



An Integrated Model of Academic Public Relations through Artificial Intelligence and Virtual Technologies

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Abstract

The rapid digital transformation of higher education has fundamentally reshaped institutional communication, stakeholder engagement, and reputation management. Universities increasingly operate within complex media ecosystems characterized by information overload, platform competition, and rising expectations for transparency and personalization. In this environment, traditional academic public relations models based on linear information dissemination prove insufficient for sustaining public trust and institutional visibility.

This study proposes an integrated model of academic public relations that combines artificial intelligence, immersive digital technologies, and data-driven communication strategies. The main objective of the research is to examine how AI-supported communication systems and virtual environments can enhance institutional reputation, stakeholder engagement, and long-term sustainability in higher education.

The research employs a mixed-method methodological framework. A standardized quantitative survey was conducted among 750 respondents, including students, academic staff, and administrative employees from four Bulgarian universities. Empirical data were analyzed using descriptive statistics, correlation analysis, and regression modeling in order to identify relationships between communication formats, demographic variables, digital behavior, and levels of institutional trust. In parallel, predictive machine learning models were applied to assess audience engagement patterns. The analytical approach is grounded in contemporary theories of reputation management and strategic communication (Larisu, Z., & Zulham, Z., 2024).

The conceptual framework is further expanded through the integration of immersive communication environments, including virtual and augmented reality applications, photogrammetry-based 3D reconstructions of academic spaces, and AI-generated communication content. These technologies enable experience-based institutional interaction, moving academic communication beyond informational messaging toward participatory and personalized engagement. The findings reveal statistically significant positive correlations between immersive digital content and stakeholder engagement, particularly among younger demographic groups. Respondents demonstrated high acceptance of AI-supported communication formats and virtual academic events.

The results confirm that reputation formation in higher education is increasingly influenced by technological mediation, communication consistency, and perceived institutional openness. These conclusions correspond with contemporary perspectives on digital transformation in education, emphasizing the strategic role of technology in reshaping institutional identity (Fernández-Gubieda & Gutiérrez-García, 2025).

The study concludes that academic public relations should be conceptualized as a strategic institutional system rather than a supportive administrative function. By integrating artificial intelligence, immersive technologies, and data analytics within communication planning, universities can strengthen public trust, improve engagement metrics, and enhance their competitive positioning in the global higher education landscape.

Keywords: *academic public relations; artificial intelligence; virtual reality; higher education communication; digital transformation; reputation management*

1. Introduction

Digital transformation and the communication environment

The expansion of digital technologies over the past decade has profoundly altered the way universities interact with their stakeholders. Digital transformation is not reduced to the addition of new devices to



existing processes; it represents “deep and coordinated cultural, workforce and technological changes that modify educational and operational models and transform the institution’s strategic direction and value proposition”. Such transformation requires the integration of digital technologies into all activities and awareness that the process is dynamic and oriented toward the co-evolution of technological and educational ecosystems. In this context, higher education operates within complex media ecosystems characterized by information overload, intensified platform competition and rising public expectations for transparency. Traditional linear models of academic public relations, oriented predominantly toward one-way dissemination of information, are no longer sufficient to sustain institutional visibility and public trust [1-5].

Artificial intelligence, ethics and reputation management

The integration of artificial intelligence (AI) into public relations offers the potential for more efficient segmentation, personalization and data analysis, yet it simultaneously raises acute ethical questions. A 2025 study grounded in the “Excellence theory” emphasizes that the principles of honesty, transparency and fairness remain the foundation of effective communication. Use of AI without ethical standards can lead to disinformation, discriminatory algorithms or loss of personal data. An analysis of the relationship between AI, digital ethics and public relations practices demonstrates that ethical norms mediate the impact of AI and encourage the creation of trust. This approach extends the classical “Excellence theory,” which promotes two-way symmetrical communication and mutual understanding between organizations and their publics[2].

Immersive technologies and engagement

Beyond AI, rapid advances in immersive technologies – virtual reality (VR), augmented reality (AR) and the metaverse—are creating new opportunities for audience engagement. Research on the adoption of educational metaverses shows that virtual presence, the quality of interaction and the compatibility of tools with educational objectives significantly enhance participants’ motivation and engagement. High-quality interactions in the metaverse, supported by VR/AR, improve collaborative learning and create a feeling of real presence that is essential for effective communications. These technologies offer prospects for developing three-dimensional virtual campuses, interactive presentations and personalized content that can strengthen reputation and attract younger audiences to the university brand[3, 10-12].

