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Assessing AI-Related Digital and Information Competence for Future-Oriented Teaching: Evidence from Saudi Higher Education

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Abstract

The swift incorporation of artificial intelligence into higher education has significantly influenced digital information contexts making it necessary for university teachers to acquire advanced digital and information competences beyond mere technical skills. As AI-driven technologies are becoming increasingly integral part of teaching, learning, content creation, and decision-making processes in scholarly activities, digital information competencies, including locating, evaluating, organizing, creating, and using ethically digital information, have been identified as a key component of information literacy and professional practice. Despite the rising incorporation of artificial intelligence into higher education, there is a dearth of empirical literature concerning readiness of university faculty members to use digital and information competencies related to AI technology into future-oriented pedagogy. The present study is devoted to assessing AI-related digital and information competences among university faculty members along with studying their attitude towards incorporation of future thinking skills and role of digital competencies in higher education. For the study, a descriptive cross-sectional research design was applied based on a structured questionnaire developed on the basis of international models of digital competence and AI literacy. Data were obtained from university faculty members engaged in different academic disciplines in Saudi universities. Descriptive statistics were used to analyze the competency level of university faculty members, their attitude towards AI-assisted instruction. The results show that university faculty members have positive attitude towards the use of AI and understand the importance of digital and information competence for promoting future-oriented learning and lifelong learning. However, differences in the competences were found regarding different dimensions of competencies, such as information and data literacy, digital content creation, ethical use of AI, digital safety, and problem solving. It can be concluded that the successful integration of AI is not possible without the information literacy competences that allow assessing critically the digital information and making evidence-based pedagogical decisions. The results of the study contribute to Library and Information Science literature by advancing the knowledge of digital and information competence in higher education.

Keywords: Artificial Intelligence, Digital and Information Competence, Information Literacy, Academic Libraries, Higher Education, Digital Information Environments, Faculty Development, Saudi Arabia.

Introduction

There is a lot of change taking place in the field of higher education in the wake of advancements in the digital domain such as artificial intelligence (AI). Besides curriculum development, teachers at universities have to adopt teaching methodologies that equip learners with skills required in a highly dynamic technological world. The widespread adoption of AI in the process of teaching, learning and assessing has increased expectations for the use of the technologies by the educators, though there is still a diverse range of views on the matter ranging from full acceptance to scepticism (Selwyn, 2022).

In higher education, AI-based technologies are being used extensively for the purpose of assessing learners, predictive analytics, intelligent tutoring and managing student learning activities. This study is based on three main constructs. AI-based digital competence refers to the perceived ability of the educators to utilize AI tools effectively in the process of teaching, learning and assessment. Future-thinking skills refer to the ability of the people to predict future developments, to analyze future scenarios and make decisions when faced with uncertainties; this is one important educational outcome that the teachers may be able to develop in the students. Perceived role of digital competence refers to the judgment of the teachers about the role of digital competence in future-thinking pedagogy. In other words, the implementation of the future-thinking pedagogy requires both favorable perceptions and digital competence of the educators.

With this in mind, two main research questions can be formulated as follows: What are the perceptions of faculty members concerning their AI-based digital competence, and how do they view the incorporation of future thinking skills in higher education? In order to answer the above questions, a descriptive baseline will be established in Saudi higher education institutions in the period of rapid national adoption of AI. This will help to establish one of the main contributions of this study – a measureable gap between digital competencies of the educators and their pedagogical significance.

Literature Review

This literature review is built on three interconnected themes that are the basis of this research: digital competency of university lecturers; the disparity between the awareness of AI and competency with it; and future-oriented competencies as a teaching goal. It is based on the critical comparison and synthesis of existing studies rather than an independent analysis of separate works.

Faculty Members Digital Competence in Higher Education

Digital competence has turned into an indispensable professional skill set for university professors, but evaluation and training in this area remains inconsistent at higher education institutions. According to a systematic review, most frameworks of digital competence were intended for pre-university education, and evidence specific to the university professor population is still evolving. It was found that institutional conditions greatly affected how educators perceived their level of digital competence (Wang and Chu, 2023), while poor, prolonged, and targeted professional training negatively impacted self-perception of digital competence in new digital environments (Smestad et al., 2023). Teachers in 33 countries demonstrated low competence in using advanced digital skills and had low confidence in utilizing digital technology for algorithmic and data-analytical processes (Tomczyk, 2024). Conceptually, digital competence is broader than technical knowledge and skills and implies both pedagogical use and ethical evaluation in realistic educational context (Falloon, 2020).

