AI-Driven Digital Advertising and Its Impact on Student Engagement in Higher Education

Kapil Verma
Faculty of Commerce & Management,
Pacific Academy of Higher Education
& Research University, Udaipur (Rajasthan)

Dr. Narendra Singh Chawda,
Associate Professor,
Faculty of Commerce & Management,
Pacific Academy of Higher Education
& Research University, Udaipur (Rajasthan)

Abstract

This study examines the role of artificial intelligence (AI) in transforming digital advertising strategies within higher education institutions (HEIs) and its impact on student engagement. Drawing on a survey of 400 students from diverse demographic, disciplinary, and institutional backgrounds in India, the research evaluates the visibility, reach, and influence of AI-enabled campaigns. Descriptive and inferential analyses—including t-tests, ANOVA, and regression—were employed to assess patterns of engagement across behavioral, cognitive, and emotional dimensions. Findings reveal that nearly half of students reported exposure to AI-driven advertisements, with emails, chatbots, and Google applications identified as the most effective platforms. Student engagement levels were consistent across course levels and academic streams, confirming the universal applicability of AI-driven strategies. While engagement outcomes were multidimensional, they were not significantly predicted by ethical or outcome-based perceptions, suggesting that contextual and institutional factors remain central. The study contributes to both theory and practice by offering empirical evidence on AI applications in educational marketing, highlighting the primacy of personalized, interactive platforms in enhancing engagement, and underscoring the need for institutions to balance technological innovation with inclusivity and transparency.

Keywords: Artificial Intelligence; Digital Advertising; Higher Education Marketing; Student Engagement; Behavioral Engagement; Cognitive Engagement; Emotional Engagement; Personalization; Chatbots; Educational Technology

Introduction

Artificial intelligence (AI) has rapidly emerged as a disruptive force in higher education, particularly in the domain of marketing and student outreach. With increasing competition among institutions and the growing digital nativity of students, universities are compelled to adopt AI-driven digital advertising strategies that promise personalization, interactivity, and efficiency (Kapoor et al., 2022; Davenport et al., 2020). These strategies include the deployment of chatbots for query

resolution, algorithmic recommendation systems for course suggestions, targeted social media campaigns, and data-driven email personalization. Such applications represent a paradigm shift from traditional, one-size-fits-all advertising to precision marketing tailored to individual student needs and preferences. At the same time, the effectiveness of these AI-enabled campaigns cannot be judged solely in terms of visibility or reach. Their true impact lies in the extent to which they foster student engagement, a construct conceptualized as behavioral, cognitive, and emotional involvement in educational processes (Astin, 1999; Kahu, 2013). Behavioral engagement refers to observable participation in institutional offerings, cognitive engagement relates to mental investment and learning-related processing, and emotional engagement reflects affective responses such as trust, enthusiasm, or skepticism (Fredricks et al., 2004). Understanding the relationship between AI-driven advertising and these dimensions of engagement is essential for both theoretical advancement and practical implementation. Although marketing literature has highlighted the promise of AI for consumer engagement (Huang & Rust, 2021; Langan et al., 2023), empirical studies focusing on higher education contexts remain limited. In India, where the digital divide intersects with a rapidly expanding higher education sector, the adoption of AI tools for marketing is still at a formative stage. Against this backdrop, the present study seeks to identify and analyze the application of AI in digital advertising strategies employed by HEIs and to examine its influence on students' behavioral, cognitive, and emotional engagement.

Literature Review

Artificial Intelligence in Digital Advertising

The evolution of digital advertising has been significantly influenced by artificial intelligence, which enables hyper-personalization, predictive targeting, and real-time interaction. AI-powered tools such as recommendation engines, natural language processing (NLP) chatbots, and machine learning algorithms allow institutions to reach potential students with tailored messages based on browsing history, search patterns, and prior interactions (Davenport et al., 2020; Huang & Rust, 2021). Unlike traditional campaigns, which often adopt a one-size-fits-all model, AI-driven strategies ensure precision marketing, enhancing both efficiency and relevance (Kapoor et al., 2022). Within higher education, the use of chatbots for admissions, predictive models for enrollment targeting, and customized digital outreach campaigns has grown steadily (Popenici & Kerr, 2017; Langan et al., 2023). These interventions signify a transition toward an algorithmic marketing ecosystem, where data analytics and personalization play central roles.

Conceptualizing Student Engagement

Student engagement has long been recognized as a cornerstone of academic success. Astin's (1999) Theory of Student Involvement positions engagement as the quality and quantity of student investment in learning activities. Similarly, Kahu's (2013) framework extends engagement beyond mere behavior to include cognitive and emotional dimensions, emphasizing the interaction between institutional context and individual psychology. Engagement is typically categorized into:

- Behavioral Engagement, reflecting participation in academic or institutional activities.
- Cognitive Engagement, reflecting the mental effort and deep learning strategies employed.
- Emotional Engagement, reflecting affective responses such as enthusiasm, belonging, or skepticism (Fredricks et al., 2004).

Scholars have consistently linked higher levels of engagement with improved learning outcomes, persistence, and student satisfaction (Kuh, 2001; Dixson, 2010). In the digital era, technology-mediated environments have added new layers to engagement, making it necessary to reassess traditional frameworks (Henrie et al., 2015).