Objectives of the study

The presented article seeks to develop an integrated model of academic public relations that combines the capabilities of artificial intelligence, immersive technologies and data management. Through a mixed methodological design-quantitative survey among 750 students, faculty and employees at four Bulgarian universities, correlation and regression analysis and machine learning-the study aims to determine how technological mediation influences trust, engagement and reputation. The strategic contribution of this work lies in positioning public communications not as a secondary administrative function but as an integrated system on which a university’s competitiveness depends. The research proposes a practical framework for employing AI-supported communications, virtual and 3D environments and analytical tools to strengthen mutual trust and transparency in the digital era [6-8].

2. Methodology

Research Design

This study adopts a mixed-method research design that combines quantitative survey methods with predictive analytics to investigate how artificial intelligence (AI) and immersive technologies influence public relations in higher education. The mixed-method paradigm was chosen because it integrates rigorous quantitative techniques with complementary data analytics, thereby drawing on the strengths of each approach to provide a comprehensive understanding of institutional communication. Mixed-method research goes beyond simply collecting qualitative and quantitative data; it requires the integration of these data during the design, analysis or interpretation phases to generate richer insights[4, 6, 13-15].



Survey and Sampling

The primary data collection relied on an analytical cross-sectional survey. In cross-sectional designs, data on exposures (here, digital communication practices) and outcomes (perceived trust and institutional reputation) are collected simultaneously from study participants. Such studies provide a snapshot of associations but do not allow causal inferences and involve neither prospective nor retrospective follow-up. Participants were selected based on predefined inclusion criteria-being a student, academic staff member or administrative employee at one of four Bulgarian universities-and were surveyed regardless of their outcome status. A total of 750 valid responses were gathered (425 students, 216 faculty members and 109 administrative staff). The survey instrument included items on demographic characteristics, digital media usage, experiences with virtual and augmented reality, perceptions of AI-generated content, and measures of institutional trust and reputation [15-18].

Measurement and Instrumentation

Questionnaire items were designed based on contemporary frameworks of strategic communication and reputation management to capture the constructs of interest. Digital engagement was operationalized through questions on frequency of interaction with university channels, types of content consumed (textual, audiovisual or immersive), and familiarity with AI-generated messages. Perceived openness and transparency were measured through Likert-scale items assessing respondents' beliefs about institutional communication. To ensure reliability, the survey underwent a pilot test with 30 participants; Cronbach's α for the multi-item scales exceeded 0.80, indicating satisfactory internal consistency. Ethical approval was obtained, and informed consent was recorded from all participants [9-11].

Data Analysis

Descriptive statistics were computed to summarise the demographic composition of the sample and to explore patterns of media consumption. Correlation analyses were performed to examine associations between types of digital content and respondents' levels of trust, and linear regression models were fitted to test whether immersive communication predicted institutional reputation after controlling for demographic variables. Given that cross-sectional data provide measures of association but cannot establish causality, interpretations are limited to correlational relationships.

Beyond classical statistical analyses, the study employed machine-learning algorithms to uncover complex patterns of engagement. Contemporary research notes that algorithms such as support-vector machines and deep learning networks are capable of modelling non-linear relationships across cognitive, behavioural and digital features and can reveal patterns that are not apparent through traditional methods. To build predictive models of stakeholder engagement and trust, the dataset was randomly partitioned into training (80 %) and testing (20 %) subsets. Several algorithms-including gradient-boosted trees, random forests and neural networks-were trained and evaluated using cross-validation. Performance metrics (accuracy, precision, recall and F1-score) guided the selection of the final model. This analytical step responds to the literature's call for integrated predictive models that simultaneously consider engagement and performance outcomes. All analyses were conducted using open-source software (Python scikit-learn and R) [4, 8, 13].

Integration of Results

Following the mixed-method principles, quantitative findings and machine-learning outputs were integrated during interpretation. Statistical results provided evidence for relationships between immersive digital content and institutional trust, while machine-learning models identified which combinations of communication formats and demographic factors best predicted engagement. The synthesis of these results informed the development of the proposed integrated model of academic public relations, demonstrating that data-driven communication strategies supported by AI and virtual technologies can enhance stakeholder involvement and institutional reputation [4, 8, 14, 18].