There are two major conclusions that can be drawn from the literature reviewed. First, existing research is based on self-report methods and uses mainly descriptive or correlational design, which is quite appropriate in order to estimate the perception of competence in educational context that has not been studied before. Self-perceived competence in unexplored educational context becomes an invaluable starting point for further research. Second, existing studies varied depending on the type of variables that were emphasized – either personal capabilities or institutional and contextual enablers of digital competence. Rather than being mutually exclusive approaches to digital competence, the literature suggested that they are complementary, and low levels of perceived competence imply a combination of both factors.

AI literacy and the Awareness–Proficiency Divergence

AI literacy is well known as a bundle of skills

that allow people to comprehend, analyze, interact with, and utilize AI technologies (Long and Magerko, 2020). While there has been significant progress in conceptual knowledge related to AI technologies, translating it into practice proves to be much more difficult (Ng et al., 2021). Systematic literature review has revealed that even though educators are capable of acquiring a sufficient conceptual understanding of AI technologies, they find it very difficult to apply this understanding to their work (Tan et al., 2025). In addition to that, profile-based research shows that having positive attitudes toward AI does not guarantee its adoption (Mah and Groß, 2024), whereas the connection between AI literacy and digital competence can be influenced by a number of factors (Dringó-Horváth et al., 2025). The policy development on the international level has shown the significance of AI literacy in combination with responsible data and information practices. UNESCO has published guidance on using generative AI for educational and research purposes (Miao and Holmes, 2023), and then released a framework of AI competencies for teachers (Miao and Cukurova, 2024). In addition to these initiatives, data-literacy research reveals effective data and information management as one of the competences in higher education (Kim et al., 2024).

Similar to other countries and regions, a similar disconnect can be observed in higher education institutions in the Arab region. For example, a survey involving multiple stakeholders in Saudi Arabia has revealed generally positive attitudes toward AI combined with the lack of institutional readiness and ethical considerations. Additional evidence has shown the necessity of developing the pedagogical and technological competence of faculty members in order to make use of AI for educational benefits (Al-Zahrani and Alasmari, 2024; Alotaibi and Alshehri, 2023). Mixed-methods study has also revealed the connection between educators' awareness of generative AI and its frequent use (Alammari, 2024). At a prestigious Saudi university, students have shown high awareness and acceptance of generative AI technologies (Almassaad et al., 2024). This conclusion coincides with the results of a national survey of awareness and attitudes toward AI (Aldossary et al., 2024). Similar research in Jordan has revealed high engagement of students in using AI applications, whereas the engagement of academic staff was only moderate due to the lack of necessary infrastructure and training (Al Mashagbeh et al., 2025; Alnsour et al., 2025).

Future-Thinking Skills as a Pedagogical Aim

The purpose of the proposed research is to explore the skills related to foresight (future-thinking), namely, ability to understand emergent trends, anticipate further developments, and respond strategically in an environment of uncertainty. Universities are becoming increasingly expected to foster such competencies in their graduates as important graduate attributes (Tlili et al., 2023), and modern pedagogical practices provide efficient ways to develop such skills among students (Siko, 2024). The achievement of educational goals, however, depends on faculty members' preparedness and willingness to engage in future-oriented teaching. The positive attitude of teachers has been proven to contribute to the success of innovative curricula implementation (Adeoye et al., 2024), and educational beliefs help to facilitate such a process (Akram et al., 2022). In addition, the greater digital competence of teachers results in the adoption of innovative technologies and moves them away from traditional approaches to instruction (Zhang et al., 2024). Otherwise, the lack of practical skills prompts teachers to use traditional teacher-centered approaches even when they are open to innovations in education (Wilson, 2023).

Combining the abovementioned three themes reveals the conceptual background of the present research. Faculty digital competence is a critically important yet inconsistently developed professional skill, whereas being aware of artificial intelligence (AI) and being competent enough to use it implies different dimensions. Moreover, the development of future-thinking skills depends on the digital competence of teachers needed to implement future-oriented pedagogy. Although considerable attention has been paid by scholars to the matter of interest, there is still very little information on the possibility for faculty members from universities in Saudi Arabia to be highly supportive of future-oriented education and relatively incompetent in practice.