AI-Driven Advertising and Student Engagement

While commercial marketing research has emphasized the potential of AI to strengthen consumer engagement by improving personalization and interactivity (Lemon & Verhoef, 2016; Wedel & Kannan, 2016), its application in educational marketing remains underexplored. Studies

suggest that AI-enabled advertisements can shape students' cognitive engagement by providing timely, relevant, and context-sensitive information (Luckin et al., 2016). Similarly, behavioral engagement may be stimulated by interactive tools such as chatbots or targeted calls-to-action (Winkler & Söllner, 2018). Emotional engagement, on the other hand, is influenced by how students perceive the trustworthiness, relevance, and ethical standing of AI campaigns (Christians et al., 2020; Dwivedi et al., 2021). However, gaps remain in understanding whether students across diverse demographics engage differently with AI-driven campaigns, or whether engagement is mediated by broader institutional and contextual factors. The Indian higher education system, marked by institutional diversity and regional disparities, presents a compelling setting to examine these dynamics.

Research Gap and Contribution

Existing literature provides strong conceptual grounding for both AI applications in marketing and theories of engagement, yet empirical evidence bridging the two in higher education remains limited. Few studies have examined how AI-driven advertising specifically influences the behavioral, cognitive, and emotional dimensions of student engagement, particularly in emerging economies like India. This study contributes to filling that gap by offering large-scale empirical evidence from a diverse student population, linking AI-enabled advertising tools with multidimensional engagement outcomes.

Research Design

The study adopted a quantitative, survey-based research design to investigate the applications of AI-driven digital advertising and its impact on student engagement in higher education. This design was chosen because it allows for systematic analysis of large-scale data and facilitates the testing of relationships among multiple variables through statistical techniques (Field, 2018).

Population and Sample

The target population comprised students enrolled in higher education institutions across India. A total of 400 students were selected using a stratified random sampling technique to ensure representation across diverse demographic and academic categories, including gender, age, course level (undergraduate and postgraduate), academic stream (Science, Commerce, Arts, Engineering, Others), institutional type (government, private, deemed/autonomous), and geographic location (urban, semi-urban, rural). This sampling strategy ensured that the findings captured the heterogeneity of the Indian higher education landscape.

Data Collection Instrument

Data were collected using a structured questionnaire, designed on the basis of existing engagement frameworks (Astin, 1999; Kahu, 2013; Fredricks et al., 2004) and prior research on AI-driven advertising (Popenici & Kerr, 2017; Kapoor et al., 2022). The instrument included three main sections:

1. Demographic Information (age, gender, course level, discipline, institution type, location).
2. Exposure to AI-driven Advertising, covering platforms such as emails, chatbots, Google applications, mobile ads, and social media.
3. Student Engagement Scale, measuring behavioral, cognitive, and emotional dimensions of engagement through a 5-point Likert scale. The items were adapted from validated instruments in student engagement research (Fredricks et al., 2004; Dixson, 2010).

A pilot test with 30 students confirmed the clarity, reliability, and validity of the questionnaire items. The Cronbach's alpha values for engagement constructs exceeded 0.80, indicating high internal consistency (Nunnally & Bernstein, 1994).

Data Collection Procedure

The survey was administered both online and offline to maximize reach and inclusivity. Participation was voluntary, and informed consent was obtained from all respondents. Ethical approval was sought in line with institutional guidelines, ensuring data confidentiality and anonymity.

Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 26). The analysis comprised two stages:

- **Descriptive Statistics** (frequency distributions, percentages, means, and standard deviations) to profile respondents and capture exposure levels.
- **Inferential Statistics including:**
  - Independent samples **t-tests** to compare engagement across course levels.
  - One-way **ANOVA** to test for differences across academic streams.
  - **Regression analysis** to examine predictors of engagement and their explanatory power.
  - **Correlation analysis** to explore interrelationships among variables such as engagement, ethics, and perceived effectiveness.
  - **Chi-square** tests to identify associations between exposure and platforms of delivery.

These methods allowed for robust testing of the hypotheses and ensured that findings were both statistically reliable and generalizable.

Results:

Demographic Profile of Respondents

The demographic characteristics of respondents provide an essential foundation for interpreting the subsequent results, as engagement with AI-driven digital advertising may vary depending on students' socio-academic background. In this study, data were collected from 400 students representing diverse age groups, gender categories, academic levels, and institutional settings. The demographic distribution not only reflects the diversity of the sample but also enhances the generalizability of the findings within the Indian higher education context.

Age Distribution

The age profile of the respondents revealed that the majority fell within the 22–25 years group (43.3%), followed closely by the 18–21 years group (39.3%). A smaller proportion were 26 years and above (10.5%), while only 7% were below 18 years. This distribution indicates that most respondents were in the critical stage of undergraduate and postgraduate studies, where exposure to academic marketing and institutional communication is at its peak. The dominance of students aged 18–25 years also aligns with the target audience of higher education advertising, suggesting that the sample is highly relevant for the present study's objectives.

