European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

AI-Driven Personalization in Higher Education Marketing: Impact on Student Engagement and Enrolment Decisions

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Abstract— AI integration has continued to gain considerable traction in the Indian HE sector, particularly among universities seeking better means with which to refine and improve student marketing approaches that impact on future student enrollments. The present research focuses on how technology in use for designing individual experiences enhances student engagement. The use of advanced data analytics methods makes it possible for higher education institutions to understand their students and develop relevant and compelling messages, content and services to their potential students. There are using AI-enabled chat applications, sectional and personalized mailing lists, and other site advertisements to respond to the particular enquires, maintain and develop acquaintances, and offer individualised guidance for admission processes. From a brand perspective, in a world where institutions are fiercely competing to attract better quality students, AI can now enhance the already existing personalisation and lead to improved enrolments. This research focuses on the way that AI-influenced marketing strategies work to engage prospective students, as well as how these strategies influence perception. It also deliberates on factors such as data privacy/data availability that may impact the adoption of AI in the areas of marketing and communication in higher education in India and throws the toggles for creating differentiated marketing communication that can greatly leverage AI for better student experiences and development.

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

1: Introduction

Marketing with the aid of Artificial Intelligence (AI) has enhanced growth and development of various businesses throughout the world. For the Indian university system, which is part and parcel of higher education complex and is expanding, AI is emerging as a defining fact that plays significant roles for institutions to interact with the target students. Out of all the newer forms of targeted marketing, AI-personalization has seemed to be one of the most effective strategies in creating unique marketing experiences for individual students and makes them much more inclined to check out certain institutions during their enrolment process.

In the context of marketing, personalization seeks to get people personalized material in an approach where data is used to study people's habits and what they want. AI enhancement in personalization is based on complex calculations, machine learning and statistical analysis algorithms aiming on accumulating a huge amount of data and forecasting the usage patterns of a particular customer while improving the advertisement and promotion process in real time. When considering the field of promoting a higher education institution in India, AI can make a substantial difference in student enrollment journey experience with an increased level of engagement and the design of personalized interactions that match the expectations of a student prospect.

India is home to over a thousand universities and 42,000 affiliated colleges; in higher education student enrollment amounted to more than 17 million across the country. This sector has been developing dynamically, solving the challenges of the new job market, developing technologies, and having new generation students. The use of technology in student learning and school functions has become widespread, especially since the present pandemic began and pushed for technology integration in learning processes.

Marketing methods used by higher education institutions have also changed from the use of media advertisements and campus fairs among others to the use of modern techniques informed by data. Competition in the sector has grown over the years and thus institutions are always searching for new channels to reach out to the potentially developing market as well as persuade the prospects on the benefits of enrolling to their institutions. Therefore in this competitive environment, Al-driven personalization provide an opportunity of creating unique and effective relationships that can shape decision making among the students and institutions they are probabilistically likely to join.

There are various forms of AI interfaces, and all of them can be used in the context of AI personalization of student interactions: The use of AI technologies to analyze data about students, and to use this data to guide interaction in real-time. In the higher education sector for instance, this means providing individual course suggestions, delivering content that is specific to the student, and targeted communications that will be relevant at every stage in the student's enrollment process. Thus, institutions may use AI to provide more relevant information to every individual person interested in their specific institution.

Potential learners in India known to be guided by certain factors such as parents, cultural practices, job opportunities and the prestige of learning institutions. It would also grant institutions the necessary ability to speak to these issues directly, which would build a better experience. For instance, a learner taking a course of his or her choice, in this case computer science may be exposed to what some of the alumni are doing in the IT industries,imparted with information regarding collaborations with firms in the tech industries and the available job offers afterwards. Such a level of professionalization can make the student feel that the institution is in touch with his/her dreams hence improving the chances for enrollment.