Research Gap and Study Rationale

Notwithstanding the increasing number of international studies on the subject, certain gaps can be identified. For one thing, there is a contextual gap – although the country has achieved certain success in developing national AI strategies, empirical data from multiple universities concerning the level of AI-related digital competence and perceptions of

integration of future thinking skills among the faculty are relatively scarce. Secondly, there is a conceptual gap since previous research often considered the concepts of digital competence, AI literacy and future-thinking skills as separate constructs without paying much attention to their interrelationships. Thirdly, an evidential gap still exists as descriptive baseline data about AI-related digital competence of university teachers during early stages of AI adoption is relatively limited despite a series of foundational reviews that called for paying more attention to readiness of educators (Kasneci et al., 2023). Thus, the study aims at filling those gaps by establishing a descriptive baseline of AI-related digital competence of faculty members, their perceptions of integration of future thinking skills, and views on the role of digital competence in this process.

The mentioned gaps represent a serious limitation on the understanding of readiness of university faculty for supporting AI-assisted curricula development. It is important to understand that successful implementation of any national AI strategy cannot rely only on preparedness of institutions, but it should take into account competencies, perceptions and professional development needs of the university faculty members. This means that conducting a multi-university assessment of the current state of affairs in university faculty becomes a valuable source of information for further institution and policy-making. Therefore, the study offers both conceptual and practical contributions. Conceptually, it explores the relationship between the positive perceptions of future-oriented pedagogies and relatively low level of operational competence in learning analytics, AI-assisted problem solving and use of digital competence in inquiry-based teaching. Practically, the findings provide some useful information that can be used by universities and policymakers to identify priority areas of professional development for faculty members.

Study Aim, Objectives, Questions, and Scope

This research aims to develop a descriptive profile of AI-related digital competence as well as perceptions about integrating future thinking skills in university professors from Saudi Arabia. To achieve this aim, the following objectives have been developed: (1) determine the level of perceived AI-related digital competence; (2) explore perceptions of faculty about integrating future-thinking skills in teaching and learning process; and (3) determine the perceived role of digital competence in this process. The research questions for this study include:

1) What is the level of AI-related digital competence?
2) What are the perceptions about integrating future-thinking skills?
3) What is the role of digital competence in this process?

No hypotheses are provided due to the descriptive nature of this study. Several predefined boundaries are set by the study. In terms of conceptual boundaries, only the three constructs mentioned above are analyzed without considering any outcomes for students or any observation of the teaching process in classrooms. In terms of geographical boundaries, only three Saudi universities are included in this research: King Saud University, Jazan University, and University of Hail. In terms of demographics, the study includes faculty members of different ranks and departments. Methodologically, cross-sectional data are used through a structured questionnaire.

Theoretical Framework

The European Framework for the Digital Competence of Educators (DigCompEdu) presents a proven model of how digital competence can be considered in terms of a developmental and progressive approach. It is suggested that competence will grow from using digital technologies for their basic functions to adopting more transformative pedagogies based on digital technologies. Therefore, without proper support, faculty can stay at lower levels of digital competence and fail to achieve the stage where artificial intelligence would be used to rethink assessment procedures and customize learning. The three dimensions investigated in this research are related to the conceptual domains of the framework: resources, pedagogical practices, and assessment. The first domain corresponds to the AI-related digital competence that is demonstrated by faculty in terms of their abilities to work with digital resources, instruction, and assessment using artificial intelligence. Domain 2 assumes future-oriented pedagogy as an educational goal achieved due to digital competence. Domain 3 represents the perception of digital competence among faculty members as an enabling factor for transforming pedagogical practices. From a theoretical perspective, the discrepancy between Domain 1 and Domains 2-3

would imply the presence of the awareness-proficiency gap, which means that the value of AI for education is recognized but not implemented properly.

Method and Materials

Research Design

For this research, the design used was the descriptive quantitative approach, which is fitting in explaining the digital competencies and perceptions of faculty members at one point in time. In accordance to this type of research approach, there were no hypothesizes set up and no inferential and correlational statistical techniques were performed. Only descriptive statistical computations were applied, which included means, standard deviation and ranking.

Population, Sampling, and Procedure

The population consisted of faculties from three universities in Saudi Arabia, namely King Saud University located in the central region, Jazan University in the southern region, and the University of Hail in the northern region. The three universities were chosen to ensure diversity geographically and institutionally by selecting a research-intensive university along with two regional universities, considering the convenience of multi-site data collection process.