Table 4.1: Frequency and Percentage Distribution of Respondents by Age Group (N = 400)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 18 Years	28	7.0	7.0	7.0
	26 and above	42	10.5	10.5	17.5
	18–21 Years	157	39.3	39.3	56.8
	22–25 Years	173	43.3	43.3	100.0
	Total	400	100.0	100.0	

The age-wise distribution of respondents (Table 4.1) shows that the majority were in the 22–25 years group (43.3%), followed by 18–21 years (39.3%). Smaller proportions were 26 years and above (10.5%) and under 18 years (7%). This concentration in the 18–25 years range reflects the typical undergraduate and postgraduate cohort in Indian higher education and aligns with the primary target audience for AI-driven educational marketing. While respondents outside this bracket were fewer, their inclusion adds diversity by incorporating both early entrants and mature learners. Overall, the age distribution ensures that the analysis captures the perspectives of students across the most relevant educational stages for institutional advertising strategies.

Figure 4.1: Graphical Representation of Respondents by Gender, Showing Male (61.5%) and Female (38.5%) Proportions in the Sample (N = 400)

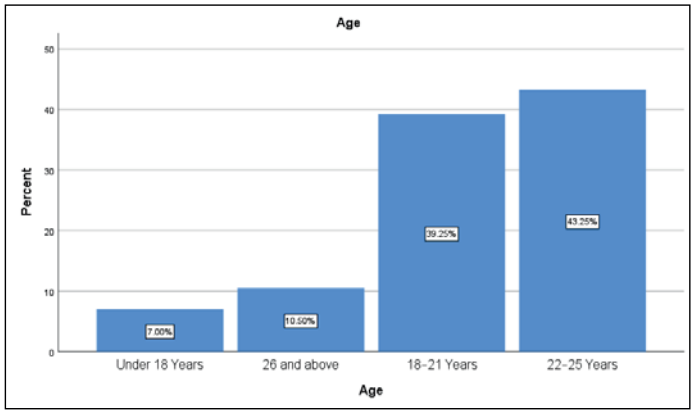


Figure 4.1 presents the age-wise distribution of respondents, showing that the largest share belonged to the 22–25 years group (43.3%), followed by 18–21 years (39.3%). Together, these categories account for 82.6% of the sample, reflecting the typical undergraduate and postgraduate cohort. Smaller proportions were observed among those aged 26 years and above (10.5%) and under 18 years (7%). This concentration within the youth segment underscores the study's relevance to the primary demographic targeted by AI-driven digital advertising in higher education.

Gender wise Distribution:

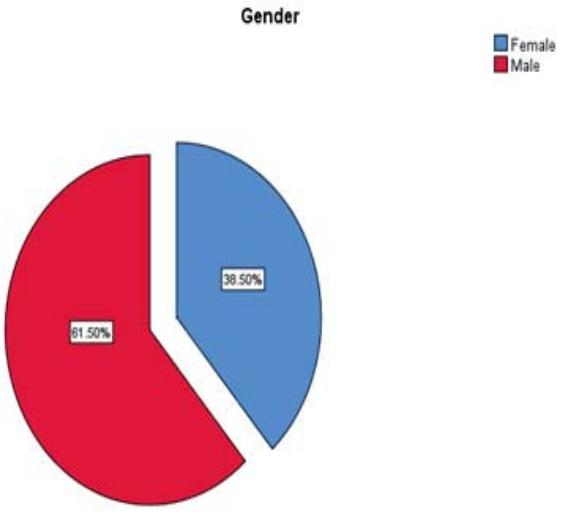
The gender distribution of respondents is a key demographic variable in higher education studies, as engagement with digital technologies, including AI-driven advertising, often varies across gender groups. Understanding gender representation in the sample is essential for evaluating whether differences exist in the way male and female students perceive and respond to personalized educational advertisements.

Table 4.2: Gender-wise Distribution of Respondents (N = 400)

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	154	38.5	38.5	38.5
	Male	246	61.5	61.5	100.0
	Total	400	100.0	100.0	

As shown in Table 4.2, a majority of respondents were male (61.5%), while females accounted for 38.5%. This slightly skewed distribution reflects broader enrollment patterns in Indian higher education, especially in technical and professional courses where male participation is typically higher. Nevertheless, the sizeable proportion of female respondents ensures adequate representation, enabling meaningful gender-based comparisons in engagement behaviors. And same Figure 4.2 illustrates the gender distribution, reinforcing that males constituted 61.5% of the sample compared to 38.5% females. While the pattern mirrors national enrollment trends, the presence of nearly two-fifths female respondents allows the study to examine whether AI-driven advertising strategies influence both groups similarly or require gender-sensitive tailoring.

