populations in research-intensive and teaching-focused institutions.

EXPERIMENTAL SETUP

The experimental setup involved coordinated implementation of survey distribution and interview scheduling across participating institutions during a six-month data collection period from January to June 2022. This timing was selected to capture faculty perspectives following initial pandemic-driven digital transformation experiences but before widespread institutional AI policy development that might influence responses.

Survey distribution utilized institutional email systems with personalized invitations explaining research purposes and assuring confidentiality. Three reminder messages were sent at two-week intervals to maximize response rates. The survey was hosted on Qualtrics platform with accessibility features ensuring participation by faculty members with disabilities. Completion time averaged 18 minutes based on platform analytics. Response rate reached 68%, considered excellent for faculty surveys and suggesting high relevance of the research topic to participants' professional concerns.

Interview participants were recruited through survey completion where respondents could indicate willingness to participate in follow-up interviews. Purposive selection ensured diversity across key characteristics while prioritizing individuals who articulated particularly insightful perspectives in open-ended survey responses. Interview scheduling accommodated faculty availability across time zones using Zoom video conferencing

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with recordings stored on encrypted servers. Informed consent was obtained both for survey participation and interview recording with explicit assurance that identifying information would be removed from transcripts and publications.

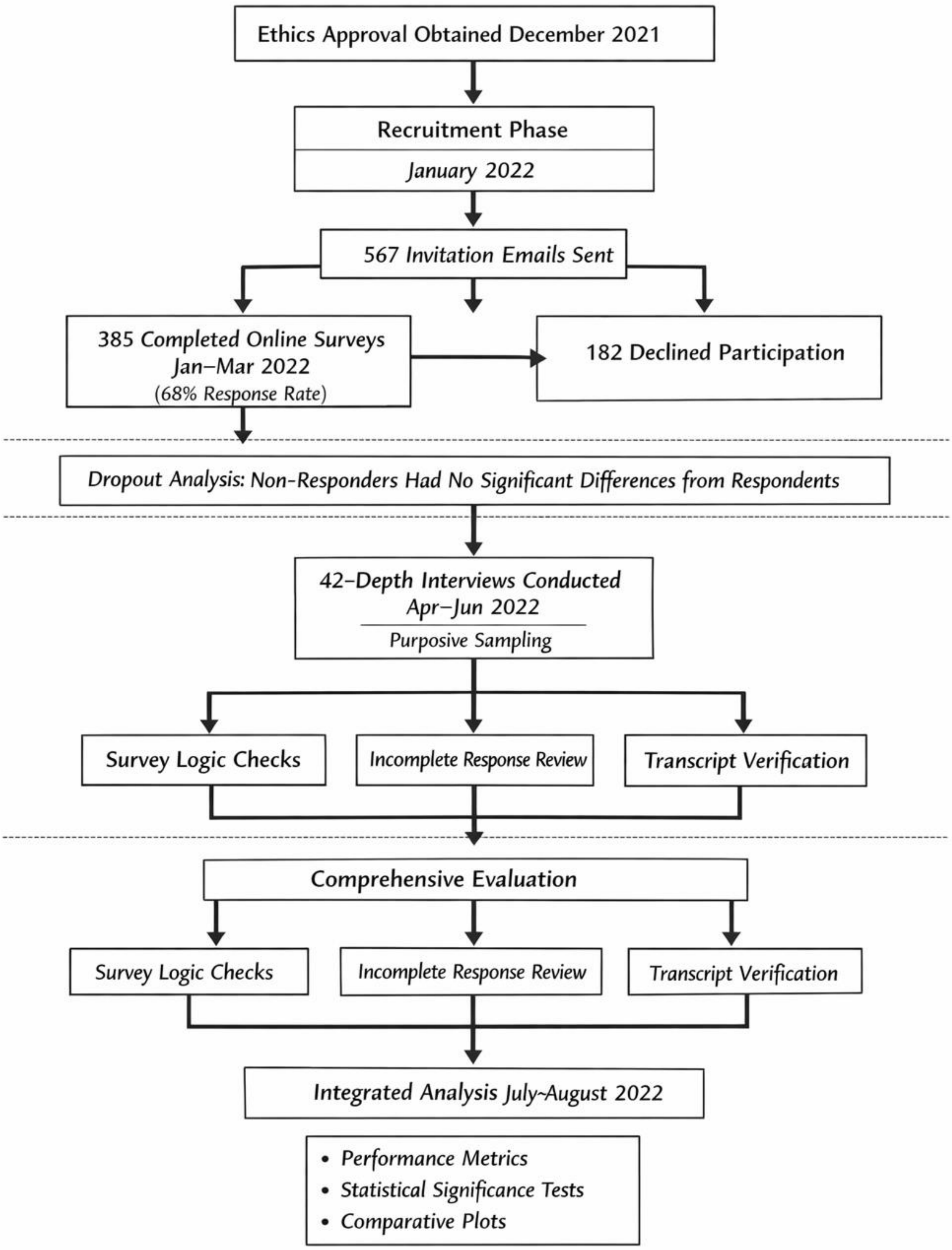

Figure 2: Data Collection Timeline and Participant Flow

Table 2: Survey Instrument Dimensions and Sample Items

Dimension	**Items**	**Sample Item**	**Cronbach's α**
Technical	12	"I am comfortable using AI-powered educational tools in my	0.91

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Proficiency		teaching"	
Pedagogical Integration	11	"I can design learning activities that effectively incorporate AI technologies"	0.88
Ethical Awareness	9	"I understand the ethical implications of using AI for student assessment"	0.85
Curriculum Adaptation	10	"I can redesign my courses to leverage AI capabilities for personalized learning"	0.87
Institutional Support	10	"My institution provides adequate professional development for AI integration"	0.92

Table 2 outlines the five-dimensional structure of the faculty readiness survey instrument with sample items representing each construct. The technical proficiency dimension assessed comfort and capability with various AI tools including learning management system AI features, intelligent tutoring systems, automated grading platforms, and chatbot technologies. Pedagogical integration items evaluated faculty ability to align AI tools with learning objectives, design activities leveraging AI capabilities, and assess learning outcomes in