


Using Generative Artificial Intelligence to Improve User Engagement in Content Marketing

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Abstract: The use of Generative Artificial Intelligence (GenAI) is revolutionising how companies create digital content on social networks. However, how users respond to this content remains less explored. The aim of this article is to compare GenAI-generated content with human-generated content on Instagram. First, through a survey of 273 students, we explored user engagement with the eSports team's content on Instagram. Second, we measured followers' engagement behaviors (i.e., "likes", comments, shares and reach) with GenAI-generated content versus human-created content. Results indicate that both GenAI tools (ChatGPT and Gemini) achieved similar levels of engagement in terms of "likes". ChatGPT stood out for its use of interactive features like opinion polls, particularly in "stories", while Gemini excelled in total reach and visibility. In contrast, human-generated content attracted a higher proportion of non-followers, suggesting a stronger potential to expand the existing audience. These findings underscore the advantages of adopting a hybrid strategy that combines the scalability and speed of GenAI with the contextual relevance and authenticity of human-created content.

Keywords: Generative Artificial Intelligence, Content Marketing, Social Media Engagement, Instagram Analytics, eSports

Categories: I.2, I.2.0, I.2.1

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1 Introduction

The digital age has ushered in transformative changes across various industries, with marketing being one of the most impacted [Kshetri et al., 2024]. The advent of AI has precipitated significant shifts in how marketing strategies are developed and implemented, especially in sectors characterized by high interactivity and engagement demands such

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as eSports [Chan et al., 2022]. This introduction sets the stage for a detailed exploration of GenAI's potential in revolutionizing content marketing strategies within the eSports industry on social platforms like Instagram.

The rapid advancement of AI technologies has not only enhanced operational efficiencies but also introduced new capabilities in the realm of digital content creation [Manoharan et al., 2024]. Historically, marketing strategies heavily relied on human creativity and intuition to produce content that resonates with audiences. However, as digital platforms evolve and the volume of content interactions increases exponentially, traditional methods are increasingly challenged to meet the scale and personalization that digital natives demand. AI, particularly generative models like Generative Pre-trained Transformer (GPT) and PaLM—the original model powering Gemini—, presents novel opportunities to address these challenges. These AI systems are capable of analyzing vast amounts of data to generate personalized content that aligns closely with user preferences, potentially enhancing engagement and loyalty [Matz et al., 2024].

Despite the rapid advances and promising potential of AI in content generation, for the eSports industry the challenges are especially focused on the authenticity and emotional resonance of AI-generated content. It is not only about the large amounts of content generated, but also about the dynamic interactivity that the eSports audience expects. This raises crucial questions: Can AI foster authentic user engagement in a space where brand identity, fan loyalty and real-time responsiveness are paramount? Addressing these questions is essential not only to improve the user experience, but also to maintain the credibility and competitive advantage of digital content strategies in eSports [Brüns and Meißner, 2024].

The significance of exploring AI in this context lies in its potential to transform how content is created and consumed in digital marketing. For industries like eSports, where the audience is predominantly digital-savvy and highly active online, AI's ability to deliver tailored content could significantly enhance engagement metrics. This research aims to delve into the comparative effectiveness of AI-generated versus human-created content on Instagram, providing insights into both the potential and limitations of AI in crafting compelling marketing narratives.

Thus, this study seeks to answer the question of whether, in eSports marketing campaigns, does GenAI-generated content produce higher engagement rates than human-generated content?. To achieve that goal, the following objectives are proposed:

- Development of Marketing Campaigns by Human Experts and Generative Language Models: The study focuses on the creation of marketing campaigns using both human expertise and advanced AI tools, such as ChatGPT and Gemini, to evaluate their respective contributions to campaign success.
- Analysis of Social Media Metrics to Assess AI Performance: By examining social media engagement metrics, the research aims to determine whether generative AI can outperform human experts in crafting effective marketing campaigns.

This paper is structured as follows: Section 3 reviews the existing literature on the integration of AI in marketing, identifying key gaps. Section 4 provides a thorough explanation of the methodology, including the data collection and measures, research context, GenAI tools selection, and AI-content generation. Section 5 will present the findings from a survey conducted to establish a knowledge base for the AI tools to generate marketing content on Instagram, along with a comparative analysis of AI-generated versus human-generated content. Section 6 offers a general discussion of the findings,

including theoretical implications and practical recommendations for content marketing. Finally, Section 7 concludes the paper by summarizing contributions, acknowledging limitations, and suggesting directions for future research.