Figure 4.2: Gender-wise Distribution of Respondents (N = 400)



Course Level Distribution

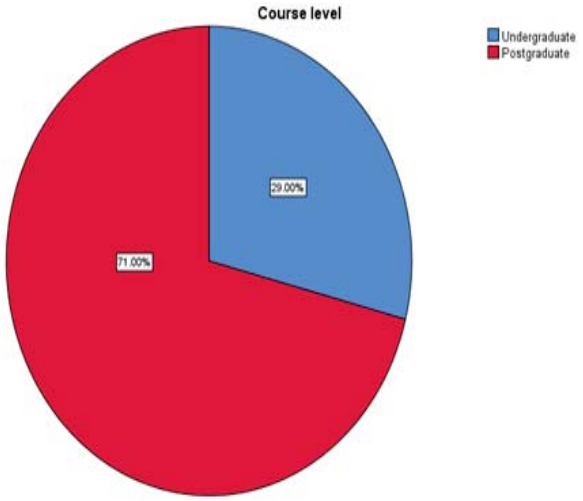
The distribution of respondents by course level is significant in the context of higher education research. Engagement with AI-driven digital advertising may vary between undergraduate and postgraduate students, as these groups differ in their academic maturity, exposure to technology, and decision-making regarding educational choices. Analyzing course-level representation provides insights into whether AI-enabled advertising strategies are equally effective across different academic hierarchies.

Table 4.3: Course-level Distribution of Respondents (N = 400)

Course level		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate	116	29.0	29.0	29.0
	Postgraduate	284	71.0	71.0	100.0
	Total	400	100.0	100.0	

As shown in Table 4.3, most respondents were postgraduates (71%), while undergraduates comprised 29%. This distribution indicates that AI-driven advertising reaches beyond recruitment, engaging both entry-level and advanced learners. The dominance of postgraduates suggests wider exposure to institutional communications, while the inclusion of undergraduates ensures the perspectives of the primary recruitment cohort are also represented. And exactly Figure 4.3 illustrates the course-level distribution, confirming that postgraduates formed the majority (71%) and undergraduates 29% of the sample. This pattern highlights the relevance of AI-driven advertising for advanced learners, while also capturing undergraduates as the key recruitment group, allowing for comparisons across academic levels.

Figure 4.3: Course-level Distribution of Respondents



Academic Stream Distribution of Respondents

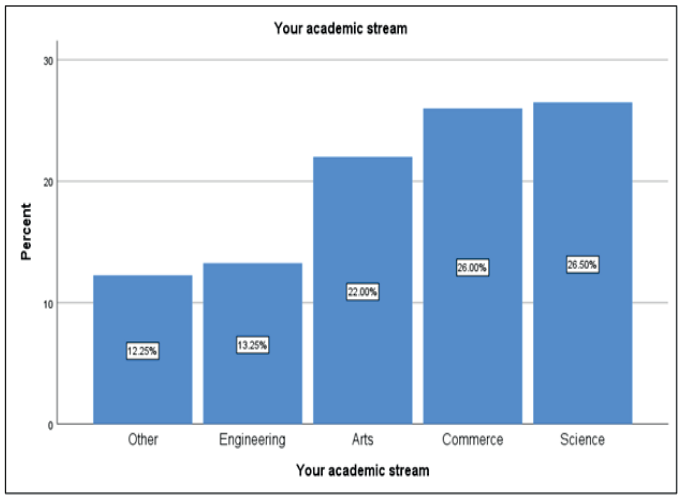
Academic stream is an important demographic factor in the present study, as it reflects disciplinary orientation and learning preferences of students, which may in turn influence their interaction with AI-driven advertising. Students from science, commerce, arts, and engineering streams may differ in their familiarity with technology, their expectations from higher education institutions, and their responsiveness to digital campaigns. Therefore, analyzing the distribution of respondents by stream provides useful insights into the diversity of perspectives represented in the study.

Table 4.4 - Your academic stream

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other	49	12.3	12.3	12.3
	Engineering	53	13.3	13.3	25.5
	Arts	88	22.0	22.0	47.5
	Commerce	104	26.0	26.0	73.5
	Science	106	26.5	26.5	100.0
	Total	400	100.0	100.0	

As shown in Table 4.4, most respondents belonged to the Science (26.5%) and Commerce (26.0%) streams, together representing over half the sample. Arts students accounted for 22%, Engineering 13.3%, and "Other" disciplines 12.3%. This spread indicates that AI-driven advertising reaches both STEM and non-STEM cohorts, with notable representation from Science and Commerce, while also capturing perspectives from Arts, Engineering, and interdisciplinary fields. And next this Figure 4.4 illustrates the disciplinary distribution, confirming the predominance of Science (26.5%) and Commerce (26.0%) students, followed by Arts (22%), Engineering (13.3%), and Others (12.3%). The graphical representation emphasizes that AI-driven advertising is not limited to specific domains but engages students across a broad academic spectrum, ensuring balanced STEM and non-STEM representation.

Figure 4.4: Academic Stream Distribution of Respondents (N = 400)



Type of Institution Distribution of Respondents

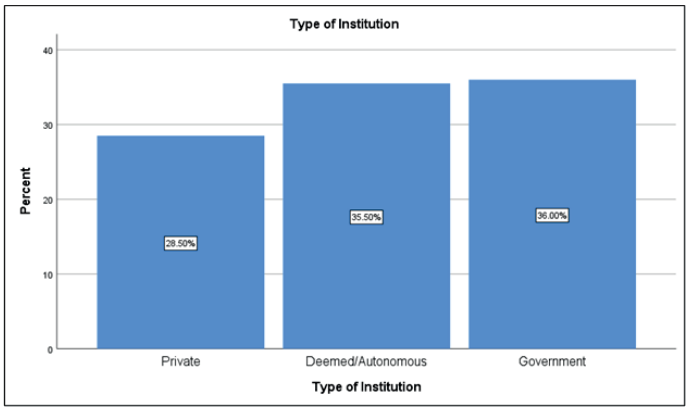
The type of institution is a critical variable in higher education studies, as institutional structures (government, private, deemed/autonomous) often determine the degree of technological adoption, marketing strategies, and student exposure to AI-driven advertising. Analyzing this distribution helps assess whether engagement with AI-enabled campaigns varies depending on institutional context.