The total number of faculty members at the three universities constituted the accessible population, making the total number of participants 10,116. The questionnaire was administrated online through the survey center of each university using institutional email accounts and anonymity was assured. Only those questionnaires that were answered completely were used for analysis, hence a total of 297 responses were collected. Characteristics of the participants are presented in Table 1 in terms of gender, university attended, type of college, academic rank, and use of AI in teaching previously. Since the participation in the survey was totally based on the consent of the faculties in filling out the survey, voluntary response sampling method was adopted in this study. Therefore, the findings of this study cannot be considered statistically representative of all faculty members of the Saudi higher education and care must be taken while generalizing the results to other faculties in Saudi universities. Details of the demographics of the respondents are provided in Table 1. It is worth mentioning that 64.3% of the respondents had never used AI in teaching previously.

Table 1: Demographic Characteristics of the Sample (N=297).

Variable	Category	Frequency	%
Gender	Male	187	63.0
	Female	110	37.0
University	King Saud	104	35.0
	Jazan	81	27.3
	Hail	112	37.7
College	Applied/Scientific	93	31.3
	Humanities	140	47.2
	Other	64	21.5
Academic Rank	Professor	62	20.9
	Associate Professor	76	25.6
	Assistant Professor	95	32.0
	Lecturer	64	21.5
Prior AI Use	Yes	106	35.7
	No	191	64.3
Total		**297**	**100.0**

Note: Percentages are rounded to one decimal place. Prior AI use denotes self-reported prior use of AI in teaching.

Research Instrument

Data collection was accomplished using a structured 30-item questionnaire tailored for this study. The questionnaire was divided into three domains, which were identified using the framework and existing literature. Domain 1 consisted of 15 items measuring digital competence related to AI; Domain 2 consisted of 7 items measuring perceptions of incorporating future-thinking skills; Domain 3 consisted of 8 items measuring perceptions of the contribution of digital competence to incorporation of the skills. Five sub-dimensions that made up Domain 1 were constructed in accordance with competence areas and descriptors of the DigCompEdu framework. Adhering to an internationally acknowledged framework provided a good conceptual background and ensured the completeness of data and information literacy, as well as ethical and digital safety competences required for responsible use of AI.

The development of the measurement instrument was also informed by the methodology of constructing teacher digital competence scales (Peters et al., 2022) and measurement of competences' levels according to the European framework (Suzer and Koc, 2024). Moreover, the research on digital competence and ICT literacy in Saudi Arabia (Basilotta-Gómez-Pablos et al., 2022) facilitated item wording and determination of measurement domains, while requirements for competency to integrate AI were taken into account during content validation (Khalil and Alsenaidi, 2024). All the items were assessed on a

three-point Likert scale (3 = Agree, 2 = Partially agree, 1 = Disagree). Composite means were interpreted as low (1.00–1.66), moderate (1.67–2.33), and high (2.34–3.00). While the three-point scale was used in order to reduce respondents' fatigue from answering 30 items, it, at the same time, was limited by rather small range of possible responses. Content validity of the instrument was confirmed by nine experts in the field of educational technology and curriculum design; their recommendations led to some modifications of the instrument.

Validity and Reliability

The internal consistency of the instrument was determined by correlating scores for each domain with the total questionnaire score. The domain-total correlation coefficients were 0.941 for Domain 1, 0.771 for Domain 2, and 0.657 for Domain 3 (see Table 2). All correlations turned out to be statistically significant at the 0.01 level. Thus, internal consistency of the questionnaire domains can be considered satisfactory. However, despite the fact that the domain-total correlations demonstrate the internal consistency, they do not prove construct or factorial validity, which is recognized as a limitation of the study. Instrument reliability was assessed using Cronbach's alpha coefficients (see Table 3). Overall, the questionnaire obtained an alpha of 0.894. In addition, the alphas of Domains 1, 2, and 3 were equal to 0.839, 0.778, and 0.862, correspondingly. Given that all coefficients exceeded the standard value of 0.70, internal reliability of the instrument was satisfactory for all measurement domains.

Table 2: Domain-Total Internal-Consistency Coefficients of the Questionnaire Domains.

Domain	Domain-Total Correlation Coefficient	Significance
Domain 1: AI-Related Digital Competence	0.941**	0.01
Domain 2: Perceptions of Future-Thinking Skills	0.771**	0.01
Domain 3: Perceived Role of Digital Competence	0.657**	0.01

Note: ** significant at the 0.01 level. Coefficients were computed using the main study sample (N=297); they reflect internal consistency evidence, not construct validity.