2 Research questions and objectives

Guided by the objectives that AI-generated content can surpass the effectiveness of traditional content creation methods in specific contexts, this study poses several research questions: Can AI-generated content achieve higher engagement rates than human-created content on Instagram within the eSports community? What are the implications of using AI for content creation in terms of user perception and interaction quality? Answering these questions will not only contribute to the academic discourse on digital marketing and AI but also offer practical insights for marketers aiming to leverage AI in their strategies.

Thus, the objectives of this study are twofold: (1) To evaluate the performance of AI-generated content in engaging users on Instagram; and (2) To compare these results with those of human generated-content. By focusing on measurable engagement metrics such as likes, comments, shares, and overall reach, this research seeks to provide a quantifiable assessment of AI's impact on user interaction within the eSports sector.

3 Related Work

The integration of Generative Artificial Intelligence (GenAI) into digital marketing has rapidly transformed how content is produced, customized, and delivered. While several conceptual and technical reviews have addressed the architecture and general use of GenAI in various domains [Chang et al., 2024, Raiaan et al., 2024, Wang et al., 2017, Kumar et al., 2024, Ooi et al., 2023], empirical investigations that directly evaluate how users interact with GenAI-generated content on social media platforms remain limited. This section critically examines four key empirical studies that, despite differing objectives and methods, provide important context for our research. We identify their strengths and limitations and articulate how our study addresses the gaps they leave unresolved.

3.1 Empirical Evidence and Its Limitations

The study conducted by [Brüns and Meißner, 2024] investigates user reactions to brands employing generative AI (GenAI) in social media content creation. A key strength of this research lies in its psychological focus since it explores how perceived brand authenticity can decline when users are aware that content is AI-generated. By using experimental designs to test user attitudes, the authors move beyond mere performance metrics, offering valuable insights into how AI affects brand perception and consumer trust. This is especially relevant in a digital context where authenticity is a crucial driver of engagement.

However, the study exhibits several limitations that restrict its generalizability and explanatory power. Firstly, the experimental conditions are artificial: participants are shown static, hypothetical content scenarios rather than engaging with real-time, platform-specific media. This limits ecological validity and may not accurately reflect how users respond in dynamic social media environments such as Instagram or TikTok. Secondly,

while the research documents a negative effect on perceived authenticity, it does not consider user engagement metrics (e.g., likes, shares, comments, or reach), nor does it explore whether these attitudinal shifts actually translate into behavioral change. Thirdly, the study treats AI-generated content as a monolithic category, without distinguishing between different tools (e.g., ChatGPT vs. Gemini) or formats (e.g., feed posts vs. stories). As a result, the analysis overlooks the nuanced ways in which different GenAI tools and content types may elicit varied user reactions. Lastly, the study is limited to a consumer psychology perspective and does not integrate marketing strategy dimensions, such as the potential benefits of hybrid approaches that blend AI and human content creation.

While the study contributes meaningfully to the discourse on authenticity and AI, its focus on perception rather than interaction leaves a critical gap in understanding how GenAI content performs in real-world marketing contexts. This underscores the need for empirical studies that combine attitudinal and behavioral data in live campaigns.

Authors in [Zhang et al., 2024] present a large-scale text mining analysis examining how generative AI (GenAI) has been mentioned and discussed across both social media and academic domains. A clear strength of this study lies in its scale and methodological rigor. By analyzing extensive internet text data through topic modeling, the authors provide a panoramic view of emerging narratives, concerns, and thematic patterns related to GenAI. Their comparative approach—contrasting academic and public discourse—also uncovers key discrepancies in perception, such as varying levels of technological optimism and ethical concern, which are useful for mapping communication gaps between researchers and practitioners.

