International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Artificial Intelligence in E-Commerce Education: Bridging the Gap between Academic Learning, Digital Competencies and Industry Readiness

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ABSTRACT:

Artificial Intelligence (AI) is becoming an important part of modern business, particularly in the rapidly expanding field of e-commerce. From recommending products and responding to customer queries through chatbots to understanding consumer preferences, detecting fraudulent transactions, managing inventory, and improving supply-chain decisions, AI is changing how online businesses operate and compete. This transformation also raises an important question for commerce and business education: are students receiving the knowledge and practical skills needed for the digital workplace they will enter? Although universities provide students with essential theoretical foundations, a gap often remains between classroom learning and the digital competencies expected by employers. Recent research provides valuable evidence on how AI can contribute to addressing this gap. For instance, a systematic review of AI and personalised learning in higher education screened 17,899 records and identified 45 relevant studies, highlighting the potential of AI to support adaptive learning, timely feedback, student engagement, and data-informed teaching. Another systematic review examining 125 studies published between 2015 and 2025 further demonstrates the growing use of AI in teaching, learning, and assessment. These findings suggest that AI can make learning more personalised and responsive, but they also show that technology by itself cannot transform education. Teachers need appropriate training and confidence to integrate AI into their teaching, while students require meaningful opportunities to develop digital and analytical skills. Issues such as data privacy, algorithmic bias, academic integrity, and unequal access to technology also need careful attention. In e-commerce education, students should therefore be encouraged to connect classroom concepts with real business situations through simulations, live projects, internships, case studies, data analysis exercises, and practical exposure to AI-enabled platforms. More importantly, they should learn to question and evaluate AI-generated information rather than simply accept it. Critical thinking, creativity, communication, ethical awareness, and human judgement remain essential alongside technological skills. By bringing academic knowledge together with practical experience, digital competencies, and responsible use of AI, e-commerce education can help graduates become more confident, adaptable, and industry-ready, enabling them to respond effectively to the changing demands of the digital economy.

Keywords: AI, E-Commerce Education, Digital Competencies, Industry Readiness, Experiential Learning

1.1 INTRODUCTION OF THE STUDY

Artificial Intelligence is no longer limited to technology companies; it has gradually become an important part of everyday business, particularly in the rapidly growing e-commerce industry. Online businesses now use AI in several ways, including recommending products based on customer preferences, responding to enquiries through chatbots, analysing buying behaviour, predicting demand, detecting fraudulent transactions, and supporting digital marketing decisions. These developments are also changing what businesses expect from commerce and management graduates. Today, students need more than a strong understanding of traditional business concepts; they also need digital literacy, data interpretation skills, critical thinking, problem-solving abilities, creativity, adaptability, and the confidence to use emerging technologies responsibly. This changing business environment has created a need to rethink how e-commerce is taught in higher education. Although classroom teaching provides students with important knowledge about e-commerce models, digital marketing, online payment systems, consumer behaviour, logistics, and business strategies, theoretical knowledge alone may not provide sufficient preparation for the practical challenges of the workplace. Students need opportunities to understand how AI is used in real business situations and how its outputs can be interpreted, questioned, and applied to decision-making. Recent research also suggests that AI can contribute positively to education by providing personalised learning, timely feedback, learning support, and data-informed teaching. However, its growing use also brings concerns related to data privacy, academic integrity, algorithmic bias, unequal access to technology, and the preparedness of teachers. Therefore, integrating AI into e-commerce education should involve more than simply introducing new digital tools; it should encourage meaningful changes in teaching, learning, assessment, and industry engagement. In this context, the present study examines how AI can help bridge the gap between academic learning, digital competencies, and industry readiness among e-commerce students. It gives importance to practical skills, analytical thinking, technological confidence, ethical awareness, and problem-solving through activities such as live projects, case studies, simulations, internships, and exposure to AI-enabled e-commerce applications. By connecting classroom knowledge with real-world business practices, the study seeks to understand how higher education institutions can prepare students to become confident, adaptable, responsible, and industry-ready professionals who can contribute effectively to the changing digital economy.