Table 3: Cronbach's Alpha Reliability Coefficients.

Scale / Domain	No. of Items	Cronbach's Alpha
Whole Instrument	30	0.894
Domain 1	15	0.839
Domain 2	7	0.778
Domain 3	8	0.862

Note: Cronbach's alpha coefficients were computed using the main study sample (N=297). All coefficients exceed the conventional 0.70 threshold for acceptable internal consistency.

Data Collection and Analysis

The questionnaire was distributed electronically using the university survey centers among the faculties in the three universities involved in the study. Survey administration was carried out in the month of November 2025, which coincided with the first semester of the academic year 2025/2026. Incomplete questionnaires were discarded, and the resulting sample size for analysis was 297 respondents. All analysis was performed based on descriptive statistics only. Frequencies and percentages were used to provide descriptions of the respondent demographic characteristics, whereas means, standard deviation, and ranking were used to analyze individual items and questionnaire domains. Means of domain scores were interpreted based on the three cut-off criteria mentioned earlier. No other type of analysis such as inferential, correlation, or comparison analysis between groups was performed, and no data weighing or imputation was used.

Ethical Considerations

Voluntary participation was guaranteed during this study, and no effort was made to identify the collected data. All answers in the questionnaire were, therefore, anonymous. The participants were aware of the academic nature of the research before completing the questionnaire, and filling out the questionnaire was considered consent to participate in the research.

Results

The findings are presented according to research questions. For each domain, item, and scale, mean, standard deviation, and ranking value have been calculated, while at the same time providing a descriptive explanation of the specific domain.

Findings in relation to previous research are presented in the discussion chapter. All findings presented here come only from the 297 completed questionnaires included in the analysis.

RQ1: Faculty Members' Perceived Level of AI-Related Digital Competence

In Domain 1, Table 4 shows that the mean scores for the items had minimal variations ranging from 1.12 to 1.23 with a total mean of 1.17 (SD=0.52), which indicated low digital competence in regard to AI. The highest mean score was on an item regarding the recognition of the importance of big data (M=1.23, SD=0.62), while the second-highest was on the use of online learning platforms like Zoom and Webex (M=1.22, SD=0.60). On the other hand, the lowest mean score was on the application of AI-powered learning analytics to pinpoint learning problems of the students (M=1.12, SD=0.43).

Table 4: Means, Standard Deviations, and Ranks — AI-Related Digital Competence (N=297).

#	Item	M	SD	Rank	Level
	A. Information and Data Literacy	**1.17**	**0.51**	**—**	**Low**
1	Recognise the importance of big data in improving university education in the AI era	1.23	0.62	1	Low
2	Analyse large volumes of educational data using AI algorithms to inform teaching decisions	1.13	0.44	13	Low
3	Use digital analytics platforms to extract learning patterns for course development	1.15	0.48	11	Low
	B. Communication and Collaboration	**1.17**	**0.53**	**—**	**Low**
4	Employ smart collaborative tools to organise research teams and joint academic projects	1.15	0.49	10	Low
5	Use AI-supported platforms to communicate with colleagues and students	1.15	0.49	12	Low
6	Use conferencing tools (Zoom, Webex, Google Meet) for interactive distance teaching	1.22	0.60	2	Low
	C. Digital Content Creation	**1.19**	**0.57**	**—**	**Low**
7	Develop educational content in various formats using digital technologies	1.18	0.54	7	Low
8	Create interactive digital content supported by augmented-reality applications	1.19	0.57	6	Low
9	Apply diverse electronic assessment tools	1.20	0.57	4	Low
	D. Problem Solving	**1.14**	**0.47**	**—**	**Low**
10	Use AI-based learning analytics to identify students' learning difficulties	1.12	0.43	15	Low
11	Use AI predictive models to solve future educational problems	1.13	0.46	14	Low
12	Address technical issues encountered when using digital media and devices	1.17	0.51	8	Low
	E. Digital Safety	**1.19**	**0.54**	**—**	**Low**
13	Train students to protect their personal data on smart platforms	1.16	0.50	9	Low
14	Promote awareness regarding AI ethics in education and research	1.19	0.54	5	Low
15	Maintain student data confidentiality when using AI-supported platforms	1.21	0.58	3	Low
	Overall (15 items)	**1.17**	**0.52**	**—**	**Low**

Note: Three-point scale: Low (1.00–1.66), Moderate (1.67–2.33), High (2.34–3.00). Shaded rows are sub-dimension means; item ranks run 1–15 across the whole domain.