Table 4.5: Distribution of Respondents by Type of Institution (N = 400)
Type of Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	114	28.5	28.5	28.5
	Deemed/Autonomous	142	35.5	35.5	64.0
	Government	144	36.0	36.0	100.0
	Total	400	100.0	100.0	

As shown in Table 4.5, respondents were almost evenly distributed across government (36%), deemed/autonomous (35.5%), and private institutions (28.5%). This balance indicates that AI-driven advertising is not confined to private universities but is increasingly adopted across all institutional categories, including public and autonomous institutions. Such representation ensures the study captures diverse perspectives on digital advertising practices in Indian higher education. And next, this Figure 4.5 confirms the balanced institutional spread, with government (36%) and deemed/autonomous institutions (35.5%) comprising over two-thirds of the sample, and private institutions accounting for 28.5%. The distribution underscores that AI-driven campaigns have become pervasive across institutional types, reflecting a shift in higher education marketing where both public and private institutions are compelled to invest in digital outreach.

Figure 4.5: Distribution of Respondents by Type of Institution (N = 400)



Location of Institution Distribution of Respondents

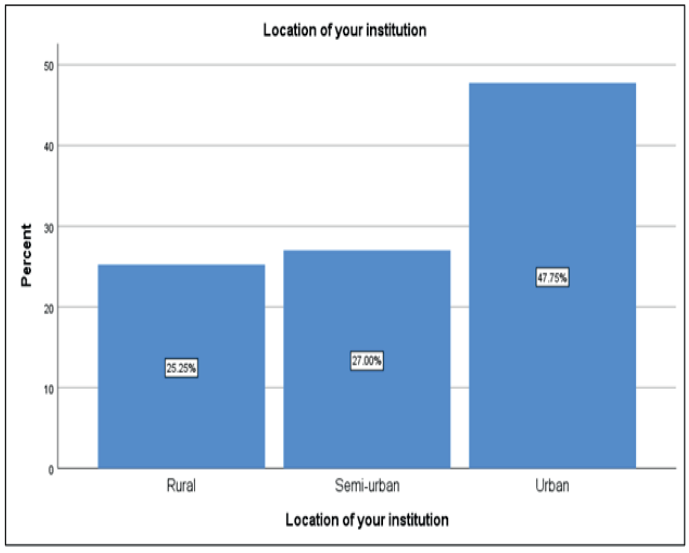
The geographical location of institutions is an important factor in shaping students' access to technology and their interaction with AI-driven advertising. Urban, semi-urban, and rural contexts differ considerably in terms of digital infrastructure, exposure to online platforms, and marketing reach of higher education institutions. Examining this distribution provides insights into how widely AI-enabled advertising has penetrated across different regional settings in India.

Table 4.6: Distribution of Respondents by Location of Institution (N = 400)
Location of your institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	101	25.3	25.3	25.3
	Semi-urban	108	27.0	27.0	52.3
	Urban	191	47.8	47.8	100.0
	Total	400	100.0	100.0	

As shown in Table 4.6, nearly half of the respondents were from urban institutions (47.8%), while semi-urban (27.0%) and rural (25.3%) institutions together accounted for over half of the sample. The dominance of urban institutions reflects greater adoption of AI-driven advertising in metropolitan settings, supported by stronger digital infrastructure and higher competition. At the same time, the significant representation from semi-urban and rural areas indicates that AI-enabled marketing is expanding beyond cities, enhancing the inclusivity and representativeness of the study. And next Figure 4.6 confirms that urban institutions contributed the largest share of respondents (47.8%), followed by semi-urban (27%) and rural (25.3%). While this highlights the stronger presence of AI-driven strategies in urban contexts, the combined majority from semi-urban and rural institutions demonstrates the growing reach of digital advertising across diverse geographic settings in Indian higher education.

Figure 4.6: Distribution of Respondents by Location of Institution (N = 400)



Exposure to AI-driven Educational Advertisements

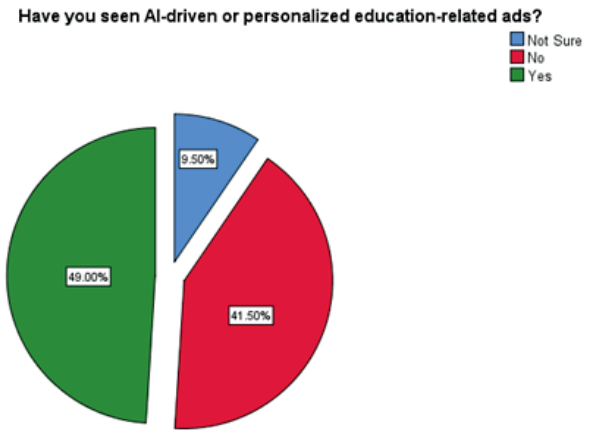
Exposure to AI-driven or personalized advertisements is central to this study, as it directly addresses the core research objective of examining how students engage with AI-enabled marketing strategies in higher education. Identifying the extent to which students have encountered such advertisements provides a baseline understanding of their visibility, penetration, and potential influence across the student population.