1.2 BACKGROUND OF THE STUDY

The rapid growth of e-commerce and the increasing use of Artificial Intelligence (AI) are bringing significant changes to the business environment and creating new expectations from graduates entering the workforce. E-commerce businesses now use AI for personalised recommendations, customer service, demand forecasting, digital marketing, fraud detection, inventory management, and other business decisions. As these technologies become more common, students studying commerce, management, and e-commerce need to develop skills that go beyond conventional theoretical knowledge. Higher education institutions therefore face the challenge of preparing students for a workplace where digital tools, data, automation, and AI-supported decision-making are becoming part of everyday business activities. Research on AI in education indicates that AI can support personalised learning, provide timely feedback, improve student engagement, and assist teachers in understanding learning needs. At the same time,

concerns regarding data privacy, ethical use, academic integrity, algorithmic bias, unequal access to technology, and the readiness of educators cannot be ignored. This makes it important to develop an educational approach that balances technological knowledge with human judgement and responsible decision-making. In e-commerce education, practical exposure through live projects, case studies, simulations, internships, digital laboratories, and industry interaction can help students connect classroom concepts with real business situations. Against this background, the study examines the role of AI in strengthening students' digital competencies and improving their preparedness for the changing requirements of the e-commerce industry, while recognising the importance of critical thinking, creativity, adaptability, and ethical awareness.

1.3 SIGNIFICANCE OF THE STUDY

1. **Enhances Student Digital Competencies:** The study highlights how AI can help students develop digital literacy, data analysis, problem-solving, and technology-related skills required in modern e-commerce.
2. **Bridges the Academic–Industry Gap:** It examines how practical exposure to AI tools can connect theoretical classroom learning with the skills and competencies expected by e-commerce employers.
3. **Supports Curriculum Development:** The findings can help colleges and universities design e-commerce curricula that include AI applications, digital marketing, analytics, automation, and emerging business technologies.
4. **Improves Industry Readiness:** The study emphasises practical learning through live projects, simulations, internships, case studies, and industry interaction to improve students' confidence and employability.
5. **Promotes Responsible Use of AI:** It draws attention to ethical issues such as data privacy, academic integrity, algorithmic bias, transparency, and the importance of human judgement while using AI.
6. **Guides Teachers and Educational Institutions:** The study provides useful insights for educators and institutions on adopting AI-supported teaching methods and creating learning environments that prepare students for the changing digital economy.

1.4 OBJECTIVES OF THE STUDY

1. To examine the role of Artificial Intelligence in e-commerce education.
2. To assess the level of AI and digital competencies among e-commerce students.
3. To identify the gap between academic learning and industry-required skills.
4. To examine the impact of AI-based learning on students' industry readiness.
5. To identify the challenges in integrating AI into e-commerce education.
6. To assess students' awareness of ethical and responsible AI usage.
7. To suggest measures for improving AI-enabled e-commerce education and employability.

1.5 LITERATURE REVIEW

Verdú et al. (2015) examined the use of intelligent and adaptive technologies in education and highlighted the potential of AI-based systems to adjust learning content according to individual student needs. Their work established an early foundation for understanding how intelligent technologies could make learning more flexible and learner-centred.

Zawacki-Richter et al. (2019) conducted a systematic review of Artificial Intelligence applications in higher education. From 2,656 initially identified publications, 146 studies were included in the final analysis. The review identified applications in assessment, prediction, adaptive systems, and intelligent tutoring, but also noted the limited involvement of educators in AI research.

Chen, Chen and Lin (2020) reviewed the role of Artificial Intelligence in education and discussed applications including personalised learning, intelligent tutoring, assessment, and educational prediction. Their work suggested that AI could support both teachers and learners but emphasised the importance of appropriate implementation and human involvement.

Crompton et al. (2020–2021) examined AI applications in higher education and identified opportunities for personalised instruction, automated feedback, assessment, and learning support. Their research contributed to the understanding of how AI can enhance the learning experience while also requiring educators to develop new technological competencies.

Kasneci et al. (2023) examined the opportunities and challenges associated with large language models such as ChatGPT in education. The study highlighted the potential of generative AI to support explanations, feedback, content creation, and personalised learning, while raising concerns about accuracy, academic integrity, bias, and overdependence on AI.