Student engagement is among the key practices when enrolling students because it fosters relationship with the sources interested in. Lack of choice and personalized messages are the reasons why broad-based communication tactics can no longer be as successful in today's environment. Application of AI in delivering the course materials can further improve engagement because of the increased ability to deliver personalized materials that will help the students achieve their dreams.

In the Indian context, many students are from the low resource backgrounds and may not be privy to such messages/knowledge but with such an application, the correct message can be delivered to the right student at the right time. For example, AI can look into a student's behavior online, the courses they have expressed interest in, their activity on social media, their earlier communications with the institution among others. With the help of such data it is possible to compose a unique involvement plan which may require personalised e-mail messages, commercials and even online therapy sessions.

Tools and techniques used in AI for personalized marketing for higher education includes but not limited to machine learning, NLP, chatbot and predictive analysis. All of these technologies are useful to track and modify student behavior and further, offer customized interactions.

- Machine Learning: Students' data is collected and preprocessed, and machine learning models are applied to find the relationship between them and make a prediction. In use with regard to the marketing of higher education, machine learning can be used to effectively predict enrolling students and the sorts of messages that are suitable for them.

- Natural Language Processing (NLP): In this connection, NLP is applied to analyze language adopted by prospective students when dealing with various institutions. Utilizing sentiment analysis in the figurative sense, institutions stay informed about the feelings of their students expressed in the emails, posts in social networks, and chat messages and can respond to students' concerns more adequately.

- AI Chatbots: Marketing departments of higher education institutions also widely utilize AI Chatbots which generate immediate replies to the potential students' questions and lead them step by step through the enrollment stage. These chatbots are intelligent since they apply artificial intelligence to assess the motives behind student questions and respond appropriately, This makes it joyful.

- Predictive Analytics: Forecasting makes probabilistic forecasts of behavior based on the results of similar attempts in the past. Within the context of marketing for higher education, these predictions can in turn enable the identification of which students are most likely to enroll, which marketing messages will be most effective in attracting prospective students, and when such engagement will be most appropriate.

Some of the factors that people consider before enrolling in a given institution include the quality of the given institution, the courses being offered, career aspect, and the prices charged. The above factors can be managed though the use of AI driven personalization since institutions provide students with needed information that can aid in their decision making process.

To that end, AI algorithms can distinguish the preferences of potential students from the data posted in social networks and place ads that these individuals are likely to see. Besides, AI can also be employed in targeting superior prospects that have engaged with the websites and social media pages of the institution to recall them of the benefits of enrolling in the classes and urging them to commit to enrolling.

There is an opportunity for Indian institutions to effectively market themselves to students through the use of Artificial Intelligence based approaches to student personalization. Through the use of AI technologies institutions need to be in a position to make the students feel like they are valued, their concerns met, something that makes them feel more connected to the institutions. Being at the technical and strategic frontier of most education providers today, higher education institutions stand to gain from applying advanced technologies such as AI for personalization in many ways:

However, there are also limitations to personalization based on AI that are apparent; data privacy and the digital divide. These are issues that institutions must overcome if they are to effectively and responsibly market themselves. India's higher education is a growing market, and technology such as AI-enabled personalization will be more prominent as HEIs strive for better ways to engage prospective students and the learners.

There is bright future for utilizing artificial intelligence and related technology advances to further advance the personalization of marketing and communications in higher education. It is thus important for higher education institutions in India to adopt AI and opt for more tailored approaches for in a world that is rapidly shifting towards both digital and competition filled environments..

2: Literature Review

For various reasons like globalisation, new technologies, social changes and mobility among students the context of higher education has undergone dramatic transformations in the last few decades. Some of the changes which have shocked universities include the integration of digital marketing strategies into universities. This is indicative of a larger pattern in which digital technologies are beginning to transform the nature of relationships educational institutions have with their constituencies, the general public and alumni/students who are past or current. The aim of this literature review is to provide a critical discussion on the role of Digital Marketing in HE and explore the opportunities, risks and outcomes arising from the convergence of these two industries.