Naturally, this work also has notable limitations in the context of evaluating GenAI-generated content. Most critically, it relies exclusively on secondary discourse data and does not incorporate any direct measures of user engagement with AI-generated content. As a result, the study cannot offer empirical insights into how users behave or feel when interacting with GenAI outputs. In addition, the authors do not differentiate between content formats or specific tools, nor do they assess platform-level dynamics. Their findings, while sociolinguistically rich, remain broad and descriptive, limiting their practical relevance for marketing professionals or researchers interested in performance outcomes. Consequently, the study provides an important discursive overview but does not address key behavioral, comparative, or evaluative dimensions of GenAI in practice.

Authors in [Haq and Chiu, 2024] investigate how short video endorsements on TikTok affect user engagement, emphasizing the role of influencer image in transferring perceived value to both the platform and the promoted product. One of the key strengths of their study lies in the integration of the image transfer theory with experimental validation. The authors construct a robust model that links influencer image to online engagement behavior, including metrics like social connection and active participation. Their focus on short-form video content on TikTok is especially timely, given the platform's growing dominance and relevance for digital marketing strategies targeting younger audiences.

Nonetheless, several limitations constrain the applicability of their findings to AI-driven content. First, the study centers entirely on human-generated influencer content and does not include or compare GenAI-generated media. This makes it difficult to extrapolate whether similar mechanisms of image transfer and engagement would hold in AI-mediated contexts. Second, their evaluation of engagement remains relatively narrow, focusing on immediate interaction intentions without exploring longitudinal effects or cross-platform dynamics. Additionally, while the authors highlight the importance of content design and influencer credibility, they do not address how algorithmic or synthetic content could replicate—or fail to replicate—these effects. As such, while the paper makes a strong contribution to understanding influencer-driven engagement, it leaves

open critical questions about GenAI's potential to simulate persuasive human traits in social media marketing.

Author in [Taherdoost, 2023] presents a comprehensive literature review exploring how Machine Learning (ML) and Neural Networks (NN) can enhance social media platforms. Drawing from 26 studies selected through a systematic screening process, the paper outlines diverse applications ranging from content recommendation and sentiment analysis to moderation and user experience personalization. A key strength of this work lies in its breadth, as it synthesizes recent technological developments across multiple domains. The review effectively links technical functionalities—such as personalization engines and chatbot interactivity—to user engagement outcomes. Another notable contribution is the balanced perspective: while the paper highlights benefits like scalability and improved decision-making, it also discusses risks related to the interpretability of ML models, artificiality of outputs, and algorithmic uncertainty. These elements provide a well-rounded overview that underscores both the potential and limitations of AI in social media settings.

Even so, the breadth of the review comes at the cost of depth. The analysis does not delve deeply into specific domains such as content marketing or platform-based strategies, limiting its practical applicability for marketers. While user engagement is frequently mentioned, it is primarily addressed through general system-level improvements rather than user-centric behavioral metrics. Furthermore, the review does not provide new empirical evidence, relying entirely on secondary sources and potentially inheriting their biases. Most importantly, it only touches tangentially on generative AI. Although transformer architectures are briefly mentioned, the review does not explicitly examine GenAI models like ChatGPT or their use in content creation. This restricts its utility for understanding the emerging landscape of AI-driven marketing content. As such, while the study is valuable for contextualizing broader AI trends in social media, it offers limited insight into the concrete effects or strategic use of generative tools in user engagement campaigns.

3.2 Addressing the Research Gap

Collectively, these studies underscore the relevance of GenAI in digital engagement but also reveal important research gaps. First, there is a scarcity of empirical studies that compare the performance of GenAI and human-generated content using actual social media metrics. Our study fills this gap by analyzing both quantitative engagement data and survey-based user perceptions. Second, prior studies often treat GenAI as a monolithic category, without exploring differences across tools (e.g., ChatGPT vs. Gemini) or content formats (e.g., posts vs. stories). We address this limitation by examining performance and engagement metrics specific to each tool and content type. Third, there is little exploration of hybrid strategies in which AI- and human-generated content coexist and complement each other. Our results demonstrate that combining both approaches can yield stronger outcomes than relying exclusively on one. Finally, important ethical and perceptual concerns—such as transparency, authenticity, and platform effects—are acknowledged in earlier studies but have not been empirically tested in real-world scenarios. By deploying actual content in live campaigns, our study provides empirical validation of these critical issues.