Luo et al. (2025) conducted a systematic review of AI-based learning tools in higher education and found that such tools can provide personalised learning experiences, real-time feedback, and greater flexibility. The study also highlighted the importance of designing AI tools around meaningful educational outcomes rather than technology adoption alone.

Merino-Campos (2025) systematically examined the impact of AI on personalised learning in higher education and highlighted the ability of AI to adapt instructional content, methods, and learning pace to individual student requirements. The study reinforces the potential of AI to make higher education more responsive to diverse learner needs.

Farhood et al. (2025) reviewed research published between January 2015 and June 2025 and synthesised 125 studies on AI-based personalised learning. Their findings demonstrate the expanding application of AI across teaching, learning, and assessment and identify both opportunities and challenges associated with AI-supported education.

Research Gap

Research from 2015 to 2025 shows the growing importance of Artificial Intelligence (AI) in education and e-commerce. However, most studies have examined these areas separately, with limited focus on integrating AI into e-commerce education. There is a need to understand whether practical exposure to AI-based e-commerce tools can help students connect theoretical knowledge with workplace requirements. Modern employers expect graduates to possess digital literacy, analytical thinking, problem-solving abilities, adaptability, creativity, and responsible technology-use skills. Therefore, this study addresses the existing gap by examining how AI-enabled e-commerce education can develop students' digital competencies and industry readiness. It also considers practical learning and ethical awareness as important elements in preparing students for the changing demands of the digital business environment.

1.6 RESEARCH METHODOLOGY

The study adopts a descriptive and analytical research design to examine the role of Artificial Intelligence (AI) in e-commerce education and its contribution to students' digital competencies and industry readiness. A quantitative approach will be used to collect primary data through a structured questionnaire based on

a five-point Likert scale. The study will cover commerce, management, and e-commerce students with exposure to digital technologies. Purposive sampling will be employed for respondent selection. Secondary data will be collected from peer-reviewed journals, research articles, books, and institutional reports published between 2015 and 2025. Data will be analysed using descriptive statistics, reliability analysis, correlation, and multiple regression to examine relationships among AI-enabled learning, digital competencies, practical learning, and industry readiness.

1.7 HYPOTHESIS OF THE STUDY

H_0: Artificial Intelligence-enabled e-commerce education has no significant impact on students' digital competencies and industry readiness.

H_1: Artificial Intelligence-enabled e-commerce education has a significant positive impact on students' digital competencies and industry readiness.

1.8 DATA COLLECTION

Primary Data:

Primary data will be collected from commerce, management, and e-commerce students through a structured questionnaire. The questionnaire will focus on AI-enabled learning, academic learning, digital competencies, practical skills, and industry readiness. A five-point Likert scale will be used to record respondents' opinions. Students with exposure to e-commerce and digital technologies will be selected using purposive sampling to obtain relevant and meaningful responses for the study.

Secondary Data:

Secondary data will be collected from peer-reviewed journals, research articles, books, conference papers, industry reports, and credible institutional publications. The review will mainly cover literature published between 2015 and 2025 relating to Artificial Intelligence, e-commerce education, digital competencies, employability, and industry readiness. These sources will provide the theoretical foundation for the study and help identify existing findings, research gaps, and relevant concepts.

1.9 SAMPLING METHOD

The study will use purposive sampling, a non-probability sampling technique, to select respondents who are relevant to the research objectives. The sample will consist of commerce, management, and e-commerce students who have basic exposure to e-commerce platforms, digital technologies, or Artificial Intelligence tools. This method is considered appropriate because the study specifically requires respondents who can provide informed opinions about AI-enabled learning, digital competencies, and industry readiness. The selected participants will represent students from different academic levels to obtain varied perspectives on their learning experiences and preparedness for the e-commerce industry.