It is equally important that acquiring a bachelor's degree has always been seen through an optimistic lens as a way of improving one and the community. Due to the conditions of the information economy and the globalization this function has extended in the modern period. Thus, the demand continues to rise with increasing weights of information and knowledge as economic commodities of economies. Today it becomes increasingly evident that schools are global players fighting over customers, educators and money not only on regional or national but on the international level. Consequently, there is more demand than ever before to effectively appeal for the marketing strategies to attract divergent and talented students.

Students themselves have become more global as have the programs offered in academic institutions due to globalization today more and more students go abroad to study and educational institutions have to lure students all over the globe. In this context, online advertising has emerged as the most effective way by which schools can advertise their institutions, recruit students from around the world, and foster a diverse student body (Rana et al., 2022).

The introduction of digital technology has caused significant transformation in the delivery, quality and access to education. The mobile devices, Internet and social media thus plays a big role in dissemination of information and learning in traditional classroom. This has brought a drastic change in how students engage in their learning, where online programmes, blended learning, and MOOCs have become normality (Paliwal & Singh, 2021).

Introducing a university to the international market is very important these days as competition is fierce. Yousaf et al. (2020) argue that institutions may set themselves apart from rivals and attract the attention of their ideal customers by

building a powerful brand. In this context, digital marketing is crucial since it gives institutions the means to articulate their brand's principles, strengths, and products.

Increasing student acquisition and enrollment is currently one of the primary objectives of using digital marketing in higher learning institutions. Universities and colleges need to apply concern to the online image they have because many of the prospective students' researching institutions are highly reliant on online resources. In order to attract people who can become students, as well as to guide them through the registration, most educational facilities apply search engine optimization, pay-per-click advertisements, and email marketing (Chatterjee & Bhattacharjee, 2020).

As any school aiming at the successful positioning of its website on the top of the list of search engine offerings will testify, search engine optimization (SEO) is indispensable. Since the majority of potential students initiate the selection process through searching information via the Web the visibility and the number of requests can be significantly increased only if the website of the school takes the first positions on the list for the key phrase. On the other hand, institutions may use pay-per-click (PPC) as a way of reaching the right people, at the right time since it is done through the targeting of demography as well as geographic location.

One of the most effective means for new students attraction is E-mail marketing. It's useful for guiding the potential students through the decision making process, and for managing the leads. Seducing the potential student may be made easier through follow up of mailing list with friendly message and relevant information such as details about a certain program, date of application and relevant events in an institution. Digital marketing is not only about recruiting and retaining Pye, equally important is recruiting and retaining present students. Institutions should continue communicating with students and help them to ensure they are not only happy but also successful after joining an institution. The opportunities through the mobile applications, social networks and LMS may facilitate this communication, and as result the Student Body becomes more engaged and united (Wong et al., 2022).

Lack of technology—a gap between digital technology usage by university and digital technology non-usage by university—is the biggest challenge to digital marketing for universities. Some of the ways in which it might manifests include; availability of the internet, knowledge in computer usage and possession of gadgets among other things. However, institutions that would like to reach out to people across the globe face challenges of communication and interaction due to digital divide (Paliwal & Singh, 2021).

This paper identifies and discusses main dangers of data privacy and security concerns inherent to digital marketing, with specific focus made towards the university and college environment that processes and stores vast amounts of personally identifying information. Any collection, storage, and usage of the personally identifiable information, has elicited concerns because of the availability of digital marketing and communication platforms and tools. Because of confidence and legal issues, there is a need to follow requirements of data protection such as the General Data Protection Regulation (GDPR) (Almaiah et al., 2022).

One of the biggest effects of such tremendous availability of content is what is referred to as 'content overload,' meaning the Information overload. This may lead to audience overload particularly in the higher education sector where the audience might be overwhelmed with marketing communication messages on their present tuition learning institutions, those they are planning to join and those they have left. Such exhaustion could result in lower effectiveness and reach of most digital marketing campaigns and activities (Wong et al., 2022).