Thus, while existing literature has provided valuable theoretical perspectives and some partial empirical findings, this study is among the first to empirically examine whether GenAI-generated content yields higher engagement rates than human-generated

content in the context of eSports marketing campaigns. To this end, we employ a four-phase quantitative workflow that integrates (1) user survey data, (2) both AI and human generated content, (3) Instagram publication, and (4) behavioral engagement analytics.

4 Materials and Methods

This section outlines the comprehensive approach taken to evaluate the effectiveness of AI-generated content in engaging the eSports audience on Instagram. By outlining the data collection and measures, research context, selection of GenAI tools, and AI-driven content generation, we seek to present the methodological approach undertaken in this research.

The study was conducted in four sequential phases. First, a survey was administered to explore young users' preferences and behaviors on Instagram. This survey was carried out using scales adapted from the literature to gather data from young people, the majority of whom represent the most active users of eSports [Chiu et al., 2021]. Second, content was generated using both GenAI tools—guided by survey results—and human experience. Third, all content was published on the same Instagram account to ensure comparability. Fourth, engagement metrics were collected and analyzed over a three-month period.

To provide an overview of this sequence, Figure 1 presents a workflow diagram summarizing the four phases of the study. Each phase is described in detail in the subsections that follow.

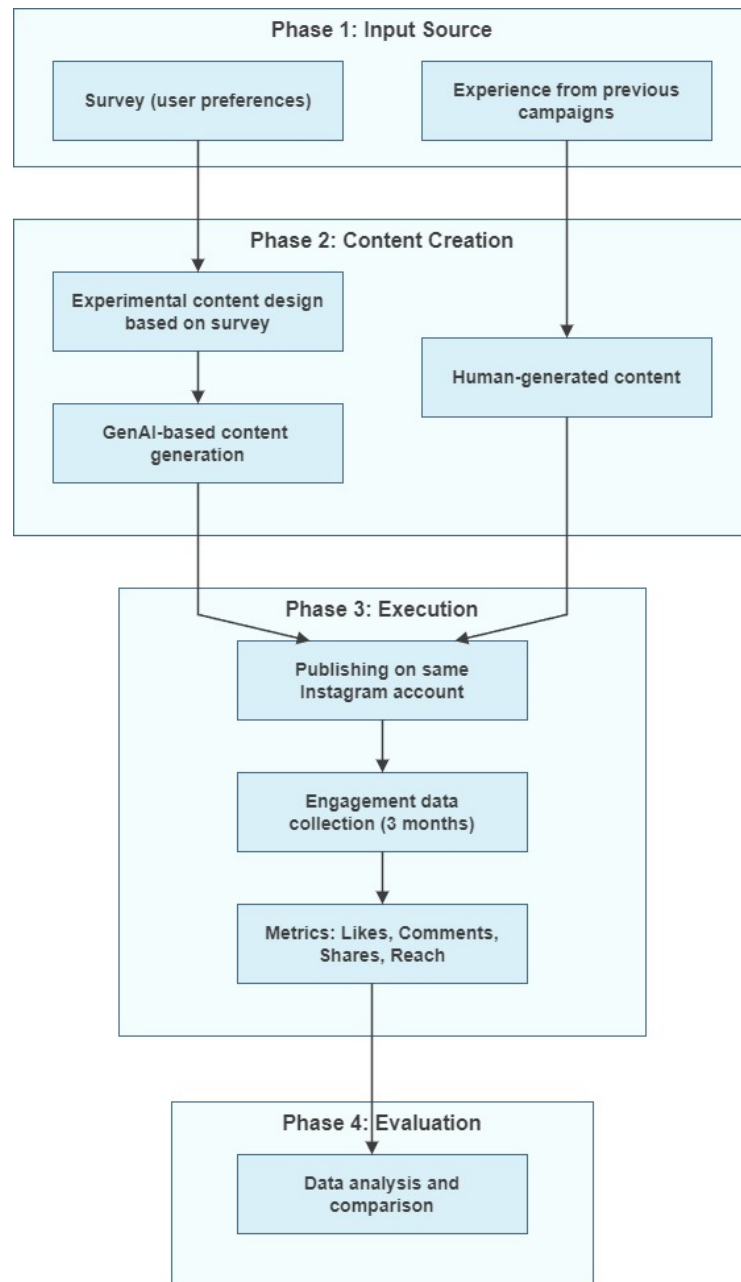


Figure 1: Workflow diagram illustrating the sequence of the study: survey-based data collection, content generation by GenAI tools (guided by survey results) and by human experience, publication on the same Instagram account, and subsequent engagement data collection and analysis.