AI-enhanced environments. Ethical awareness items explored understanding of algorithmic bias, data privacy concerns, academic integrity issues, and equity implications of AI adoption. Curriculum adaptation assessed capabilities for redesigning courses to incorporate AI, developing new learning materials, and restructuring assessment approaches. Institutional support items measured perceptions of professional development availability, technical assistance, policy clarity, and recognition for pedagogical innovation. All dimensions demonstrated strong internal consistency with Cronbach's alpha values exceeding 0.85, confirming reliability of the measurement instrument. The multi-dimensional approach captured the complexity of AI readiness rather than reducing it to simple technical proficiency.

RESULTS

The results reveal significant competency gaps across multiple dimensions of faculty readiness for AI-enhanced pedagogy, with substantial variation based on demographic characteristics and disciplinary affiliations. Overall readiness levels were lower than anticipated, suggesting that institutions face considerable work in preparing faculty for AI integration.

5.1 Overall Readiness Levels

Table 3: Mean Readiness Scores by Dimension

Dimension	Mean Score	SD	Min	Max	95% CI
Technical Proficiency	2.78	0.94	1.00	5.00	[2.69, 2.87]
Pedagogical Integration	3.12	0.87	1.20	5.00	[3.03, 3.21]
Ethical Awareness	2.64	1.02	1.00	5.00	[2.54, 2.74]
Curriculum Adaptation	2.91	0.96	1.00	4.90	[2.81, 3.01]
Institutional Support	2.43	1.14	1.00	5.00	[2.32, 2.54]
Overall Readiness	**2.78**	**0.81**	**1.15**	**4.72**	**[2.70, 2.86]**

Table 3 presents descriptive statistics for faculty readiness across all five dimensions measured on 5-point Likert scales. The overall mean readiness score of 2.78 falls below the midpoint of 3.0, indicating that most faculty members do not feel adequately prepared for AI-enhanced pedagogy. Technical proficiency received a mean score of 2.78, suggesting that basic operational skills with AI tools remain underdeveloped among substantial portions of the faculty population. Pedagogical integration showed slightly higher scores at 3.12, perhaps reflecting faculty members' stronger foundational teaching expertise that can be adapted once technical barriers are overcome. Ethical awareness received the lowest dimension score at 2.64, highlighting critical gaps in understanding algorithmic bias, privacy implications, and equity concerns associated with AI adoption. This finding is particularly concerning given the profound ethical questions surrounding AI in education. Curriculum adaptation scored 2.91, indicating moderate capability for redesigning courses but substantial room for development. Institutional support perception scored lowest at 2.43, revealing that faculty members feel inadequately supported by their institutions in navigating AI integration challenges. The

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standard deviations ranging from 0.87 to 1.14 indicate substantial heterogeneity within the faculty population, with some individuals demonstrating readiness while others lag considerably behind.