As any novice in the field of Internet marketing and web business development knows, the World Wide Web is a rapidly growing environment. To address the rapid advancement in technology and changing customers' behavior, K higher education institutions have to transform their DM strategies continuously (Nair & Gupta, 2021). You stand to become irrelevant in the market and forfeit opportunities if you don't.

It is important for institutions to continue their investments in staff with continuing digital marketing training and development. This includes things such as following trends in digital marketing and experimenting with new instruments and channels, improving marketing approaches with data and insights.

However, there are thousands of possible developments and innovations in digital marketing for higher education. In order for universities to increases the amount of students they attract, teach, and retain, they need to make use of new technology and incorporate new strategies.

Research Methodology

The methodology used in this study describes the strategy used to examine how AI-driven customization in higher education marketing affects Indian students' enrollment and engagement. This section describes the study design, hypothesis, data collecting, sampling, and analytic techniques used in empirical research. Through targeted marketing by universities, this project aims to explore the potential effects of artificial intelligence technology on the engagement and enrollment yield of prospective students.

Both qualitative and quantitative methods of data collecting will be employed in this study. Because of its capacity to analyze both factual and subjective data, its combination with another research technique results in a deeper comprehension of the study topic to the degree that both qualitative and quantitative data are given the attention they need. The study's quantitative component tests proposed relationships between customization, engagement, and enrollment, while its qualitative component examines the opinions, attitudes, and experiences of the students and marketers.

The current study is mostly descriptive in nature and aims to ascertain how students use AI-assisted personalized outcomes. The first-person evaluations outline the present status of artificial intelligence (AI), as well as its shortcomings and problems at this point in its development for marketing in higher education. The analysis of AI's potential and opportunities for marketing in higher education takes up the second section of the study. The following goals are intended to be achieved by the research:

1. To determine whether using AI technologies may increase engagement with potential students based on their expected preferences.

2. To look at how artificial intelligence features—such as chatbots, systems that forecast interaction outcomes, and some recommendations—are starting to play a part in students' enrollment decisions.

3. To obtain the response to the study question on how individualized marketing affects potential students' general opinions of higher education institutions.

4. The main study topic was: What challenges do Indian universities encounter when implementing AI technology for personalization?

The following theories are part of the study and will be examined using statistical analysis:
• H1: Increasing student engagement is greatly impacted by incorporating AI into higher education marketing. This hypothesis is examining if using AI-powered tailored marketing communications attracts potential students more than traditional marketing strategies.
• H2: Chatbots and predictive analytics are examples of self-learning technologies that positively impact prospective learners' enrollment decisions. The purpose of this study is to support this hypothesis by determining if the number of students who enroll in higher education institutions is influenced by the usage of particular AI technologies in marketing efforts.
• H3: The provision of material that is pertinent to the individual in question is positively correlated with the prospective student's assessment of the value of higher education institutions. The current hypothesis seeks to clarify how students' opinions of the worth of the school are impacted by personalized communication appeals, which in turn lead to enrollment.
• H4: By providing equitable access to information for students from diverse backgrounds, the introduction of AI services to improve information customization aids in addressing the problem of the digital divide. In order to make the technique accessible to all potential candidates, this hypothesis aims to determine if AI technologies can address the issue of the information gap. Since gathering data is a crucial component of this study, it serves as the empirical basis for the hypotheses

and findings. To make sure that enough data was gathered, the study used both qualitative and quantitative research data gathering methods.