4.1 Data Collection and Measures

Data were collected over a three-month period through an online survey administered to 273 students to explore their preferences and behaviors related to social media content. This information was subsequently used to inform the AI-based content generation in the second phase of the study. The survey was conducted with students from a secondary school located in the region of Murcia, southeastern Spain, and served as the foundation for tailoring GenAI-generated posts to align with user preferences.

Participants were informed about the academic nature of the study and consented to participate. Initially, they completed a set of socio-demographic questions, followed by general inquiries regarding their preferences and dislikes about the content they typically consume on social media. Five-point Likert scales (1 = strongly disagree, 5 = strongly agree) were employed to measure the constructs. eSports content engagement was assessed using an adaptation of the community engagement scale from [Badrinarayanan et al., 2015]. Intention to share eSports content was measured using an adaptation of the Word-of-Mouth (WOM) scale from [Lee and Kim, 2020]. Involvement was also measured with the same scale from [Badrinarayanan et al., 2015]. Additionally, we used a five-point differential semantic scales to measure, the intention to purchase eSports products scale was adapted from [Lee and Kim, 2020] (e.g. If the Instagram post promotes an eSports product, how likely/unlikely are you to buy it?). Also, the intention to follow an eSports player was measured using an adaptation of the intention to interact scale from [Casaló et al., 2020] (e.g. How likely/unlikely you are to follow the eSports player on Instagram?).

To assess user interaction with AI- and human-generated content, we calculated the Engagement Rate (ER) as a normalized metric widely used in social media analytics [Pletikosa Cvijikj and Michahelles, 2013]. The ER was computed using the following formula:

$$ER = \frac{\text{Likes} + \text{Comments} + \text{Shares}}{\text{Number of Followers}} \times 100 \quad (1)$$

Where:

- *Likes*, *Comments*, and *Shares* refer to the interactions each post receives.
- *Number of Followers* corresponds to the audience size at the time of the post.

This approach enables comparison across posts with different audience sizes and is consistent with prior work on digital content performance.

4.2 Research Context: eSports and Instagram

The third phase of the study involved content creation for the Instagram account of eSports users, comparing AI-generated and human-generated content. The eSports industry is characterized by competitive video gaming. This dynamic and highly interactive environment provides an ideal landscape for exploring the role of AI-generated content in enhancing user engagement. Additionally, the industry's global audience of digitally native, highly engaged individuals makes it a prime candidate for the development of innovative marketing strategies that integrate AI tools for both content creation and audience interaction.

To explore this further, the content generated for the study focused on a variety of eSports-related themes, including match highlights, player spotlights, game strategies,

and event promotions. These themes were selected to ensure the creation of content that would be both relevant and engaging for the eSports audience on Instagram. Instagram's visual-centric format, broad reach, and robust engagement metrics made it an ideal platform for the study. The platform supports a diverse range of content types, such as images, videos, and stories, which are critical for capturing the fast-paced and visually dynamic nature of eSports. Additionally, Instagram's algorithmic feed and advanced analytics tools allowed for a detailed analysis of user interactions and engagement patterns, providing the necessary tools to effectively compare AI-generated and human-generated content.

Moreover, the Instagram account of the UCAM (Universidad Católica San Antonio de Murcia) eSports team (@ucam_eSports) was used as a platform. This account provided a relevant, active and real community to examine the engagement that could be generated in the with content created from eSports. Instagram's visual-centric format, wide reach, and robust engagement metrics make it an ideal platform for this study. It allows for a diverse range of content types, including images, videos, and stories, which are crucial for capturing the dynamic nature of eSports. Instagram's algorithmic feed and extensive analytics tools allow for a more detailed analysis of user interactions and engagement patterns. These features are essential for comparing AI-generated and human-generated content effectively.

At the time of this research, according to Social Blade statistics, the UCAM eSports Instagram account had 1,245 followers and followed 15,752 accounts. The account featured 335 media uploads and had an engagement rate of 0.23%, averaging 35.19 likes and 0.38 comments per post. Over the previous 30 days, the account had experienced a 55.6% decrease in followers and a 300% decrease in following, while media uploads increased by 3.8%. These metrics indicated moderate levels of engagement, providing a baseline against which the impact of AI-generated content could be assessed and its potential to improve these statistics evaluated.

