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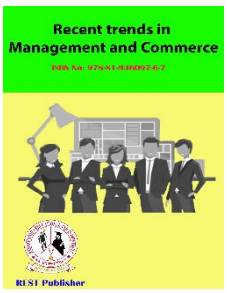

Personalized Marketing with Artificial Intelligence: Shaping Enrolment Decisions in Higher Education

***Meenakshi Malav, Kapil Khatter**

Poornima University, Jaipur, Rajasthan, India.

**Corresponding author: meenakshi.m@poornima.edu.in*

***Abstract**: In the Indian higher education industry, AI integration has been gaining significant traction, especially among colleges looking for better ways to hone and enhance student marketing strategies that affect future student enrollments. The current study focuses on how using technology to create personalized experiences improves student involvement. Higher education institutions may better understand their students and create services, material, and messaging that are appealing to prospective students by utilizing sophisticated data analytics techniques. AI-enabled chat apps, segmented and customized email lists, and other online ads are being used to answer specific questions, keep and grow relationships, and provide tailored advice for admissions procedures. From a brand standpoint, AI may now increase the already-existing personalization and result in higher enrollments in a world where educational institutions are vying for top-notch pupils. This study focuses on how marketing methods affected by AI attract potential students and how these strategies affect perception. It also discusses issues like data availability and privacy that could affect the use of AI in marketing and communication in Indian higher education. It also offers options for developing unique marketing communications that can significantly use AI to improve student experiences and growth.*

***Keywords:** AI-powered chatbots, personalized communication, student data analysis, digital ads, brand differentiation, data privacy, AI adoption, student experience, higher education marketing, student engagement, enrollment decisions, machine learning, targeted marketing, customized experiences, prospective students, India, competitive landscape, AI-powered personalization, and higher education institutions*

1. INTRODUCTION

Artificial intelligence (AI)-assisted marketing has aided in the expansion and advancement of numerous companies globally. AI is becoming a distinguishing feature of the Indian university system, which is a component of the complex and growing higher education system, and it is crucial to how institutions engage with their target student body. AI-personalization appears to be one of the most successful tactics among the more recent targeted marketing techniques for developing distinctive marketing experiences for individual students, which increases their propensity to investigate particular universities during the enrollment process.

Personalization, as applied in marketing, aims to provide consumers with tailored content using data to analyze their preferences and habits. The use of AI to improve customization is based on intricate computations, machine learning, and statistical analysis algorithms that attempt to gather vast amounts of data, predict a specific customer's usage patterns, and improve the advertising and marketing process in real time. AI may significantly impact the student enrollment journey experience in the context of advertising a higher education institution in India by increasing engagement and creating tailored interactions that meet the expectations of a prospective student.

More than 17 million students are enrolled in higher education in India, which is home to more than 1,000 universities and 42,000 associated colleges. This industry has been growing rapidly, addressing the issues of the modern labor market, creating new technology, and enrolling students from younger generations. Since the start of the current epidemic, which has pushed for the incorporation of technology into learning processes, the use of technology in student learning and school activities has expanded significantly.

Higher education schools' marketing strategies have also evolved from using campus fairs and media ads to using data-driven, contemporary strategies. Since the industry has become more competitive over time, educational institutions are constantly looking for new ways to connect with the possibly growing market and convince potential students of the advantages of enrolling. Thus, in this competitive setting, Al-driven personalization offers a chance to establish distinctive and productive connections that can influence the choices of students and the institutions they are most likely to enroll in.

All types of AI interfaces can be applied to the context of AI personalization of student interactions, which involves using AI technology to evaluate student data and use that information to direct interactions in real time. For example, in the higher education sector, this entails offering personalized course recommendations, delivering student-specific content, and sending pertinent notifications at each step of the student's enrollment process. As a result, organizations can employ AI to give each individual interested in their particular institution more pertinent information.