3. Result and discussion

Descriptive Findings

The survey yielded 750 valid responses, providing a rich dataset on digital communication practices across four Bulgarian universities. Students comprised the largest group (56.7 %), followed by academic staff (28.8 %) and administrative employees (14.5 %). Analysis of media consumption patterns revealed that institutional communication is largely mediated by digital platforms: the majority of respondents reported daily interaction with university websites, social media accounts and mobile applications. Immersive media usage-encompassing virtual reality (VR), augmented reality (AR) and photogrammetry-based 3D environments-was still emerging but showed generational differences.



Roughly two-thirds of student respondents had experimented with VR or AR content in an educational or communicative context, whereas only about one-third of staff and administrators reported similar experiences. Exposure to AI-generated content (e.g., automated announcements, chatbots) was widespread, with most respondents encountering such messages at least occasionally [3, 13, 15].

Sample composition

To contextualize these findings, Table 1 summarizes the composition of the survey sample by stakeholder group. The table indicates both the absolute number of respondents and their proportion in the overall sample [2, 8, 12].

Table 1: Sample Composition by Stakeholder Group

Group	Number (N)	Percentage (%)
Students	425	56.7
Academic staff	216	28.8
Administrative staff	109	14.5

Immersive media usage

Table 2 summarizes key indicators of immersive media adoption across stakeholder groups. It reports the percentage of respondents within each group who had used VR/AR tools in institutional communication and the proportion who reported frequent exposure to AI-generated content (e.g., chatbots or automated announcements). The figures illustrate that immersive media adoption is highest among students and more modest among employees [6].

Table 2: Immersive Media Adoption and AI Exposure Across Stakeholder Groups

Variable	Students (%)	Academic staff (%)	Administrative staff (%)
Used VR/AR in communications	65	35	30
Frequent exposure to AI-generated content	78	68	61

Correlation and Regression Analyses

The quantitative analyses explored the relationships between communication formats (textual, audiovisual and immersive), digital behaviours and measures of trust and institutional reputation. Bivariate correlations indicated that frequency of engagement with immersive content was positively associated with perceived transparency and trust in the university. Linear regression models, controlling for age, gender and role, confirmed that the use of VR/AR content significantly predicted higher levels of trust and perceived openness. Although cross-sectional designs cannot establish causality, the strength of association suggests that immersive communication formats may contribute to enhanced stakeholder engagement. Conversely, reliance on solely textual announcements had a weaker and sometimes negative association with trust, indicating that static communication may be perceived as less engaging by digital-native audiences [11].

The results of the multivariate regression are summarized in Table 3. The dependent variable was the standardized trust score, and independent variables included the frequency of immersive content, two-way digital interactions (such as commenting on posts) and perceived quality of AI-generated messages. Coefficient estimates (β) are reported alongside their standard errors and p-values. All continuous predictors were mean-centered prior to analysis to ease interpretation [14].

Table 3: Regression Estimates Predicting Trust from Digital Communication Factors

Predictor	Coefficient (β)	Standard error	p-value
Immersive content frequency	0.27	0.05	<0.001
Two-way interactions	0.19	0.04	0.002
AI-generated message quality	0.15	0.05	0.007
Constant	0.12	0.08	0.122



Predictive Modelling

To identify complex patterns of engagement, machine-learning algorithms were trained on the survey data. Random forest and gradient-boosted tree models achieved the highest predictive accuracy, with F1-scores around 0.78 in distinguishing high-engagement respondents from low-engagement ones. Feature importance analyses revealed that exposure to immersive content, perceived quality of AI-generated messages and frequency of two-way digital interaction (e.g., commenting, participating in online forums) were among the strongest predictors of institutional trust. This aligns with current research showing that machine-learning techniques are adept at uncovering non-linear relationships across behavioral and digital features. The predictive models also suggested that performance expectancy and facilitating conditions, concepts identified in trust research on generative AI, are crucial determinants of willingness to engage [16-18].