1.10 SAMPLE SIZE

The study proposes a sample size of 200 respondents, comprising students from commerce, management, and e-commerce-related programmes. The sample is considered adequate for examining students' perceptions of AI-enabled e-commerce education, digital competencies, and industry readiness. Respondents will be selected through purposive sampling, ensuring that participants have some exposure to e-commerce or digital technologies. The collected responses will be used for statistical analysis, including descriptive statistics, correlation, and regression analysis.

1.11 DATA ANALYSIS AND INTERPRETATION

Table 1.1 DEMOGRAPHIC PROFILE OF RESPONDENTS

Variable	Category	Frequency (n)	Percent (%)
Gender	Female	107	53.5
	Male	88	44
	Prefer not to say	5	2.5
Programme	BBA	78	39
	B.Com	63	31.5
	BCA	33	16.5
	MBA	25	12.5
	Unspecified	1	0.5
Year Of Study	I Year	76	38
	III Year	64	32
	II Year	60	30
Institution Type	Private Aided	114	57
	Private Unaided	86	43
Prior AI Exposure	Yes	114	57
	No	86	43
Internship Experience	No	99	49.5
	Yes	73	36.5
	Ongoing	28	14
Device Access	Smartphone + Laptop	119	59.5
	Smartphone only	42	21
	Laptop only	39	19.5

INTERPRETATION: The sample (N = 200) is fairly balanced by gender (53.5% female, 44% male, 2.5% undisclosed) and skews toward undergraduate business programmes, with BBA (39%) and B.Com (31.5%) dominating over BCA (16.5%) and MBA (12.5%). Year of study is evenly spread (I: 38%, II: 30%, III: 32%). Private Aided institutions account for 57% of respondents, and 57% report prior AI exposure. Internship experience is limited nearly half (49.5%) have none. Most respondents (59.5%) have both smartphone and laptop access, while 40.5% rely on a single device, indicating a notable digital-access gap worth considering when interpreting AI-readiness outcomes.

Table 1.2 AGE DESCRIPTIVE STATISTICS

Variable	n (Yes)	Mean (Yes)	SD (Yes)	n (No)	Mean (No)	SD (No)	t
AI Awareness & Exposure (AIA)	114	3.34	0.93	86	2.97	0.98	2.722
Academic Learning Quality (ALQ)	114	3.12	1	86	2.97	1.14	1.054
Digital Competencies (DC)	114	3.05	1.03	86	2.79	0.91	1.883
Industry Readiness (IR)	114	3.23	0.94	86	2.92	1.06	2.174
Perceived Gap (PG)	114	3.02	0.89	86	3	1	0.158
Satisfaction (SAT)	114	3.13	1.11	86	2.95	1.07	1.121
Age	114	20.74	1.88	86	20.51	2.1	0.798

INTERPRETATION: Respondents with prior AI exposure (n=114) scored higher than those without (n=86) across all constructs, with statistically significant differences in AI Awareness (3.34 vs 2.97, t=2.722) and Industry Readiness (3.23 vs 2.92, t=2.174), and a near-significant trend in Digital Competencies (3.05 vs 2.79, t=1.883). Academic Learning Quality, Satisfaction, and Age showed only marginal differences (t<1.2), suggesting AI exposure has little bearing on academic perceptions or age. Notably, Perceived Gap was nearly identical (3.02 vs 3.00, t=0.158), indicating prior AI exposure strengthens AI-specific skills and readiness without meaningfully narrowing the perceived academic-industry divide.

Table 1.3 INDEPENDENT-SAMPLES T-TEST

N	200
Mean	20.64
Median	20
Std. Deviation	1.97
Minimum	18
Maximum	26
Skewness	0.786

INTERPRETATION: The sample (N=200) has a mean age of 20.64 years (SD=1.97), with a median of 20, indicating a young, largely undergraduate population. Ages range from 18 to 26, reflecting some diversity, likely due to the inclusion of postgraduate (MBA) students alongside undergraduates. The positive skewness (0.786) suggests a longer tail toward older respondents consistent with a smaller MBA subgroup pulling the distribution rightward while values cluster mostly at younger ages.