In India, prospective students are known to be influenced by a number of factors, including their parents, cultural customs, employment prospects, and the reputation of educational institutions. Additionally, it would give institutions the capacity to directly address these concerns, improving the overall experience. For example, a student enrolled in a course of their choosing—in this case, computer science—may be introduced to what some of the alumni are doing in the IT sectors and given information about partnerships with IT companies and future employment opportunities. This degree of professionalism can increase the likelihood that a student will enroll by giving them the impression that the school is interested in their goals.

Because it cultivates relationships with the sources of interest, student engagement is one of the most important enrollment tactics. In today's world, broad-based communication strategies can no longer be as effective due to a lack of choice and customized messaging. Due to the improved capacity to provide individualized materials that will assist students in realizing their goals, the application of AI in the delivery of course materials can further enhance student engagement.

Many students in India come from low-resource households and might not have access to such information or messages, but with the proper application, the right message can reach the right student at the right moment. AI can, for instance, examine a student's online activity, courses in which they have shown interest, social media activity, and previous correspondence with the school, among other things. Such information can be used to create a customized engagement plan that may call for customized emails, advertisements, and even online therapy sessions.

Machine learning, natural language processing, chatbots, and predictive analysis are just a few of the AI tools and methods utilized in higher education for targeted marketing. In addition to providing tailored interactions, all of these technologies are helpful for monitoring and adjusting student behavior.

• Machine Learning: After gathering and preprocessing student data, machine learning models are used to determine their relationship and generate predictions. When used to higher education marketing, machine learning can be used to accurately forecast who will enroll and what kinds of messaging will be most appropriate for them.

• Natural Language Processing (NLP): NLP is used in this context to examine the language used by potential students in their interactions with different educational institutions. By using sentiment analysis in a metaphorical sense, educational institutions can better address the problems of their students by staying up to date on how they are feeling as stated in emails, posts on social media, and chat conversations.

• AI Chatbots: AI Chatbots are also frequently used by marketing departments of higher education institutions. They provide prompt answers to prospective students' inquiries and guide them through the enrolling process step-by-step. These chatbots are clever because they use artificial intelligence to determine the purpose of student inquiries and provide relevant answers, which makes it enjoyable.

• Predictive analytics: Forecasting uses historical data from comparable initiatives to develop probabilistic predictions about behavior. These forecasts can then be used to determine which students are

most likely to enroll, which marketing messages will work best to draw in potential students, and when such engagement will be most suitable in the context of higher education marketing.

Before enrolling in a certain institution, people take into account a number of criteria, such as the institution's quality, the courses it offers, the career aspect, and the costs. Since schools give students the information, they need to make decisions, the aforementioned factors can be controlled through the use of AI-driven customization.

The use of artificial intelligence and associated technological advancements to enhance the personalization of communications and marketing in higher education has a promising future. Therefore, in a world that is quickly moving towards digital and competitive contexts, it is crucial that Indian higher education institutions embrace AI and choose more specialized techniques.

2. LITERATURE REVIEW

Over the past few decades, the context of higher education has experienced significant changes due to a number of factors, including globalization, new technology, societal changes, and student mobility. Among the innovations that have taken institutions by surprise is the incorporation of digital marketing tactics. This is part of a broader trend whereby digital technologies are starting to change the way that educational institutions interact with their constituents, including the general public and current and former students and graduates. This literature review's objectives are to critically examine the function of digital marketing in higher education and investigate the potential, dangers, and results that result from these two sectors coming together.

Equally significant is the fact that earning a bachelor's degree has always been viewed positively as a means of bettering oneself and the community. This function has expanded in the modern era as a result of globalization and the digital economy. As a result, the demand keeps growing as knowledge and information become more important economic commodities. Today, it is becoming more and more clear that schools are global entities vying for students, teachers, and funding on a regional, national, and worldwide scale. As a result, there is a greater need than ever for marketing methods that successfully appeal to diverse and brilliant students.

Globalization has made both students and academic programs more international. Since more and more students are studying abroad these days, educational institutions must attract students from all over the world. In this regard, internet advertising has become the most efficient means for educational institutions to promote themselves, attract international students, and cultivate a varied student body (Rana et al., 2022).