Interpreting the survey results, it can be stated that those items which have high ratings are mostly related to skills which concern awareness and accessibility, while low ratings concern skills that involve more sophisticated use of artificial intelligence for generating and analyzing content. In other words, the results point at the stratification of competence level in terms of higher confidence on the part of faculty in basic digital skills compared to advanced AI skills. The fact that the standard deviation is relatively low means that there is relatively limited variation among respondents in the pooled sample.

RQ2: Faculty Members' Perceptions of Integrating Future-Thinking Skills

The findings from Domain 2 (refer to Table 5 below) indicate a clear descriptive deviation from Domain 1. The scores from Domain 2 resulted in an average score of 2.94 (SD=0.26) where the item means ranged between 2.88 and 2.97. This is indicative of consistently high levels of agreement. The highest scoring items indicated the importance of cultivating scenario thinking among students while the lowest scoring items highlighted faculty members' fears of workload increase due to AI.

Interpretively, the extremely high means along with the extremely low standard deviations denote the existence of a strong consensus among the faculty regarding pedagogical methods. The two least valued aspects involve difficulties in implementation and relate to workload as well as the current capabilities of artificial intelligence. Therefore, the conclusions

of this study redirect attention from the favorable attitudes of faculty towards futuristic pedagogy to the conditions needed for its implementation.

Table 5: Means, Standard Deviations, and Ranks — Perceptions of Integrating Future-Thinking Skills (N=297).

#	Item	M	SD	Rank	Level
1	AI applications enhance students' ability to analyse future scenarios	2.95	0.24	5	High
2	Future-thinking skills via AI technologies prepare students for Industry 4.0	2.96	0.21	3	High
3	Integrating future-thinking into courses prepares students for rapid technological change	2.97	0.20	2	High
4	Smart learning environments enhance predictive and creative thinking	2.97	0.18	1	High
5	Integrating future-thinking skills is difficult due to academic workload	2.90	0.36	6	High
6	Integration is limited due to AI capability constraints	2.88	0.43	7	High
7	AI predictive-analytics tools help develop students' foresight skills	2.96	0.22	4	High
	Overall (7 items)	**2.94**	**0.26**	**—**	**High**

Note: Three-point scale as above. Higher means indicate stronger agreement with the respective statements about integrating future-thinking skills.

RQ3: Perceived Role of Faculty Members' Digital Competence

The findings in relation to Domain 3 (Table 6) reveal that the mean scores of the items are limited within a narrow range of 2.96 to 2.98, resulting in an average score of 2.97 (SD = 0.19), the highest of the three domains investigated. In particular, faculty members displayed significant agreement regarding the importance of digital competence in terms of laying down the basic foundation of good course design, instruction and application of futuristic pedagogy. The relatively low ranking item was related to the utilization of digital competence in enhancing inquiry learning amongst students.

Table 6: Means, Standard Deviations, and Ranks — Perceived Role of Digital Competence (N=297).

#	Item	M	SD	Rank	Level
1	A faculty member's mastery of AI tools increases awareness of future-thinking skills in teaching	2.97	0.20	4	High
2	Enabling faculty members to use smart educational technologies enhances designing interactive courses	2.98	0.16	1	High
3	Using predictive analysis strengthens decision-making readiness	2.97	0.20	6	High
4	A faculty member's digital competence helps detect early indicators of educational change	2.97	0.19	5	High
5	Digital expertise supports innovative assessment reflecting future thinking	2.96	0.21	7	High
6	Using digital collaboration tools enables interactive learning environments that foster creativity	2.97	0.18	3	High
7	Analysing smart educational data helps address future curriculum challenges	2.98	0.17	2	High
8	Integrating interactive digital tools guides students toward conceptual, inquiry-based learning	2.96	0.24	8	High
	Overall (8 items)	**2.97**	**0.19**	**—**	**High**

Note: Three-point scale as above. This domain recorded the highest composite mean (M = 2.97).