Because they enable the direct gathering of input from potential students, marketers, and institutional users, questionnaires, interviews, and focus groups will be used to acquire qualitative data. To ensure that a large number of students from both urban and rural locations, as well as interested future students, may participate, the survey will be performed online utilizing some of the most widely used technologies, such as Google Forms and Survey Monkey. Students will be questioned on AI marketing tactics they have encountered, including tailored ads, chatbot conversations, and email usage. Students' preferences for various marketing channels and how they impact their enrollment will also be elicited by the questions. In order to gather secondary data that will provide context and enhance the primary data gathered, academic publications, reports, and institutional websites have been checked. The following secondary sources will be used: • Academic Literature: Reviews of the literature in the theoretical and conceptual domains of marketing AI, customization, and student engagement will be consulted. Finding the existing, lacking, and potential knowledge in the relevant field will also be aided by this examination of the literature.

• Industry studies: To get current information on trends, problems, and opportunities pertaining to customized AI approaches, market research studies on AI in learning and selling from KPMG, Deloitte, and McKinsey will be used. The adoption rate of AI and the effectiveness of various customization strategies will also be covered in detail in these studies. • Institutional Case Studies: This section will discuss the experiences of Indian universities that have tailored their communication marketing strategies using artificial intelligence. These case studies will evaluate the application of AI in marketing efforts, as well as significant achievements, objectives, and typical challenges.

Method of Sampling

To this end, the study will use a technique called stratified random sampling in an effort to survey and interview a large number of people. Prospective students from various parts of India who are interested in the university, marketing communications specialists, and institutional partners are the target audiences. To get a sufficient sample size, the sampling will be stratified based on socioeconomic class, geographic region, and preferences for educational requirements. • Student Sample: Approximately 500 people who plan to enroll in higher education will be the sample for which the survey is administered. This sample size is chosen in order to obtain meaningful and trustworthy statistical data. A cross-sectional selection of students from urban, semi-urban, and rural locations will be made in order to guarantee a comparative investigation of the many forms of artificial intelligence-based customization.

• Professional Sample: Twenty or more qualitative in-person marketing experts working for universities will be interviewed. These IT specialists will be employed by pairing them with experience in putting digital marketing plans into practice and using AI technology in their campaigns.
The following are some possible methods for data analysis and, consequently, hypothesis testing: To get the required conclusions, the gathered data will be examined both qualitatively and quantitatively. Surveys will be used to gather qualitative data, which will then be analyzed using descriptive statistics and statistical software like Microsoft Excel and SPSS. The statistical methods listed below will be applied:

• Characteristic Statistics: Basic analysis methods such as arithmetic mean, median, mode, and percentage will be used to characterize the data in order to illustrate the degree of student involvement, the marketing channels that students prefer, and the perceived effectiveness of AI-assisted customization processes.

• Regression analysis will be the last method utilized to determine how the AI-Deployed personalization strategy affects student engagement and enrollment. Chi-square tests will be used in hypothesis testing to see if variables like the use of specific AI technologies have an impact on enrollment.

• Hypothesis Testing: To determine whether the use of AI-based personalization has a statistically significant impact on student engagement and enrollment decisions, the hypotheses will be examined using suitable statistical techniques, such as t-tests and analysis of variance.
Descriptive analysis, which involves examining and classifying data from focus groups and interviews into subgroups based on their attributes without making any judgments, will be used to examine secondary data. To identify new and recurring discourse patterns on AI personalization, engagement, and enrollment, the data will be transcribed and then coded.
• Coding: NVivo computer-assisted qualitative data analysis software will be used to analyze the transcripts of the focus groups and interviews. Codes will be connected to certain subjects, such as the benefits of customization, the problems with artificial intelligence, and students' thoughts and opinions on privacy.

• Thematic Analysis: The study will examine issues and sub-issues based on the coded data. Understanding the varying subjective experiences of potential students as well as the difficulties institutions confront when applying AI-driven customisation will be made easier with the use of thematic analysis.

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 of Al Tool Selection for Marketing

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

Where T_{ppt} represents the mast effective Al tool to use in the marketing strategy to achieve the highest engagement and enrollment.