The delivery, caliber, and accessibility of education have all undergone substantial change since the advent of digital technology. Thus, social media, the Internet, and mobile devices are crucial to knowledge sharing and learning in traditional classroom settings. Students' learning habits have drastically changed as a result, with MOOCs, blended learning, and online programs now commonplace (Paliwal & Singh, 2021).

Given the intense competition nowadays, it is crucial to introduce a university to the global market. Yousaf et al. (2020) contend that by developing a strong brand, organizations may differentiate themselves from competitors and draw in their ideal clients. Digital marketing is essential in this regard since it provides organizations with the ability to communicate the values, attributes, and goods of their brand.

Currently, one of the main goals of employing digital marketing in higher education institutions is to increase student acquisition and enrollment. Since many of the research institutions of potential students rely heavily on online resources, universities and colleges must be mindful of their online reputation. The majority of educational institutions use email marketing, pay-per-click ads, and search engine optimization to draw in potential students and assist them with the registration process (Chatterjee & Bhattacharjee, 2020).

Search engine optimization (SEO) is essential, as any school hoping to successfully place its website at the top of the list of search engine options would attest. Only by placing the school's website at the top of the list for the key term can the exposure and volume of requests be greatly enhanced, as most prospective students start the selection process by searching for information online. However, because pay-per-click (PPC) targets both demographics and physical area, it may be used by organizations to reach the appropriate individuals at the right time.Email marketing is one of the best strategies for attracting new students. It is helpful for handling the leads and assisting prospective students in making decisions. Following up with a kind note and pertinent information, such as specifics about a program, the application deadline, and pertinent events at the university, might help entice a prospective student. Pye recruitment and retention are only one aspect of digital marketing; attracting and keeping current students is just as crucial. In order to

make sure that students are not only satisfied but also successful after enrolling, educational institutions should keep in touch with them and assist them. The student body may become more involved and cohesive as a result of the communication opportunities provided by mobile applications, social networks, and LMS (Wong et al., 2022).The largest obstacle to university digital marketing is a lack of technology, namely the difference between university use and non-use of digital technology. The availability of the internet, proficiency with computers, and ownership of devices are a few examples of how it could show up. However, the digital gap makes it difficult for organizations that want to connect with people worldwide to communicate and interact (Paliwal & Singh, 2021).

The primary risks of data privacy and security issues that are inherent in digital marketing are identified and discussed in this article, with particular attention paid to the university and college settings that handle and retain enormous volumes of personally identifiable data. The availability of digital marketing and communication platforms and tools has raised concerns about the acquisition, storage, and use of personally identifiable information. Following data protection regulations, such the General Data Protection Regulation (GDPR), is necessary due to trust and legal concerns (Almaiah et al., 2022).One of the main consequences of having so much content available is what is known as "content overload," or information overload. This could result in audience overload, especially in the higher education sector where people may be inundated with marketing messages about the tuition-paying institutions they currently attend, those they intend to attend, and those they have already left. Most digital marketing initiatives and activities may become less successful and reach more people as a result of this weariness (Wong et al., 2022).The World Wide Web is an ecosystem that is expanding quickly, as any newcomer to Internet marketing and web business development is aware. K higher education institutions must constantly adapt their DM strategies to meet the rapidly evolving technological landscape and shifting consumer behavior (Nair & Gupta, 2021). If you don't, you risk losing opportunities and becoming obsolete in the market.

Institutions should keep investing in their employees' ongoing training and growth in digital marketing. This involves using data and insights to improve marketing strategies, experimenting with new tools and channels, and keeping up with developments in digital marketing.Nonetheless, there are countless opportunities for advancements and innovations in higher education digital marketing.