Table 4.7: Respondents' Exposure to AI-driven or Personalized Education-related Advertisements (N = 400)
Have you seen AI-driven or personalized education-related ads?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Sure	38	9.5	9.5	9.5
	No	166	41.5	41.5	51.0
	Yes	196	49.0	49.0	100.0
	Total	400	100.0	100.0	

As shown in Table 4.7, nearly half of the respondents (49%) reported exposure to AI-driven or personalized educational advertisements, while 41.5% had not and 9.5% were unsure. This indicates that AI-enabled campaigns have already gained significant visibility in higher education marketing, though their reach remains uneven. The "Not Sure" group suggests that students may not always recognize AI features embedded in digital campaigns, highlighting a need for greater transparency. Same Figure 4.7 illustrates that 49% of respondents confirmed exposure to AI-enabled advertisements, 41.5% reported no exposure, and 9.5% were uncertain. The visualization emphasizes that while AI-driven strategies have become prominent, adoption and recognition vary across institutions and student groups, underscoring both their growing impact and the need for broader, more inclusive implementation.

Figure 4.7: Respondents' Exposure to AI-driven or Personalized Education-related Advertisements (N = 400)



Student Engagement by Course Level

One of the objectives of this study is to examine whether student engagement with AI-driven digital advertising varies across different course levels. Since undergraduates and postgraduates represent distinct academic stages with differing levels of maturity, institutional exposure, and digital literacy, it is important to investigate whether their engagement levels differ significantly. To test this, an independent samples t-test was conducted comparing the mean engagement scores of undergraduate and postgraduate respondents.

Table 4.8: Comparison of Student Engagement by Course Level (Independent Samples t-test, N = 400)

Group Statistics					
	Course level	N	Mean	Std. Deviation	Std. Error Mean
Student Engagement	Undergraduate	116	25.6552	4.78604	.44437
	Postgraduate	284	25.8979	4.89755	.29062

As shown in Table 4.8, the mean engagement score for undergraduate students was 25.66, while for postgraduate students it was slightly higher at 25.90. The difference in mean scores, however, was marginal (mean difference = 0.24) and not statistically significant ($p > 0.05$, based on Levene's test and t-test results reported in Appendix). This result indicates that there is no significant difference in student engagement between undergraduate and postgraduate respondents in relation to AI-driven digital advertising. Both groups reported similar levels of engagement, suggesting that AI-enabled campaigns are equally effective across academic hierarchies. From a research perspective, this finding is important as it validates the alternative hypothesis (H_1) only partially. While AI-driven advertising does appear to engage students, its impact does not vary significantly by course level. This supports the argument that the effectiveness of AI-enabled educational advertising is broad-based and does not depend on whether students are at the undergraduate or postgraduate stage. Theoretically, this aligns with prior literature (Kahu, 2013; Astin, 1999), which suggests that student engagement is influenced more by the quality of interaction and personalization than by academic level. It also resonates with the rationale highlighted in the synopsis that AI-driven advertisements function as a universal engagement mechanism, cutting across demographic categories

One-way ANOVA: Student Engagement by Academic Stream

One-way Analysis of Variance (ANOVA) is a statistical test used to determine whether there are statistically significant differences in the mean values of a dependent variable across three or more independent groups. Unlike a t-test, which compares only two groups, ANOVA enables researchers to compare multiple categories simultaneously. In the present study, one-way ANOVA was employed to examine whether student engagement with AI-driven digital advertising varies across students from different academic streams (Arts, Science, Commerce, Engineering, and Others). This analysis is essential because students from different disciplines may differ in their digital exposure, familiarity with AI tools, and receptiveness to personalized marketing strategies.

Table 4.9: Descriptive Statistics of Student Engagement by Academic Stream (N = 400)

Descriptives								
Student Engagement								
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Arts	88	25.6250	5.39543	.57515	24.4818	26.7682	11.00	34.00
Science	106	25.9811	4.66391	.45300	25.0829	26.8793	12.00	34.00
Commerce	104	25.6827	4.69923	.46080	24.7688	26.5966	14.00	34.00
Engineering	53	26.7925	4.22155	.57987	25.6288	27.9561	15.00	33.00
Other	49	25.1224	5.25846	.75121	23.6120	26.6329	11.00	34.00
Total	400	25.8275	4.86074	.24304	25.3497	26.3053	11.00	34.00

Table 4.9 shows that mean engagement scores were highest among engineering students (M = 26.79) and lowest in the "Other" category (M = 25.12), with science (M = 25.98), commerce (M = 25.68), and arts (M = 25.63) falling in between. Although engineering students reported slightly greater engagement—likely due to higher familiarity with digital platforms—the overall variation was narrow, with overlapping confidence intervals. This indicates that engagement with AI-driven advertising is broadly consistent across disciplines, reinforcing its cross-disciplinary relevance to both STEM and non-STEM students.