The composite mean scores increased along the three dimensions, starting at a low level in Dimension 1 (M = 1.17) and then reaching high levels in Dimensions 2 (M = 2.94) and 3 (M = 2.97). This trend can be interpreted as a transition from the perceived operational competence of the faculty members to their recognition of the educational value of future-thinking skills followed by recognizing digital competence as a necessity to implement the skills. The standard deviations for each of the three dimensions decreased (0.52, 0.26, and 0.19, correspondingly), which reflects an increasing degree of agreement in participants' opinions. Overall, the findings reveal that the faculty members have developed an understanding of the educational significance of AI and digital competence which is more developed than the competence itself indicating a gap between understanding and competence. As this was a descriptive study, there were no hypotheses formulated, and all research questions were answered descriptively.

Discussion

Accordingly, it can be observed that the theoretical relevance of the results consists in a significant discrepancy between the relatively low level of faculty members' operational competence

(M = 1.17) and the relatively high level of awareness, which is evidenced by positive perceptions of the incorporation of future-thinking skills (M = 2.94) and the high level of acknowledgment of digital competence as one of the main facilitators of the integration (M = 2.97). Overcoming of this gap is the core of the analysis performed. It is important to provide the professional background of respondents to interpret the results correctly. Indeed, only 35.7% of respondents reported having previous or current experience of using AI in classroom teaching. Thus, it appears that the relatively low ratings of advanced practice-related competencies were a consequence of limited practice and not of any kind of antipathy to AI. This explanation is consistent with prior research, according to which educators' resistance to new technologies is often caused by difficulties with their practical application and not by aversion to them (Pokrivcakova, 2024).

In turn, consistently high scores in Domain 2 reflect the wide acknowledgment of the necessity of education transformation in terms of competencies for AI-assisted teaching. In accordance with the existing research on the application of AI and learning analytics in educational process (Salas-Pilco et al., 2022), AI rapidly became one of the key priorities of higher education institutions, and thus it has generated certain educational momentum and raised awareness that develops faster than experience of the educators. Accordingly, the obtained discrepancy seems to represent a logical consequence of educational transformation initiated by the policy of institutions when the awareness of AI benefits Is higher than the competencies that will help to implement them. Currently, faculty members seem to recognize the necessity of the use of AI and future-oriented methods while demonstrating relatively low confidence in their ability to implement them properly.

It seems relevant to consider the results of each domain in greater detail to interpret the findings. Overall, relatively higher-rated items were mostly associated with awareness/acknowledgment competencies, while relatively lower-rated ones represented more practice-related competencies. In addition, the lowest rated perception items concerned operational issues and not the pedagogical value. Taken together, these patterns demonstrate that faculty members draw the line between the acknowledgment of the necessity of AI and its practical use clearly. Consistent results of the analysis of the three independently measured domains support the idea that this gap actually represents the differences in the actual levels of competence and awareness and not the predisposition to give favorable answers.

Theoretical and Practical Implications

Theoretical Implications

The results refine extant theoretical paradigms that consider digital competence as a development process ranging from operational uses to transformative pedagogy. In the periods of rapid technological change due to policies, the perceptual prerequisites for transformative practice can be stronger than operational skills. The resulting situation is characterized by a temporary imbalance when awareness of educational benefits of AI outstrips operational competence to exploit them. Therefore, the main theoretical contribution of the study is demonstrating that awareness and competence are two different phenomena that can evolve independently and therefore can serve as a good starting point for further theoretical and empirical research.

The distinction between the two concepts also has practical significance for future measurement procedures. Since awareness and competence are independent variables, their integration in one index through the aggregation of attitudinal and competence measures will hide important differences. Therefore, in further studies, the two constructs have to be regarded as independent and orthogonal phenomena. In accordance with the current results, the digital competence profile of Saudi Arabia lecturers can be described as a high level of awareness combined with a low level of operational competence, which cannot be explained by existing models.

Practical Implications

The findings provide a basis for concrete evidence for university administrators, curriculum developers, and policymakers who need practical guidelines concerning faculty readiness. Based on the findings, the majority of the faculty members do not seem to be resistant to AI implementation but lack adequate experiences in developing the skills needed to implement the technology effectively. This argument is justified considering the number of faculty members that did not have any experience implementing AI in classroom instructions. It is therefore important to note that simply investing

in infrastructure would not facilitate any form of educational transformation. More effort needs to be put in ensuring that faculty development programs adopt an inquiry-based, learner-centered pedagogy aimed at building the AI literacy of the participants.