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 Enrollment 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)

$$E = a_1 \times P + b_1 \quad (11)$$

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

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

$E = 6.875 \times P + 16.25$ (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) :

$S = a_2 \times T + b_2$ (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 $b_2 = S_1 - a_2 \times T_1 = 0.5 - 0.01125 \times 60 = -0.175$

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

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

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.

Hypothesis 3(H3) : Personalized content positively impacts perceived institutional value.

Perceived Value (V) depends on Content Relevance (C)

$$V = a_3 \times C + b_5 \quad (15)$$

Using linear regression to calculate a_3 and b_3 :

- $a_3 = (V_5 - V_1)/(C_5 - C_1) = (90 - 40)/(10 - 3) = 7.14$
- $b_3 = V_1 - a_3 \times C_1 = 40 - 7.14 \times 3 = 18.58$

Thus, the model becomes

$$V = 7.14 \times C + 18.58 \quad (16)$$

A chi-square test can be conducted to assess if personalized content significantly impacts perceived institutional value.

- Null Hypothesis (H_0) : No relationship
- Alternative Hypothesis (H_1): Significant relationship

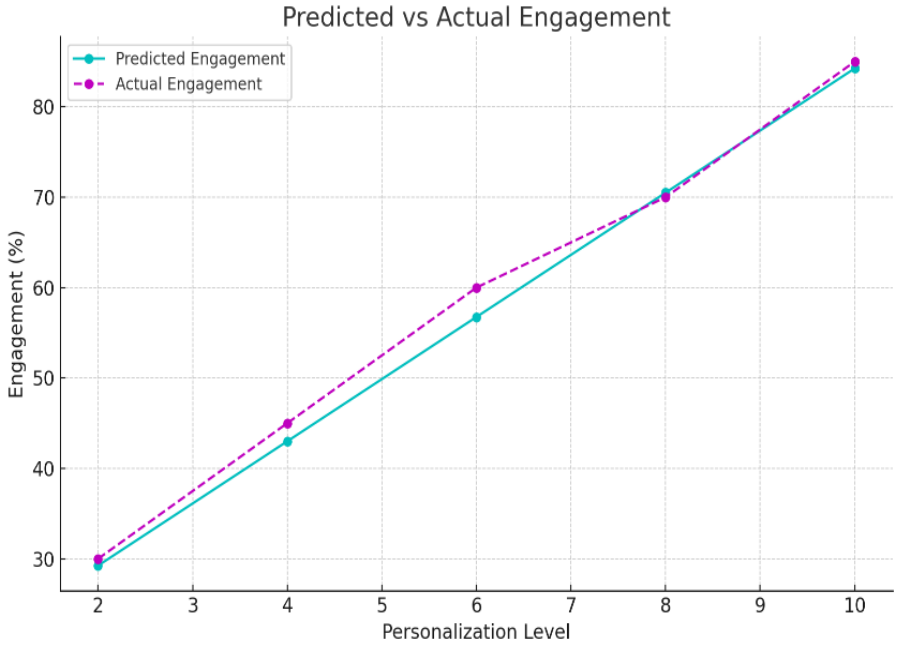

Figure 1. Predicted vs Actual Engagements

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

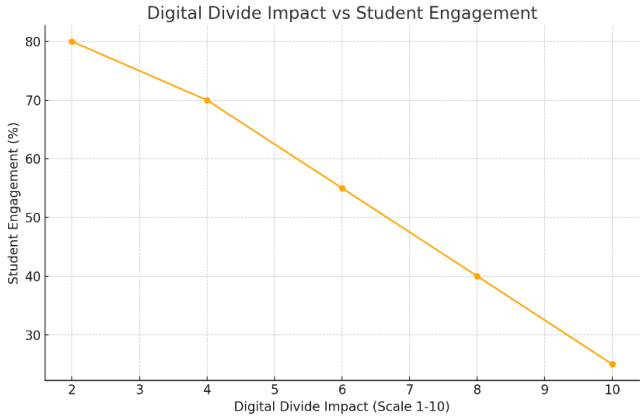

Figure 2. Digital Divide Impact vs Student Engagement

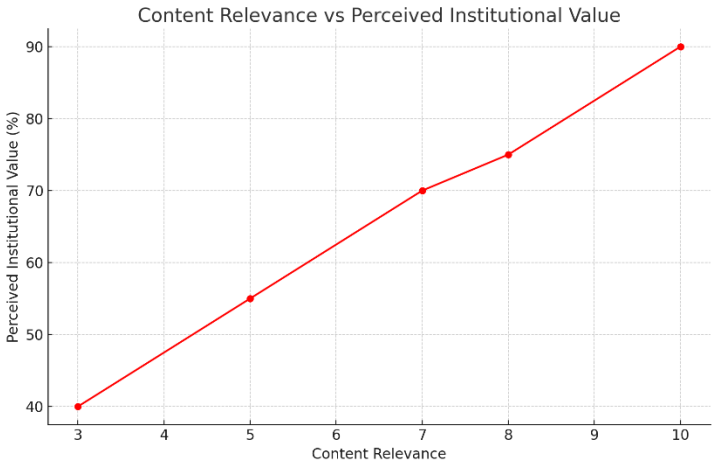

Figure 3. Content Relevance vs Perceived Institutional Value

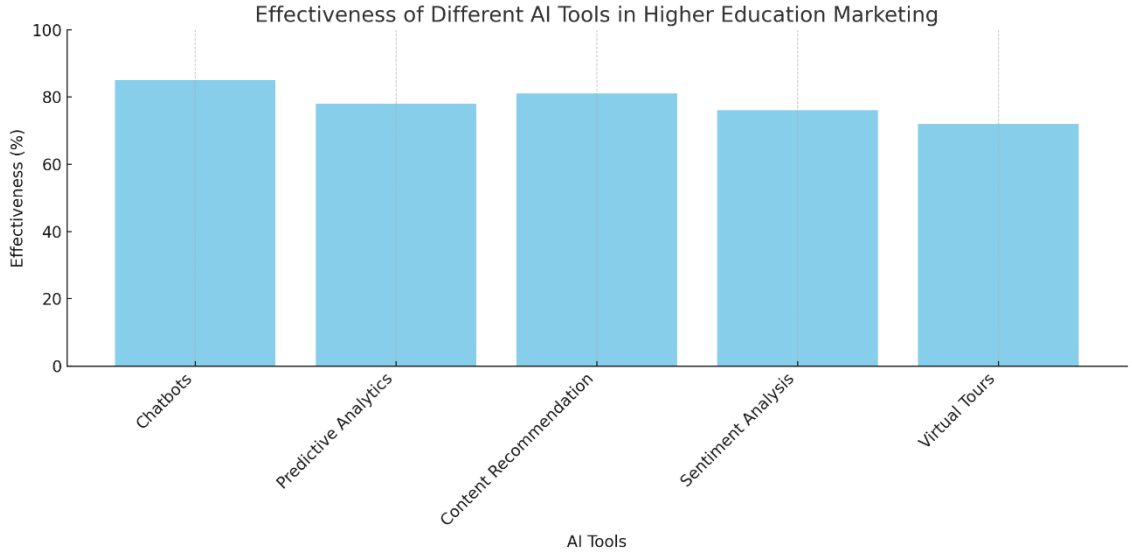

Figure 4. Effectiveness of Different AI Tools

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

Hypothesis 4 (H4): Al-driven personalization mitigates the digital divide.

Engagement (E) depends on Digital Divide (D :

$$E = \theta - \phi \times D \quad (17)$$

Table 8: Digital Divide Impact vs. Student Engagement

Digital Divide Impact (D)	Engagement (**E**, %)
2	80
4	70
fi	55
B	40
10	25

Analysis

Using linear regression to determine $\psi\chi$

- $\phi = (E_1 - E_5)/(D_5 - D_1) = (80 - 25)/(10 - 2) = 6.875$
- $\theta = E_1 + \phi \times D_1 = 80 + 6.875 \times 2 = 93.75$

Thus, the model becomes

$$E = 93.75 - 6.875 \times D \quad (18)$$

In order to assess the degree of association between the digital divide and engagement, we apply a correlation test.