Table 1.4 ONE-WAY ANOVA TEST

Variable	F	df1	df2	p-value
AI Awareness & Exposure (AIA)	0.244	3	195	0.865
Academic Learning Quality (ALQ)	0.301	3	195	0.825
Digital Competencies (DC)	0.403	3	195	0.751
Industry Readiness (IR)	1.306	3	195	0.274
Perceived Gap (PG)	0.24	3	195	0.868
Satisfaction (SAT)	0.578	3	195	0.630
Age	71.147	3	195	<.001

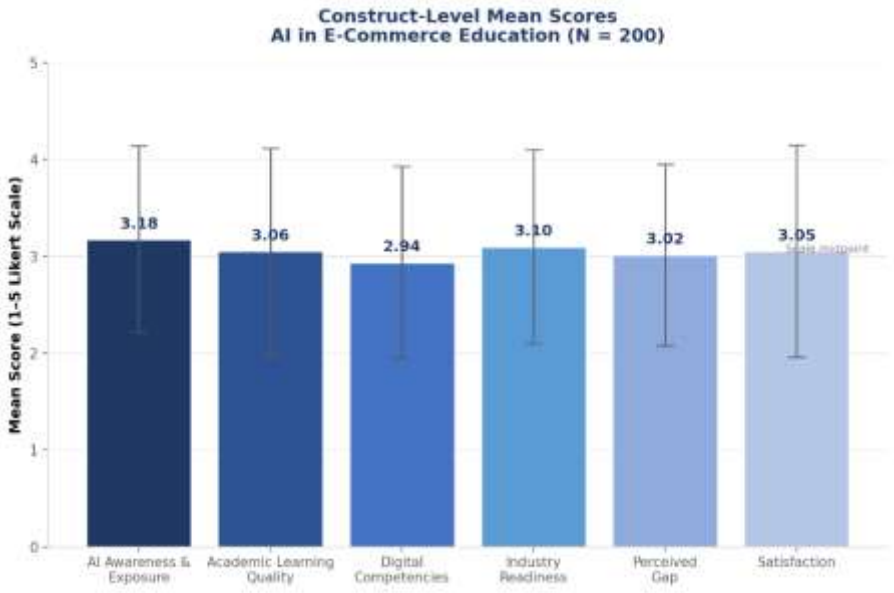
INTERPRETATION: The one-way ANOVA results indicate that Programme (BBA, B.Com, BCA, MBA) has no statistically significant effect on any of the core constructs, AI Awareness (F=0.244, p=.865), Academic Learning Quality (F=0.301, p=.825), Digital Competencies (F=0.403, p=.751), Industry Readiness (F=1.306, p=.274), Perceived Gap (F=0.240, p=.868), or Satisfaction (F=0.578, p=.630) all p-

values well above 0.05. This suggests perceptions of AI readiness and learning outcomes are consistent across programmes. The only significant difference is in Age (F=71.147, p<.001), expected given MBA students are typically older postgraduates, confirming programme-level age variation without influencing construct-level outcomes.

Table 1.5 FACTOR ANALYSIS

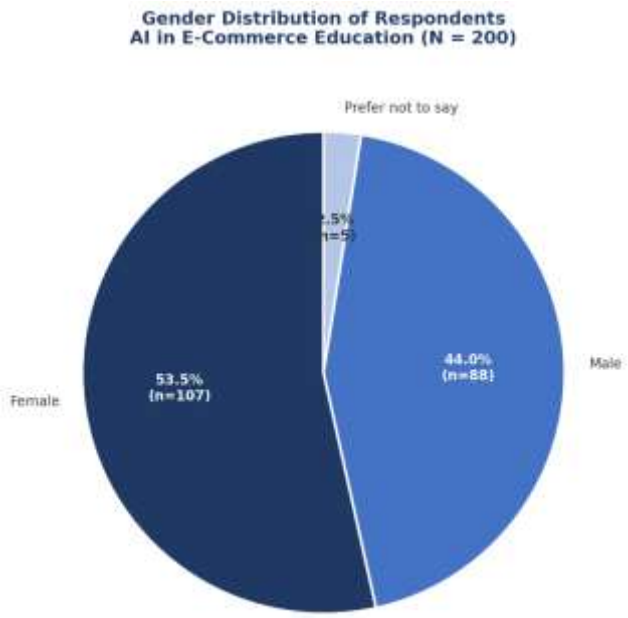
Factor	SS Loadings	% of Variance	Cumulative %
Factor 1 (ALQ: Academic Learning Quality)	3.572	13.23	13.23
Factor 2 (PG: Perceived Gap)	3.055	11.32	24.55
Factor 3 (DC: Digital Competencies)	3.929	14.55	39.1
Factor 4 (AIA: AI Awareness & Exposure)	3.772	13.97	53.07
Factor 5 (SAT: Satisfaction)	2.473	9.16	62.23
Factor 6 (IR: Industry Readiness)	3.683	13.64	75.87