3. RESEARCH METHODOLOGY

This study's method explains the approach followed in the investigation of the role of AI-driven personalization in higher education marketing on students' engagement and enrollment in India. In this part, empirical research is described according to its research design, hypotheses, methods of data collection, sampling, and data analysis. The purpose of this study is to investigate how application of artificial intelligence technologies can impact engagement and enrollment yield of interested learners through targeted marketing by universities.

In this research, data collected will be both qualitative and quantitative method of data collection is used. Its use in mixture with another research approach leads to an enhanced understanding of the research problem to an extent where both the qualitative and quantitative data is given due consideration due to its ability to analyse both personal and factual information. The work's qualitative component entails the views, attitudes, and experiences of the students and marketers and the quantitative component engages in testing hypothesized correlations between personalization, engagement, and enrollment.

The current study is mainly descriptive in nature and focuses on determining how students use results personalised with the assistance of AI. The first person reviews describe the state of AI and its drawbacks and issues at the current stage of establishment for higher education marketing The second part of the paper is devoted to analyze the possibilities and prospects of AI for marketing in higher education. The research aims to fulfill the following objectives:

1. To find out possibility to engage prospective students more on the basis of their preferences which predicted by applying AI technologies.
2. In order to investigate the emerging role of artificial intelligence features (the chatbots, the systems that predict the outcome of the interactions and some recommendations) as the factors influencing the students' decisions for enrollment.
3. In order to get the answer to the research question regarding the effect of personalized marketing on the overall perception of higher education institutions among prospective students.

4. The major research question was: What are the obstacles faced by Indian higher learning institutions in the process of Personalization through AI Technology?

The research involves the following hypotheses, which will be tested through statistical analysis:

- H1: Integrating AI in the more marketing of higher education has a great impact of enhancing the level of student engagement. This hypothesis means testing of whether the use of AI-based personalized marketing communication increases the lure of prospective students more so than conventional marketing appeals.
- H2: Self-learning technologies, including chatbots and predictive analytics, have a positive effect on the potential learner's enrolment choices. In support of this hypothesis, this research seeks to find out whether the use of specific AI tools utilized in marketing campaigns determine the number of students enrolling in higher learning institutions.

4. SAMPLING TECHNIQUE

In the study, an attempt will be made to survey and interview a number of participants and for this purpose the study will employ a technique known as stratified random sampling. The target audiences are prospective students interested in the Institution from different regions of India, marketing communications professionals and institutional collaborators. The sampling will be stratified according to geographical location, socio-economic status and educational needs preferences in order to get a good sample sized population.

- Student Sample: The survey will be carried on the sample of around 500 persons who are intending to become students of higher education. Such sample size is adopted with a view to having reliable and valid statistical data. Cross sectional selections of students will be conducted both from urban, semi-urban and rural areas to ensure comparative analysis of various types of personalization involving the use of Artificial intelligence.
- Professional Sample: About 20 qualitative face-to-face marketing professionals employed in higher education institutions will be interviewed. The specific IT professionals shall be hired by matching them with the experience in implementing the digital marketing strategies and the utilization of the AI technologies in the campaigns they are conducting.

Based on the coded data the study will look into concerns as well as sub concerns.Thematic analysis will help in understanding the subjective experiences of prospective students and the challenges faced by institutions in implementing AI-driven personalization.

To model the research, let us define some variables:

- Let **E** = Student Engagement
- Let P = Personalization Level
- Let M = Marketing Channel Effectiveness
- Let S = Student Enrollment Probability
- Let T = Al Tool Effectiveness
- Let C = Content Relevance Score
- Let F = Socio-economic Factor
- Let A = Awareness of Al Tools
- Let **D** = Digital Divide Impact
- Let R = Return on Marketing Effort