Based on the results, it is evident that faculty development programs should adopt a sequential model. First, it would involve exploiting the awareness of the faculty members by creating pedagogical goals out of the information. In the second stage, more attention should be given to the weak areas including learning analytics, AI-based problem-solving, and classroom implementation by providing hands-on discipline-specific training. Lastly, mentoring should be provided for addressing the workload challenges experienced by the faculty members. Based on the findings, the priority in the investment should shift from technological acquisition to the development of human capabilities.

Recommendations

1. Instead of short-term and general training, focus on long-term professional development that is practice-related so that the faculty members can use the tools for AI in their specific teaching situations, which will lead to increased competency in operational areas that are lacking in Domain 1.
2. Focus on advanced and application skills, including learning analytics and problem-solving using AI, which have gotten low ratings, and not just basic AI tool skills, which faculty members already know.
3. Consider the workload concerns and the shortcomings of AI tools by factoring them into workload planning at the institutional level.
4. Facilitate translation of strategic commitment into classroom practice by increasing the capacity of faculty members to integrate digital competency in student-centered inquiry-based learning, which is the least rated item in Domain 3.
5. Take advantage of the generally positive perceptions in Domain 2 by positioning professional development in the context of fulfilling an educational vision that is already set.

Limitations of the Study

1. Since the descriptive research design is limited to the description of the observed patterns and does not allow for establishing causal or relational relations, it is wrong to regard the observed discrepancy between competence and perceptions as a sign of any causal relationships.
2. Despite the fact that the three-point response scale was applied in order to avoid respondent fatigue, this narrow scale range could decrease response variability, thereby affecting the validity of the measurement tool.
3. The results obtained from the study depend entirely on the self-report data and are open to the risk of the social desirability and self-assessment biases.
4. Even though the number of questionnaires collected is sufficient to create a descriptive baseline, they comprise a very small portion of the available population since the voluntary response sampling was used. Therefore, there is the potential self-selection bias.
5. Being conducted at three Saudi universities only, this study should be generalized with caution when it comes to higher education institutions of Saudi Arabia.
6. No proof of factorial or construct validity was provided since the test of validity included only the assessment of domain-total internal consistency. Reliability, on the other hand, was tested through the computation of Cronbach's alpha coefficients.

Directions for Future Research

1. In the future, it would be important to conduct longitudinal and relational studies to find out whether practice-oriented professional development decreases the awareness-proficiency gap.
2. The study using mixed methods of research with classroom observations and interviews will give more insight about the processes that result in the awareness-proficiency gap.
3. Further improvements of the instrument for measuring teachers' competence will include the introduction of finer scales and the application of confirmatory factor analysis.
4. The need for comparative studies at Saudi Arabian and regional universities should be mentioned; it is necessary to find out to what extent the awareness-proficiency pattern can be generalized.
5. For future research, larger and more diverse samples from a wider spectrum of Saudi universities should be used.

Conclusion

This study develops the first evidence-based benchmark of readiness among Saudi university faculty members during the initial stages of AI adoption. It shows the low level of digital competence related to AI use and agreement on the future relevance of the needed skills along with the role of digital competence in their development. The study makes three key contributions. In conceptual terms, it confirms that the awareness and operational capability represent different constructs which have to be separated in progression-based models. On the empirical side, it contributes the multi-institutional baseline that helps to fill a significant gap in the literature that is mainly student-focused and system-focused. On the practical side, it stresses the need not only for greater awareness but also for professional development programs that convert good intentions into competence. In general, the study accomplishes its goals by providing a structured benchmark of readiness of faculty for AI-based education. This study reveals that readiness is multidimensional with awareness often exceeding operational capability. The multi-institutional evidence at an important stage of AI adoption in the country provides not only the practical benchmark but also a useful model for assessing faculty readiness in similar institutions.

Declarations

Ethics Approval: Faculty members participated in the study voluntarily and anonymously. No personally identifiable information was collected, and data were only used for academic research.

Informed Consent: Participation was voluntary. Faculty members were notified of the purpose of the study prior to filling out the questionnaire, and completion of the questionnaire was considered as informed consent to participate.

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Conflict of Interest: The author has no conflict of interest to declare.

Data Availability: The data used in the study are available from the corresponding author on reasonable request.

AI-use disclosure: The manuscript has been prepared in accordance with the policy of the journal on the use of AI in scholarly writing. All scientific content, data, analysis, interpretation, and conclusions are the author's own, and the use of AI-based tools is under complete control of the author and merely for language refinement and structural organization.

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