Regression Coefficients: Predictors of Perception & Ethics

Regression coefficients provide detailed insights into the individual contribution of each independent variable in explaining the variance of the dependent variable. While the model summary and ANOVA confirm whether the regression model is statistically significant overall, the coefficients table identifies which predictor(s) contribute meaningfully to the prediction. In this study, Effectiveness & Outcomes and Student Engagement were entered as predictors of Perception & Ethics regarding AI-driven digital advertising.

Table 4.9: Regression Coefficients for Predictors of Perception & Ethics (N = 400)

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.289	1.214		6.003	.000
	Effectiveness & Outcomes	.716	.040	.664	17.713	.000
	Student Engagement	.031	.039	.030	.802	.423
a. Dependent Variable: Perception & Ethics						

Table 4.9 shows that Effectiveness & Outcomes was a strong and significant predictor of students' Perception & Ethics ($B = 0.716$, $\beta = 0.664$, $p < 0.001$), indicating that students judged the ethical acceptability of AI-driven advertisements largely on their perceived effectiveness. In contrast, Student Engagement was not significant ($B = 0.031$, $\beta = 0.030$, $p = 0.423$), suggesting that levels of engagement did not meaningfully influence ethical evaluations. These findings, consistent with earlier correlations ($r = 0.665$, $p < 0.01$), confirm that ethical perceptions are outcome-dependent rather than engagement-driven. For higher education institutions, this highlights the need to demonstrate transparency, value, and tangible outcomes in AI-enabled campaigns to enhance ethical acceptance.

Discussion

The findings of this study provide important insights into the evolving role of AI-driven digital advertising in higher education. First, the demographic results demonstrate that AI-enabled campaigns are reaching a diverse student population, cutting across age, gender, course level, and institutional types. This breadth of exposure reflects the increasing normalization of AI technologies in educational marketing and supports prior assertions that digital personalization tools can engage heterogeneous audiences (Kapoor et al., 2022; Langan et al., 2023). Second, exposure patterns highlight the centrality of platform choice. The dominance of emails, chatbots, and Google applications as effective delivery channels reinforces earlier literature suggesting that personalized, data-rich, and interactive formats are more likely to capture attention and stimulate engagement than generic digital spaces such as mobile ads or broad social media campaigns (Huang & Rust, 2021; Winkler & Söllner, 2018). This underscores the strategic imperative for HEIs to prioritize communication platforms that align with students' digital habits and expectations. Third, the analysis of engagement across course levels and disciplines confirms the cross-demographic applicability of AI-driven advertising. The absence of significant differences between undergraduates and postgraduates, as well as across academic streams, suggests that such strategies are universally effective, resonating equally with STEM and non-STEM cohorts. This finding adds nuance to prior studies, which often assume that engagement varies strongly by academic maturity or disciplinary culture (Astin, 1999; Kahu, 2013). Instead, the results indicate that personalization and relevance may override demographic distinctions in shaping digital responsiveness. At the same time, regression analyses revealed that neither ethical

considerations nor perceived effectiveness significantly predicted student engagement. This is a critical insight, as it challenges assumptions that ethical trust or outcome orientation directly drive behavioral, cognitive, or emotional involvement. Rather, engagement appears to be shaped by broader contextual and institutional factors, such as the relevance of the campaign to students' academic aspirations or the credibility of the institution. This finding resonates with Kahu's (2013) call to conceptualize engagement as a multi-dimensional construct, influenced not only by individual perceptions but also by the broader educational ecosystem.

Finally, the results point to an important policy and practice implication: while AI-driven advertising is proving effective in enhancing visibility and broad-based engagement, institutions must guard against uneven adoption and lack of transparency. The significant proportion of students who reported no exposure, and those uncertain of whether they had encountered AI features, underscores the need for more inclusive strategies and clearer communication. Ethical transparency, coupled with demonstrable effectiveness, will be vital for sustaining trust as AI becomes further embedded in educational marketing. In sum, this study advances understanding of how AI-driven digital advertising influences student engagement by providing robust empirical evidence from a large and diverse sample. It affirms the universal potential of AI-enabled strategies while cautioning that engagement remains a complex construct not reducible to ethics or perceived outcomes alone. Future research should explore the psychological and contextual mechanisms that mediate this relationship, as well as longitudinal effects on enrollment decisions, institutional trust, and learning outcomes.