Student Engagement and Personalization Relationship

$$E = a_1 \times P + b_1 \quad (1)$$

Where a_1 and b_1 are constants. This equation shows that student engagement (E) is directly proportional to the level of personalization (P) applied in marketing. Impact of Al Tool Effectiveness on Enrollment Probability

$$S = a_2 \times T + b_2 \quad (2)$$

Where a_2 and b_2 are constants. Student enrallment probability (S) depends on the effectiveness (T) of Al toals used in the marketing strategy. Student Engagement Based on Marketing Channel Effectiveness

$$E = \sum_{i-1}^{n} M_i \quad (3)$$

Where M_i represents the effectiveness of each marketing channel Engagement (E) is the cumulative effectiveness across multiple channels. Content Relevance Score as a Factor of Engagement

$$C = \alpha \times E + \beta \quad (4)$$

Where α and β are constants. Content relevance $\langle C)$ is modeled as a function of engagement (E).Socio-Economic Impact an Enrollment Decisions

$$S = \gamma \times F + \delta \quad (5)$$

Where γ and δ are constants. Socio-economic factors (F) influence the probability of student enrollment (S).Influence of Personalized Content on Student Perception

$$P = \lambda \times C + \mu \quad (6)$$

Where λ and μ are constants. Personalization level (P) is directly influenced by content relevance (C) . Digital Divide and Its Impact on Student Engagement.

$$E = \theta - \phi \times D \quad (7)$$

Where θ is the maximum engagement possible and ϕ is a factor that quantifies the impact of the digital divide (D) on student engagement (E).Return on Marketing Effort

$$R = \sum_{i-1}^{n} (S_i \times E_i \times T_i) \quad (8)$$

Where S_j, E_j, and T_i represent student enrollment, engogement, and tool effectiveness far each strategy respectively. Predictive Model for Enrollment Probability

$$S = a_3 \times P + b_3 \times A + c_3 \times F + d_3 \quad (9)$$

Where a_3, b_3, c_3, and d_3 are constants. Student enrollment prabability (S) depends on personalization (P), awareness of Al tools (A), and socio-economic factors (F). Optimization.

$$T_{\text{cpt}} = \max(T_1, T_2, \dots, T_n) \quad (10)$$

Where T_{ppt} represents the mast effective Al tool to use to achieve the highest enrolment.

TABLE 1. Variables and Definitions

Variable	Definition	Unit
EEE	Student Engagement	Percentage (%)
PPP	Personalization Level	Scale (1-10)
MMM	Marketing Channel Effectiveness	Percentage (%)
SSS	Student Enrollment Probability	Probability (0-1)
TTT	AI Tool Effectiveness	Scale (1-100)
CCC	Content Relevance Score	Scale (1-10)
FFF	Socio-economic Factor	Scale (1-10)
AAA	Awareness of AI Tools	Percentage (%)
DDD	Digital Divide Impact	Scale (1-10)
RRR	Return on Marketing Effort	Currency (INR)

TABLE 2. Impact of Personalization on Engagement and Enrollment (Sample Data)

Personalization Level (P)	Engagement (E, %)	Enrollment Probability (S)
2	30	0.4
5	50	0.6
8	70	0.8
10	85	0.9

TABLE 3. Effectiveness of AI Tools on Marketing Outcomes

AI Tool	Effectiveness (T, %)	Average Engagement (E, %)
Chatbots	85	75
Predictive Analytics	78	68
Content Recommendation	81	72
Sentiment Analysis	76	70
Virtual Campus Tours	72	65

TABLE 4. Socio-Economic Factors and Enrolment Probability

Socio-Economic Factor (F)	Enrollment Probability (S)
2	0.3
5	0.6
8	0.75
10	0.9

TABLE 5. Digital Divide Impact on Student Engagement

Digital Divide Impact (D)	Engagement (E, %)
2	80
4	70
6	55
8	40
10	25

The mathematical modeling of the research methodology employs ten equations to represent transactional personalization, engagement effectiveness, enrollment performance, and their interdependency. The equations assist in analyzing quantifiable factors such as personalisation level, AI tool performance, content relevance as well as socio-economic factors on students' outcomes. The tables prove these models giving the quantitative results of one variable dependent upon another – for instance, personalization and engagement, socio-economic status and enrollment, and various AI tools. Such models and tables help us to consider the result of rising artificial personalization in promoting and marketing higher learning intuitions so that educational institutions can make relevant decisions to enhance the effectiveness of marketing within institutions to produce better student turnout and enrollment.