4.3 GenAI tools selection

The selection of GenAI commercial tools for this study was informed by the significant advancements in AI-driven content creation models, such as GPT-3 and its successors. In particular, for the generation of posts on Instagram, as will be explained later, we used ChatGPT 3.5 and Gemini 1.0, two prominent GenAI tools well-suited for creating text-based content for the eSports audience on that social network. For the generation of stories, we employed the more advanced ChatGPT 4 and Gemini in combination with Stable Diffusion 2.0 for enhanced image creation. These models were chosen because they were the best at the time of this study was conducted.

ChatGPT, developed by OpenAI, is a state-of-the-art language model that generates text based on given prompts. ChatGPT 3.5 was used for the generation of posts, leveraging deep learning techniques to understand context and produce natural-sounding language. This version of ChatGPT is highly effective at generating informative and engaging content, making it a valuable tool for creating Instagram posts that can capture the interest of the eSports audience. For stories, we used ChatGPT 4, which offers even greater contextual understanding and versatility, providing improved results in both textual and visual content generation when compared to its predecessor.

Gemini, another advanced AI tool, was used in its version 1.0 for the generation of posts. It provides similar text generation capabilities to ChatGPT but with additional features optimized for creative content generation and campaign management. Its AI engine integrates historical and real-time data from millions of users, offering accurate,

privacy-compliant insights and adaptive content generation based on real-time user behavior. This makes Gemini 1.0 particularly suitable for creating targeted and relevant content for the eSports audience. For stories, Gemini was paired with Stable Diffusion 2.0, a powerful image generation model specialized in creating high-quality images from text-based prompts. Its integration with Gemini allowed for the seamless production of both visual and textual content. This last model uses advanced diffusion techniques to progressively generate detailed and coherent images, contributing to the overall aesthetic and engagement potential of the stories. Hereafter, the Gemini 1.0 plus Stable Diffusion 2.0 combo will be referred to as simply “Gemini”.

Both alternative tools were chosen for their ability to generate engaging and relevant content tailored to the eSports audience. The application of these models involved providing them with prompts related to various eSports topics, such as game highlights, player interviews, and event announcements, ensuring that the content produced was both informative and visually compelling.

4.4 AI-content generation

This subsection outlines the process of generating content marketing campaigns, comparing the traditional approach used by the marketing team with the automatic generation capabilities of GenAI models. The differences in their approaches and the configurations of the campaigns are discussed in detail.

The content creation for this study was carried out through the publication of both posts and stories on the UCAM eSports Instagram account. A total of 4 videos (reels) were used for the posts, where two posts’ captions (copy) were generated by ChatGPT 3.5 based on the descriptions provided in the prompt. Similarly, two more posts had their copy generated by Gemini 1.0. Additionally, the marketing team manually generated the copy for another two posts using their expertise and prior knowledge of the eSports audience. A similar procedure was followed for Instagram stories with ChatGPT 4 and Gemini plus Stable Diffusion 2.0, except that in this case, the corresponding images were generated for these pieces of content. Finally, the marketing team produced their own stories based on their professional experience. This multi-faceted approach allowed for a direct comparison between AI-generated and human-generated content in terms of user engagement and content performance.

It is important to highlight that there were minimal differences in the configuration of the various campaigns evaluated, which facilitated direct comparison. The only distinctions lay in how the marketing team and the GenAI models designed the campaigns, as all these models were conceptually identical—generated using the same prompt, with only the platform or campaign name being modified.

For the manual configuration by the marketing team, a traditional approach was followed: designing the campaign based on professional expertise until the desired results were achieved. Parameters such as objectives, target audience, and content format were carefully selected through iterative comparisons, continuing until no further improvements in campaign performance were observed.

For the content generated by ChatGPT and Gemini, the original prompt—initially written in Spanish—was reformulated in some cases to evaluate whether accurate and effective outputs could be produced without the need for prior marketing expertise. Below is an example of the initial prompt used as a basis for ChatGPT to create a sample campaign.