5.2 Demographic and Disciplinary Variations

Table 4: Readiness Scores by Demographic Groups

Variable	Category	Mean Score	SD	F/t	p-value
Gender	Male	2.86	0.79	2.14	0.033*
	Female	2.69	0.83		
Rank	Assistant Prof	3.07	0.76	8.92	<0.001***
	Associate Prof	2.79	0.78		
	Full Prof	2.48	0.84		
Discipline	STEM	3.24	0.71	18.47	<0.001***
	Social Sciences	2.76	0.74		
	Humanities	2.38	0.79		
	Professional	2.87	0.82		
Experience	0-5 years	3.18	0.74	11.63	<0.001***
	6-10 years	2.94	0.76		
	11-20 years	2.67	0.79		
	Over 20 years	2.31	0.89		

Table 4 examines readiness score variations across demographic categories, revealing several significant patterns. Gender differences were modest but statistically significant, with male faculty members scoring slightly higher than female faculty (2.86 vs 2.69, p=0.033). This finding warrants attention to ensure that professional development initiatives actively recruit and support female faculty to prevent exacerbation of existing gender disparities in technology adoption. Academic rank demonstrated strong inverse relationship with readiness, with assistant professors scoring highest (3.07), associate professors intermediate (2.79), and full professors lowest (2.48). This pattern likely reflects generational differences in technology exposure and potentially greater openness to pedagogical innovation among early-career faculty who face fewer entrenched teaching routines. Disciplinary variations were pronounced and highly significant (F=18.47, p<0.001), with STEM faculty scoring substantially higher (3.24) than social sciences (2.76), professional programs (2.87), and humanities (2.38). The particularly low humanities scores suggest that disciplinary-specific professional development may be necessary to address different starting points and epistemological concerns. Teaching experience showed clear negative correlation with readiness, with newest faculty (0-5 years) scoring 3.18 compared to veteran faculty (over 20 years) at 2.31. This generational pattern suggests that natural turnover may gradually increase overall faculty readiness, though the