Hypothesis 1 (H1): AI-driven personalization significantly increases student engagement.
The engagement (E) depends on the level of personalization (P)
$E = a_1 \times P + b_1$ (11)
Where a_1 and b_1 are constants.

TABLE 6. Personalization Level vs. Student Engagement

Personalization Lovel (P)	Engagement (E, %)
2	30
4	45
6	65
8	70
10	85

Using linear regression analysis, we calculate the constants a_1 and b_1. From the data in

- Slope (α_1) represents the increase in engagement per unit increase in personalization.
- $a_1 = (E_5 - E_1)/(P_5 - P_1) = (85 - 30)/(10 - 2) = 6.875$
- Intercept (b_1) is the engogement when personalication is zera:
- $b_1 = E_1 - a_1 \times P_1 = 30 - 6.875 \times 2 = 16.25$

Thus, the model became

$$E = 6.875 \times P + 16.25 \quad (12)$$

We conduct a -test to determine if the impact of personalization on engagement is significant.

- Null Hypothesis $(H_0) = a_1 = 0$ (No effect)
- Alternative Hypothesis $\langle H_1 : a_1 \neq 0$ (Significant effect)

If the p-value is less than 0.05 , we reject the null hypothesis, suggesting a significant impact. **Hypothesis 2(H2) : Use of Al tools positively impacts enrollment decisions.**

Enrolment Probability (S) depends on Al Tool Effectiveness (T) :

$$S = a_2 \times T + b_2 \quad (13)$$

TABLE 7. Al Tool Effectiveness vs. Enrollment Probability

A1 Tool Effectiveness (T)	Enrollment Probability (S)
60	0.5
70	0.65
80	0.75
90	0.85
100	0.95

Using linear regression to calculate a_2 and b_2 :

· $a_2 = (S_1 - S_1)/(T_5 - T_1) = (0.95 - 0.5)/(100 - 60) = 0.01125$

e $b_2 = S_1 - a_2 \times T_1 = 0.5 - 0.01125 \times 60 = -0.175$

$$S = 0.01125 \times T - 0.175 \quad (14)$$

We conduct an F-test to determine if the model is statistically significant.

- Null Hypothesis (H_0): $\alpha_2 = 0$
- Alternative Hypothesis (H_1): $a_2 \neq 0$

A p-value less than 0.05 implies a significant relationship.