Mathematical formulation

For the linear regression models, the trust score T for respondent i was modeled as a linear combination of predictors:

$$T_i = \beta_0 + \beta_1 \text{Immersion}_i + \beta_2 \text{Interaction}_i + \beta_3 \text{AIQuality}_i + \varepsilon_i,$$

where β_0 is the intercept, β_k are the estimated regression coefficients and ε_i is the error term assumed to be independently and identically distributed. The estimated coefficients reported in Table 3 indicate that, holding other factors constant, a one-unit increase in immersive content frequency is associated with a 0.27-unit increase in the standardized trust score.

For the classification tasks, performance was assessed using the F1 - score, defined as the harmonic mean of precision (P) and recall (R):

$$F1 = 2 \times \frac{P \cdot R}{P + R}$$

The reported F1-scores (≈ 0.78) reflect balanced performance in correctly identifying high-engagement respondents while minimizing false positives and false negatives [8, 12, 15].

Comparative Insights with Existing Literature

The positive relationship between immersive media usage and stakeholder engagement resonates with broader findings in educational psychology. A recent review of VR in the classroom concluded that immersive learning environments enhance cognitive engagement by allowing students to explore complex knowledge through simulations and self-directed inquiry. The same review observed that VR fosters behavioral engagement by stimulating intrinsic motivation and active participation, and can promote affective engagement by enabling empathetic interactions and role-playing. These findings support our observation that immersive communication formats contribute to higher levels of trust and openness.

Trust also emerged as a critical factor in the adoption of AI-mediated communication. The MDPI study on generative AI tools in higher education found that facilitating conditions and performance expectancy enhance both system-like and human-like trust, which together strengthen students' intention to engage with AI-assisted learning. Similarly, our models indicated that respondents who perceived AI tools as reliable and beneficial were more likely to trust institutional messages and continue interacting with AI-mediated platforms. This underscores the importance of designing AI communication systems that are transparent, responsive and aligned with user expectations [5, 15].

Finally, our results contribute to discussions on digital transformation and institutional identity. A correlational analysis of digital transformation maturity in higher education institutions noted that digital technologies not only improve operational efficiency but also strengthen institutional image and social impact. The study highlighted the need to integrate outreach initiatives into digital strategies to enhance prestige and social commitment. Our findings corroborate this perspective: stakeholders valued consistent, interactive communication that reflects institutional openness and social engagement, and such communication was linked to higher reputation scores [12, 16-18].

Discussion and Implications

Collectively, the results suggest that academic public relations is undergoing a paradigm shift. Immersive digital tools and AI-generated content are no longer novelties but central components of strategic communication. The strong associations between VR/AR engagement and institutional trust indicate that interactive experiences foster deeper connections with stakeholders, particularly among digital-native students. These conclusions align with literature emphasising that VR enhances



cognitive, behavioural and affective engagement and that AI can accelerate and magnify digital transformation efforts in higher education. However, careful implementation is required; cultural barriers, digital literacy gaps and concerns about overreliance on technology must be addressed through training and ethical governance [4, 15, 17].

From a theoretical standpoint, the findings reinforce the view that reputation management in higher education is increasingly mediated by technology. Trust emerges as a multidimensional construct influenced by the quality of communication content, the transparency of AI systems and the opportunity for reciprocal interaction. Future research should explore longitudinal designs to assess causality and examine how changes in digital communication strategies over time affect reputation and stakeholder engagement. Additionally, combining qualitative methods-such as interviews or focus groups-with predictive analytics could provide a deeper understanding of stakeholders' perceptions and emotional responses. Overall, integrating AI, immersive technologies and data analytics into public relations offers promising avenues for enhancing institutional trust, engagement and competitive positioning in the evolving digital landscape [7, 9, 11].

4. Ethical Considerations and Digital Governance

The integration of artificial intelligence (AI) and immersive technologies into academic public relations introduces profound ethical challenges that demand careful reflection and robust governance. Ethical guidelines for AI emphasise core values such as fairness, privacy, transparency and accountability, which must be upheld to mitigate risks such as bias, privacy violations and misuse. In the context of university communication, these principles translate into ensuring that AI systems enhance stakeholder engagement without compromising individual rights or institutional integrity [7, 14, 18].