INTERPRETATION: The six-factor solution collectively explains 75.87% of total variance, indicating strong construct validity for the measurement model. Digital Competencies (DC) contributes the most variance (14.55%), followed by AI Awareness & Exposure (13.97%) and Industry Readiness (13.64%), suggesting these constructs capture the most distinct, substantial variation in respondent perceptions. Academic Learning Quality (13.23%) and Perceived Gap (11.32%) contribute moderately, while Satisfaction (9.16%) accounts for the least, though still meaningfully. The relatively balanced loadings across factors, with no single dominant factor, confirm the six constructs are distinct yet collectively robust, supporting the instrument's overall psychometric soundness.



INTERPRETATION: All six constructs cluster near the scale midpoint (3.0), reflecting a broadly neutral-to-moderate perception of AI integration in e-commerce education. AI Awareness scores highest (3.18), while Digital Competencies is lowest (2.94), indicating relatively weaker hands-on technical skills

compared to conceptual familiarity. Industry Readiness (3.10) and Satisfaction (3.05) suggest moderate confidence, while Perceived Gap (3.02) points to a real but modest disconnect between academic learning and industry demands. The wide error bars (SD ≈ 0.9 : 1.1) across constructs indicate considerable variability in individual responses, showing that student experiences and perceptions differ substantially rather than following a uniform pattern.



INTERPRETATION: The gender distribution among respondents (N = 200) shows a relatively balanced but female-leaning sample. Females comprise the majority at 53.5% (n=107), followed by males at 44.0% (n=88). A small proportion, 2.5% (n=5), preferred not to disclose their gender. This distribution suggests reasonably proportional representation between the two primary gender categories.

KEY FINDINGS

1. **Balanced but undergraduate-skewed sample:** The 200 respondents were fairly gender-balanced (53.5% female, 44% male) but concentrated in undergraduate business programmes (BBA + B.Com = 70.5%), with limited MBA representation (12.5%).
2. **Digital Competencies is the weakest construct:** DC recorded the lowest mean score (2.94), falling just below the scale midpoint, indicating students feel comparatively less confident in practical, hands-on digital skills than in other areas.
3. **Prior AI exposure significantly boosts AI-specific outcomes:** Students with prior AI exposure scored significantly higher on AI Awareness ($t=2.722$, $p<.05$) and Industry Readiness ($t=2.174$, $p<.05$), confirming that exposure to AI tools meaningfully strengthens these competencies.
4. **AI exposure does not close the perceived academic-industry gap:** Despite improving AI Awareness and Readiness, prior AI exposure showed almost no effect on Perceived Gap ($t=0.158$, ns), suggesting students still sense a disconnect between coursework and industry expectations regardless of AI familiarity.

5. **Limited internship experience remains a concern:** Nearly half (49.5%) of respondents had no internship experience, which likely contributes to only moderate Industry Readiness scores (mean = 3.10).
6. **Programme type has no significant effect on core constructs:** One-way ANOVA confirmed no significant differences across BBA, B.Com, BCA, and MBA students on any construct (all $p > .05$) except Age, meaning AI-readiness perceptions are consistent regardless of academic programme.
7. **Strong construct validity confirmed via factor analysis:** The six-factor model (AIA, ALQ, DC, IR, PG, SAT) explained 75.87% of total variance with no single dominant factor, confirming the constructs are distinct yet collectively robust and the instrument is psychometrically sound.
8. **Notable digital-access gap exists:** While 59.5% of students have both smartphone and laptop access, 40.5% rely on only one device, a disparity that may constrain equal engagement with AI-enabled learning tools and should be factored into interpreting readiness outcomes.