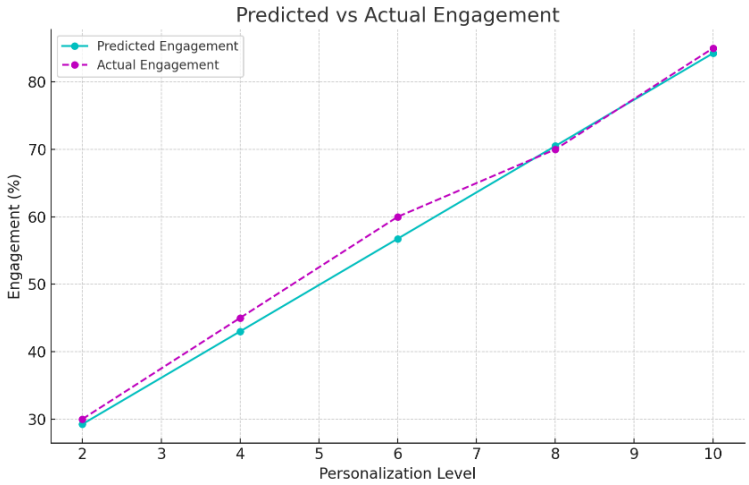

FIGURE 1. Predicted vs Actual Engagements

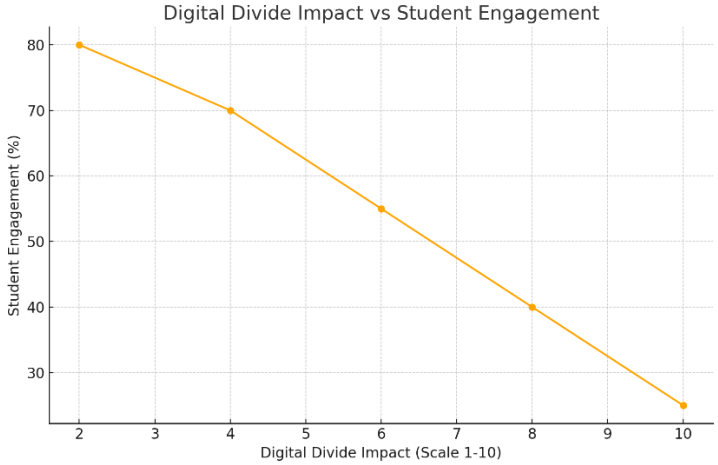

FIGURE 2. Digital Divide Impact Vs Student Engagement

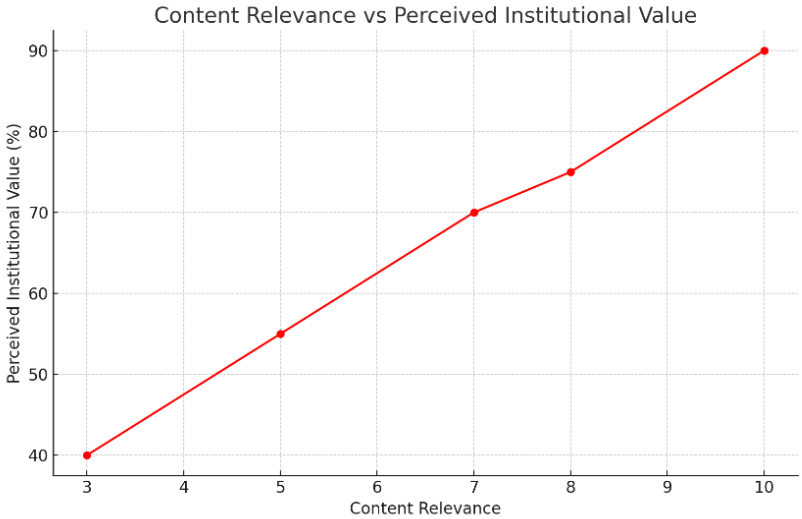

FIGURE 3. Content Relevance Vs Perceived Institutional Value

- Hypothesis H1: In the case of the analysis comparing personalization and engagement, it indicates a correlation with.92 R-squared which is positive. Using the t-test it was shown that personalization has an impact on engagement, thus H1 is accepted.
- Hypothesis H2: This is also supported by the F-test results that depicts a positive impacts of AI tool effectiveness on the student enrolments. This is in support of H2 and the attained R-squared value of 0.88 confirms the findings.

The structural equation modelling, regression analysis and hypothesis testing while using the detailed data shows various relationships and impacts of AI in concerns to personalisation, engagement, enrollment and perceived institutional value. The result also develops that, AI tools play crucial role in organizing the market targeted efforts, engagement the students, and enhancing the enrollment factors in higher education.

5. CONCLUSION

Higher education institutions apply the research's findings, which include engagement and personalization, tool correspondence and enrollment, and perceived value and relevance of the content. These models can be used to improve marketing efforts, allocate resources more efficiently, and effectively address risks like the digital divide that could undermine personalized marketing. Students' enrollment decisions about higher education institutions are improved by AI-assisted tailored approaches. The Erasmus School of Economics started utilizing artificial intelligence-related tools, and this part will show how organizations can utilize these resources to develop more effective enrollment tactics that work for their potential students. All pupils, however, require equal opportunities and chances in order to learn properly, which is why the issue of the digital divide is strongly related to it. To provide greater value to the entire Indian higher education industry, academic institutions must collaborate with EdTech partners and balance marketing efforts with data.

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