Several ethical considerations recur across the literature on AI and digital technologies in education and communications. First, the principle of autonomy requires that individuals retain control over their data and have the capacity to make informed decisions about engaging with AI-mediated content. Privacy and data protection are paramount, given that AI tools frequently collect and process personal information; safeguarding this data from unauthorized access or misuse is essential. Bias and fairness constitute another critical concern. Algorithms trained on historical data may inadvertently propagate discrimination or exclude minority perspectives; therefore, regular audits and bias mitigation strategies are necessary. Transparency and explain ability are equally important: stakeholders should understand how AI-generated messages are produced and on what basis decisions or recommendations are made. Finally, accountability mechanisms must be in place to ensure that institutions and developers are responsible for the design, deployment and consequences of AI systems [6-8].

To guide responsible adoption, higher education institutions can draw upon established ethical frameworks. The EDUCAUSE AI Ethical Guidelines articulate principles such as beneficence, justice, respect for autonomy, transparency, accountability, privacy and nondiscrimination. Beneficence obliges institutions to ensure that AI technologies promote the well-being of students and staff by enhancing learning, research and operational efficiency while minimizing harm. Justice mandates equitable access and fairness, preventing discrimination across user groups. Respect for autonomy underscores the need for informed consent and user control over AI interactions. Transparency and explain ability involve providing clear, comprehensible information about how AI systems operate, while accountability requires institutions to take responsibility for the systems they deploy. Privacy and data protection focus on securing personal information, and nondiscrimination aims to prevent algorithmic biases. These principles, viewed holistically, provide a comprehensive ethical compass for academic public relations and communications [12-14].

Implementing ethical AI and immersive technologies necessitates robust governance structures. Institutions should develop institutional policies that align with ethical guidelines and incorporate oversight mechanisms such as ethics committees or data governance boards. Such bodies can conduct regular risk-benefit analyses, monitor compliance with ethical standards, and provide guidance on emerging issues. Training programmes for staff and students are equally vital to build AI literacy and ethical awareness. Institutions should also adopt transparent reporting practices, documenting how AI systems are used, what data are collected and how decisions are made, thereby fostering trust among stakeholders. Finally, the development of participatory governance models-in which diverse stakeholders including students, faculty, administrators and external partners collaborate on ethical guidelines – can ensure that policies reflect the varied interests and concerns of the university community [13, 15].



While much of the ethical discourse focuses on AI, immersive media such as VR and AR also raise distinct ethical challenges. Issues of physical and psychological safety must be addressed, particularly for vulnerable populations. Consent procedures should clearly articulate the nature of immersive experiences and potential risks. Additionally, content creators should be mindful of cultural sensitivity and accessibility, ensuring that virtual environments do not inadvertently perpetuate stereotypes or exclude individuals with disabilities. Data collected through immersive technologies – including biometric or behavioural data – must be treated with the same rigour as other personal data in accordance with privacy principles. Overall, ethical governance for immersive media should parallel that of AI, emphasising transparency, fairness, and respect for individual rights [4, 7, 15, 18].

5. Conclusions and Recommendations

This study advances the understanding of academic public relations by proposing an integrated model that combines artificial intelligence, immersive digital technologies and data-driven communication strategies. Through a mixed-method approach encompassing cross-sectional survey analysis and machine-learning prediction, the research demonstrates that technology-mediated communication is a critical driver of institutional reputation and stakeholder engagement. The findings indicate that immersive content such as virtual and augmented reality, when used to convey institutional narratives, is positively associated with trust, perceived transparency and engagement levels. These results align with broader literature showing that VR enhances cognitive, behavioural and affective engagement in educational settings and that digital technologies strengthen institutional image and social impact. Furthermore, trust in AI-generated content emerges as a decisive factor influencing users' willingness to engage; facilitating conditions and performance expectancy significantly enhance both system-like and human-like trust [6, 13, 17].

Collectively, the evidence suggests that academic public relations should be reframed as a strategic, technology-driven function rather than a purely administrative activity. Institutions that proactively integrate AI and immersive technologies into their communication ecosystems are better positioned to meet stakeholder expectations for transparency, interactivity and personalization. However, the study also underscores limitations inherent in cross-sectional designs and highlights the importance of ethical governance. Comprehensive ethical frameworks and governance structures are essential to ensure privacy, fairness and accountability in AI-mediated communications [9, 14, 18].

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