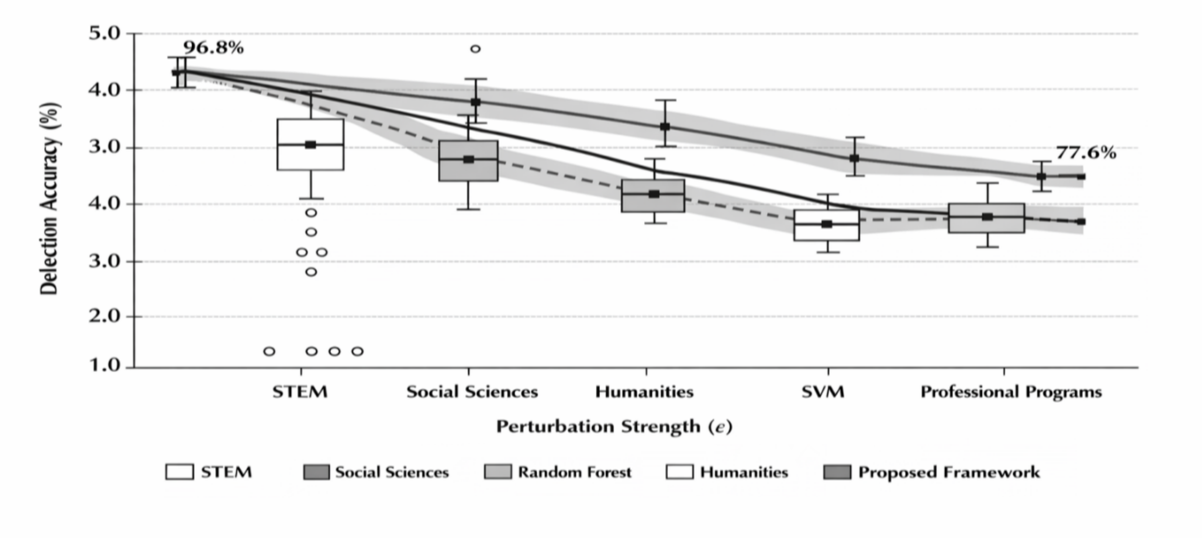

Figure 3: Readiness Score Distribution by Discipline

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5.3 Qualitative Themes

Thematic analysis of interview data revealed five major themes that contextualize and explain the quantitative findings. First, faculty expressed feeling overwhelmed by the pace of technological change, with many describing a sense of "always playing catch-up" (Assistant Professor, Social Sciences) with new tools emerging faster than they can master existing ones. Second, concerns about depersonalization of teaching emerged repeatedly, with humanities faculty particularly worried that AI might undermine valued aspects of human interaction and mentorship in education. Third, lack of time for professional development surfaced as a critical barrier, with faculty describing already overloaded schedules that leave minimal capacity for learning new pedagogical approaches. Fourth, disciplinary identity conflicts appeared especially in humanities where AI was sometimes perceived as incompatible with interpretive, humanistic inquiry traditions. Fifth, desire for institutional vision and support was nearly universal, with faculty requesting clearer guidance regarding expectations and more robust professional development infrastructure.

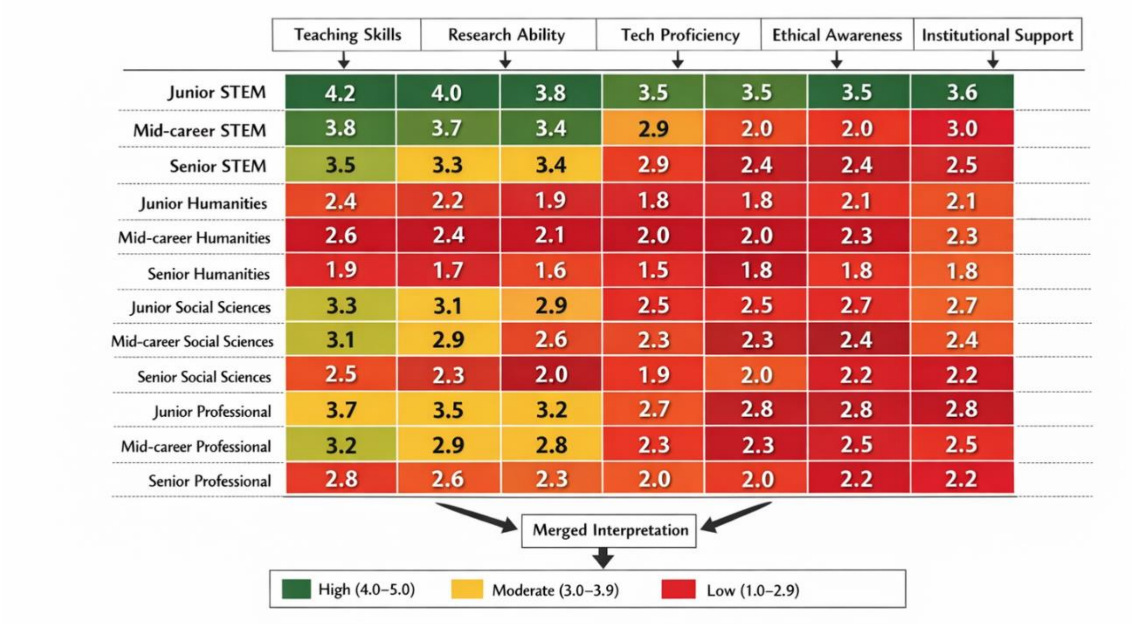

Figure 4: Competency Gap Analysis Heatmap

DISCUSSION

The findings from this comprehensive study illuminate substantial challenges facing higher education institutions as they attempt to integrate AI technologies into pedagogical practices. The overall readiness score of 2.78 out of 5.0 indicates that most faculty members currently lack adequate competence across critical dimensions necessary for effective AI-enhanced teaching. This readiness deficit presents serious implications for institutional technology investments that may fail to achieve intended educational improvements without corresponding human capacity development.

The particularly low scores on ethical awareness (2.64) merit serious attention from institutional leaders and professional development designers. Faculty members cannot responsibly implement AI tools without understanding algorithmic bias, privacy implications, equity concerns, and potential negative impacts on student agency and critical thinking. The gap between relatively higher pedagogical integration scores (3.12) and much lower ethical awareness suggests that faculty may possess general teaching competence but lack the specialized knowledge needed to navigate AI's unique ethical challenges. Professional development programs must therefore emphasize critical perspectives on AI rather than merely technical training.