SUGGESTIONS

1. **Strengthen Digital Competencies through hands-on training:** Since DC recorded the lowest mean score (2.94) among all constructs, institutions should introduce structured lab sessions, software simulations, and AI-tool workshops (e.g., analytics dashboards, chatbot builders) to close this practical skill gap.
2. **Expand internship and industry-exposure opportunities:** With nearly half (49.5%) of respondents having no internship experience, colleges should formalize partnerships with e-commerce firms for mandatory internships, live projects, and industry mentorship to boost Industry Readiness.
3. **Integrate AI tools formally into the curriculum:** Given that Prior AI Exposure significantly improved AI Awareness and Industry Readiness scores, embedding AI-based case studies, tools (e.g., ChatGPT, analytics platforms), and assignments into coursework rather than leaving exposure incidental would benefit the 43% of students currently lacking such exposure.
4. **Address the perceived academic–industry gap directly:** Since Perceived Gap remained largely unaffected by prior AI exposure, curriculum designers should focus on explicitly aligning course content with current industry practices through guest lectures, live briefs, and updated case material, rather than assuming technology exposure alone will close this gap.
5. **Bridge the digital-access divide:** With 40.5% of students relying on a single device, institutions should provide accessible computer labs, subsidized device-lending schemes, or flexible offline resources to ensure equitable participation in AI-enabled learning.
6. **Design programme-neutral AI interventions:** Since ANOVA results showed no significant differences across BBA, B.Com, BCA, and MBA programmes, AI-integration strategies can be applied uniformly across all business programmes rather than being tailored to any single stream.
7. **Leverage the validated six-construct framework for ongoing assessment:** Given the strong factor structure (75.87% variance explained), institutions can adopt this AIA–ALQ–DC–IR–PG–SAT instrument as a recurring diagnostic tool to track student readiness over time and evaluate the impact of curricular changes.
8. **Promote responsible and critical AI use:** Alongside technical skill-building, students should be trained in ethical AI use, critical evaluation of AI-generated content, and awareness of data privacy and algorithmic bias, ensuring technological competence is matched by sound judgement.

CONCLUSION

This study set out to examine how Artificial Intelligence can help bridge the gap between academic learning, digital competencies, and industry readiness among e-commerce students. While prior literature (Zawacki-Richter et al., 2019; Kasneci et al., 2023; Farhood et al., 2025) has extensively documented AI's role in personalised learning, adaptive systems, and assessment, most existing research treats AI-in-education and e-commerce readiness as separate domains leaving a clear research gap around whether practical exposure to AI-based e-commerce tools genuinely helps students connect classroom theory with workplace expectations. This study directly addresses that gap using primary data from 200 commerce, management, and e-commerce students.

The findings offer measured support for the study's hypothesis. Students with prior AI exposure demonstrated significantly stronger AI Awareness and Industry Readiness, confirming that hands-on familiarity with AI tools does translate into tangible competency gains. However, this same exposure had negligible influence on the Perceived Gap between academic learning and industry needs, indicating that AI exposure alone is not sufficient to bridge this divide a nuance not fully captured in prior literature, which often assumes a more direct relationship between AI adoption and workplace readiness. Digital Competencies emerged as the weakest area overall, while limited internship experience among nearly half the sample further constrains practical readiness. Encouragingly, programme type (BBA, B.Com, BCA, MBA) showed no significant influence on outcomes, suggesting these findings generalise across business disciplines rather than being programme-specific. The strong six-factor structure (75.87% variance explained) further validates the instrument used and reinforces that AI awareness, learning quality, digital skills, industry readiness, perceived gap, and satisfaction are distinct yet interconnected dimensions of student preparedness.

In conclusion, while AI-enabled exposure strengthens specific competencies, closing the broader academic-industry gap requires deliberate curricular integration, expanded internships, and equitable digital access confirming that technology adoption alone cannot substitute for structured, human-guided educational reform.

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