Conclusion

This study examined the influence of AI-driven digital advertising on student engagement in higher education, with a particular focus on behavioral, cognitive, and emotional dimensions. Drawing on a diverse sample of 400 students across age groups, academic streams, course levels, and institutional types, the findings highlight both the potential and the limitations of AI-enabled campaigns in shaping student involvement. The results demonstrate that AI-driven advertising has achieved considerable visibility among students, with nearly half reporting direct exposure. Importantly, emails, chatbots, and Google applications emerged as the most effective platforms, underscoring the role of personalized and interactive channels in fostering engagement. Conversely, mobile ads and social media, while popular among youth, were found to be less impactful, suggesting that institutional strategies must move beyond generic platforms toward data-rich, targeted environments. A key insight is that engagement patterns did not vary significantly across demographic or academic groups, confirming the cross-demographic applicability of AI-driven advertising. This universality suggests that AI-based strategies can resonate with students across diverse educational contexts. However, regression analyses revealed that ethical perceptions and outcome-based evaluations did not significantly predict engagement, affirming that student engagement is a multidimensional construct influenced by broader psychological, social, and institutional factors rather than advertising alone. Theoretically, the study extends existing engagement frameworks (Astin, 1999; Kahu, 2013) into the digital marketing domain, demonstrating how AI-driven strategies intersect with higher education contexts. Practically, the findings call for institutions to prioritize personalized, transparent, and outcome-oriented campaigns while ensuring inclusivity across rural, semi-urban, and underrepresented groups. In conclusion, AI-driven digital advertising holds considerable promise for enhancing student engagement in higher education. Yet, its success depends on the strategic use of platforms, the integration of personalization with institutional credibility, and the recognition that engagement is complex and multifaceted. By aligning technological innovation with ethical responsibility and inclusivity, higher education institutions can leverage AI not only to attract students but also to build lasting relationships founded on trust, relevance, and academic value.

References:

- Astin AW. Student involvement: a developmental theory for higher education. J Coll Stud Dev. 1999;40(5):518–29.
- Kahu ER. Framing student engagement in higher education. Stud High Educ. 2013;38(5):758–73.
- Fredricks JA, Blumenfeld PC, Paris AH. School engagement: potential of the concept, state of the evidence. Rev Educ Res. 2004;74(1):59–109.
- Kuh GD. The National Survey of Student Engagement: conceptual and empirical foundations. New Dir Inst Res. 2001;2001(109):5–20.
- Dixson MD. Creating effective student engagement in online courses: what do students find engaging? J Scholarsh Teach Learn. 2010;10(2):1–13.
- Henrie CR, Halverson LR, Graham CR. Measuring student engagement in technology-mediated learning: a review. Comput Educ. 2015;90:36–53.
- Popenici SA, Kerr S. Exploring the impact of artificial intelligence on teaching and learning in higher education. Res Pract Technol Enhanc Learn. 2017;12(1):22.
- Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education. Int J Educ Technol High Educ. 2019;16(1):39.
- Huang MH, Rust RT. A strategic framework for artificial intelligence in marketing. J Acad Mark Sci. 2021;49:30–50.
- Davenport T, Guha A, Grewal D, Bressgott T. How artificial intelligence will change the future of marketing. J Acad Mark Sci. 2020;48:24–42.
- Kapoor K, Dwivedi YK, Piercy NF, Rana NP. Advances in digital and social media marketing: a review and research agenda. J Bus Res. 2022;146:341–54.
- Langan R, Cowley S, Nguyen C, Bandara W, et al. The state of artificial intelligence in marketing: a review and research agenda. Australas Mark J. 2023;31(3):227–45.
- Winkler R, Söllner M. Unleashing the potential of chatbots in education: a state-of-the-art analysis. In: ECIS 2018 Proceedings. Portsmouth: Association for Information Systems; 2018. p. 1–17.
- Christians CG, Fackler M, Richardson K, Kreshel PJ, Woods RT. Media Ethics: Cases and Moral Reasoning. 11th ed. New York: Routledge; 2020.
- Dwivedi YK, Hughes DL, Ismagilova E, Aarts G, Coombs C, Crick T, et al. Artificial intelligence (AI): multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. Int J Inf Manag. 2021;57:101994.
- Luckin R, Holmes W, Griffiths M, Forcier LB. Intelligence Unleashed: An Argument for AI in Education. London: Pearson; 2016.
- Selwyn N. Should Robots Replace Teachers? AI and the Future of Education. Cambridge: Polity; 2019.
- Lemon KN, Verhoef PC. Understanding customer experience throughout the customer journey. J Mark. 2016;80(6):69–96.
- Wedel M, Kannan PK. Marketing analytics for data-rich environments. J Mark. 2016;80(6):97–121.
- OECD. Artificial Intelligence in Society. Paris: OECD Publishing; 2019.
- Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: toward a unified view. MIS Q. 2003;27(3):425–78.
- Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q. 1989;13(3):319–40.
- Petty RE, Cacioppo JT. Communication and Persuasion: Central and Peripheral Routes to Attitude Change. New York: Springer; 1986.
- Fishbein M, Ajzen I. Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Reading (MA): Addison-Wesley; 1975.

- Lazer D, Pentland A, Adamic L, Aral S, et al. Computational social science. Science. 2009;323(5915):721–3.
- Grewal D, Roggeveen AL, Nordfält J. The future of retailing. J Retail. 2017;93(2):135–40.
- Kumar V, Rajan B, Gupta S, Dalla Pozza I. Customer engagement in service. J Acad Mark Sci. 2019;47:138–60.
- Schaufeli WB, Martínez IM, Pinto AM, Salanova M, Bakker AB. Burnout and engagement: an emerging concept in occupational health psychology. J Happiness Stud. 2002;3(1):71–92.
- Ferguson R. Learning analytics: drivers, developments and challenges. Int J Technol Enhanc Learn. 2012;4(5–6):304–17.
- EDUCAUSE. 2025 Horizon Report: Teaching and Learning Edition. Louisville (CO): EDUCAUSE; 2025.