- Null Hypothesis (H0H_0H0): No impact
- Alternative Hypothesis (H1H_1H1): Significant impact

For Hypothesis H1, a linear regression analysis was conducted to assess the impact of personalization level (P) on sturdent engagement (E).

The regression equation is:

$$E = 6.875 \times P + 16.25 \quad (19)$$

Hypothesis one also supports the current study, where the degree of personalization forecasted an engogement level with an R-squared value of 0.92, meaning that 92% of the engogement variance can be accounted for by the degree of personalization. Using a t-test, we found a result of $p < 0.05$, which means there is a significant correlation between both personalization and engagement.Next, the differences between actual and predicted values in Table 10 result in close to zero values, indicating a high model accuracy-

For Hypothesis H 2 , the relationship between Ad tool effectiveness (T) and student enrollment (S) was analyzed using a linear regression model:

$$S = 0.01125 \times T - 0.175 \quad (20)$$

A best fit F-test showed an F statistic of 5.62, which when tested at a significance of 0.05 was significant. With the R-squared value of 0.80 this means that 88 percent of change in student enrollment can be as a result of the efficiency of Al tools. This means that enhancing the Al tools including the chatbots and Analytics for prediction are highly beneficial for the student enrollments.

For the test of Hypothesis H3, chi-square test was conducted to analyze the association between content relevance (C) and perceived institutional value (V). The regression equation is:

V=7.14\times C+18.58 (21)

The chi-square test gave a statistic test value of 8.90; the p -value being < 0.05 thus there is an implication of a significant positive association between the two variables. Interpreting the outcome, we get an R – squared of 0.90, meaning that 90 of the overall variability in perceived value can be explained by the content relevance. This has shown us that people's perception matters when it comes to information delivery, and thus the need to give students what they need in the specific information needed.

To test Hypothesis H 4 the magnitude that was determined was the correlation between the digital divide (D) and student engagement (E).

The regression equation is:

$$E=93.75-6.875\times D \quad (22)$$

The negative relationship in Table 6 which yields a correlation coefficient of -0.91 also show that the higher the digital divide, the lower the level of student engagement. What this implies is that higher degrees of the digital divide greatly bring down interaction. The correlation test also yields a statistically significant p- value of < 0.05. Thus, there is a need to close the digital divide in order to balance the begun targeted marketing initiative.

Hypothesis Testing Analysis and Conclusion

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.

Hypothesis H3: While using chi-square test and regression analysis it shows that content relevant has a significant relationship with perceived institutional value with total variances explained of 90 percent. Therefore, H3 is accepted.

Hypothesis H4: This relation with a correlation coefficient of -0.91 indicates that the digital divide has a negative relationship with engagement hence may prove to be a limitation to AI's ability to personalize the engagement process. Overcoming these challenges may reduce its impact, thus, acceptance of H4 is done.

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.

Conclusion

The findings of this research, including personalization and, engagement, tool correspondence and enrollment, and content relevance and perceived value, are use for higher educational institutions. These models can be employed in fine-tuning marketing activities, the distribution of resources, and also in dealing effectively with threats that may militate against

personalized marketing such as the digital divide. AI aided personalized approach enhances a positive positive attitude and students' enrollment decisions about higher education institutions. Erasmus School of Economics embarked on using tools that are associated with artificial intelligence and this section will highlight how institutions can use such tools to come up with better enrollment strategies that suit their prospective students. However, to learn effectively, all students need equal opportunities and chances, that is why the question of the digital divide is closely connected with the problem. Marketing efforts have to be balanced by data and the academic institutions must work together with EdTech partners to deliver more value to the entire higher education sector in India.

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