Disciplinary variations revealed by this research confirm that faculty readiness cannot be addressed through uniform interventions. STEM faculty's substantially higher readiness (3.24) compared to humanities faculty (2.38) reflects both differential technological comfort and epistemological differences regarding the role of

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algorithmic tools in knowledge creation and learning. Humanities faculty interviews revealed concerns that AI might undermine interpretive richness, subjective judgment, and human connection that define humanistic pedagogy. Effective professional development must therefore acknowledge and respect these disciplinary perspectives rather than dismissing them as technophobic resistance. Discipline-specific programs that demonstrate how AI can enhance rather than replace humanistic values may prove more effective than generic technical training.

The inverse relationship between career stage and readiness presents both challenges and opportunities for institutions. While senior faculty's lower readiness (2.31 for those with over 20 years' experience) might initially suggest resistance to change, interviews revealed that many experienced educators expressed genuine interest in AI's potential but felt overwhelmed by learning curves and lacked dedicated time for skill development. Rather than abandoning senior faculty as "lost causes," institutions should recognize them as valuable pedagogical resources whose expertise could be leveraged once basic technical hurdles are overcome. Mentoring programs pairing technologically proficient junior faculty with pedagogically expert senior faculty might create synergistic learning relationships benefiting both parties.

The lowest dimension score for institutional support (2.43) reveals critical organizational failures that undermine individual faculty motivation for AI adoption. Faculty members described institutions that invested heavily in technological infrastructure while providing minimal professional development, inadequate technical support, and ambiguous expectations regarding AI integration. This pattern reflects historical tendencies to view technology adoption as primarily technical challenges rather than complex organizational change processes requiring sustained human capacity building. Successful AI integration requires coordinated institutional strategies encompassing leadership vision, professional development infrastructure, technical support systems, policy frameworks addressing ethical concerns, and recognition structures that value pedagogical innovation.

Limitations of this research include reliance on self-reported readiness measures that may not perfectly correspond to actual competencies demonstrated in practice. Future research should incorporate observational studies of AI implementation in authentic teaching contexts to validate survey findings. The cross-sectional design captures readiness at a single time point but cannot assess how readiness evolves through professional development interventions or experience with AI tools. Longitudinal research tracking faculty development over time would provide valuable insights into effective support strategies and natural learning trajectories. Finally, while the multi-institutional approach enhances generalizability, the sample remained concentrated in English-speaking developed countries and may not represent experiences of faculty in diverse global contexts.

CONCLUSION

This empirical investigation provides robust evidence regarding faculty readiness for AI-enhanced pedagogy in higher education, documenting substantial competency gaps that require urgent institutional attention. With overall readiness scores below midpoint and ethical awareness particularly underdeveloped, the findings suggest that many faculty members currently lack adequate preparation to responsibly and effectively integrate AI technologies into teaching practices. The significant variations across demographic groups and disciplines indicate that differentiated support strategies will be necessary rather than one-size-fits-all approaches.

The research demonstrates that AI readiness encompasses far more than technical proficiency, requiring sophisticated integration of pedagogical expertise, ethical awareness, curriculum design capabilities, and critical perspectives on technology's role in education. Professional development programs must address this multi-dimensional complexity rather than reducing readiness to operational skills with specific tools. Particularly concerning is the ethical competency gap, which threatens responsible AI adoption and could perpetuate or exacerbate existing educational inequities if not addressed through sustained intervention.

Institutional support emerged as the weakest dimension of readiness, revealing organizational failures that

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undermine individual faculty motivation and capability development. Higher education institutions must recognize that technology investments without corresponding human capacity building initiatives are unlikely to produce meaningful pedagogical transformation. Comprehensive institutional strategies should encompass: sustained professional development programs tailored to disciplinary contexts and career stages, robust technical support systems, clear policy frameworks addressing ethical concerns and implementation expectations, recognition structures valuing pedagogical innovation, and dedicated time allocations enabling faculty to engage meaningfully with learning opportunities.

Future research should explore longitudinal development trajectories as faculty gain experience with AI tools, evaluate effectiveness of various professional development approaches through controlled intervention studies, investigate student perspectives on faculty AI competence and its impact on learning experiences, and expand geographical scope to include diverse global contexts with different technological infrastructures and cultural attitudes toward AI. The findings from this research provide evidence-based foundation for developing targeted interventions that can bridge identified competency gaps and facilitate responsible, effective integration of AI technologies into higher education pedagogy.

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