With all the information/data I have given you, plus the information you have, create the copy for an Instagram post about eSports. This post is a video where a person (who is

not seen in the video) says they like to be surprised, and then a player appears, saying that they are a jungler in League of Legends, jumping with joy. The text should be short and have a humorous tone. Use viral hashtags related to the topic. Keep in mind that the player jumps with joy because junglers attack by surprise. Also, keep in mind that the person who says they like surprises is someone outside the game, not a player. Just create the copy, and keep it short.

The prompts followed the next scheme. First, each AI tool was supplied with the contextual information gathered from the survey conducted at the secondary school. Second, the type of content included in the publication (e.g., individual image, carousel image, or video) was specified, along with a description of the content and the emotions it aimed to evoke. Third, the approximate length and overall tone of the publication were established—such as emotional, inspirational, humorous, persuasive, playful, etc. A reminder to include viral hashtags was always provided, as the AIs frequently overlooked this important aspect of the content.

Similarly, ChatGPT was queried about the optimal date and time to publish the content, as illustrated in the excerpt below.

Based on the information I've provided about the eSports audience, along with the general data you have, what day and time do you think would be best to publish it?

Nevertheless, it is important to emphasize that the primary objective with the GenAI models was not to optimize campaign parameters, identify the best marketing targets, or align these values with those selected by the marketing team. Instead, the goal was to generate a marketing campaign from a simple prompt to assess the effectiveness of the GenAI models and determine whether they could outperform a humans in certain contexts.

5 Results

The results of this study provide a comprehensive evaluation of the effectiveness of AI-generated content compared to human-generated content in engaging the eSports audience on Instagram. The data collected over a three-month period revealed significant insights into how different types of content perform in terms of user interaction. Key findings indicate that AI-generated content generally achieved higher engagement metrics, including likes, comments, shares, and overall reach. This section will discuss these findings in detail.

5.1 Survey Results

The following results are derived from a survey conducted at a secondary school. The final sample consisted of 273 students, ranging in age from 14 to 25 years, with a mean age of 17. The age distribution was as follows: 55.31% of the respondents were between 14 and 17 years old, and 44.69% were between 18 and 25 years old. This age group is known for its strong engagement with digital content and a high propensity to interact with social media posts, particularly on platforms such as Instagram. The sample was almost evenly split by gender, with 52% male and 48% female participants.

To better comprehend the differences between each measured construct, we tested the reliability of the measures and conducted an ANOVA test using the R packages lavaan

Construct	Mean	Standard deviation	Cronbach alpha
eSports content engagement	3.3	0.97	0.71
Intention to share eSports content	2.8	0.97	0.84
Involvement	3.1	1.00	0.87
Intention to purchase eSports products	2.0	1.00	0.88
Intention to follow an eSports player	2.8	1.4	0.93

Table 1: Construct Measurements for eSports Content Engagement Study.

[Rossee, 2012] for the key constructs evaluated in the survey. The results are shown in Table 1. The mean values indicate moderate levels of eSports content engagement ($M = 3.3$, $SD = 0.97$) and involvement ($M = 3.1$, $SD = 1.00$), suggesting that participants generally engage with eSports content but with some variability across the sample. The intention to share eSports content had a slightly lower mean ($M = 2.8$, $SD = 0.97$), which could reflect a more passive approach to content sharing, consistent with the generally low levels of active interaction observed in previous sections of this paper. Interestingly, the lowest mean was observed for the intention to purchase eSports products ($M = 2.0$, $SD = 1.00$), indicating a weaker commercial interest among participants. Conversely, the intention to follow an eSports player showed higher variability ($SD = 1.4$) but a relatively moderate mean ($M = 2.8$), highlighting some divergence in how much respondents are willing to engage on a personal level with individual players. The Cronbach's alpha values for all constructs exceeded the recommended threshold of 0.70, demonstrating acceptable internal consistency for each of the measured constructs. In particular, the intention to follow an eSports player ($\alpha = 0.93$) and involvement ($\alpha = 0.87$) showed very high reliability, supporting the robustness of these scales in capturing the intended constructs.

The survey also explored participants' preferences regarding the types of content they engage with on Instagram. In terms of post format, the majority (57.14%) preferred reels or videos over photos (42.86%), reflecting the increasing popularity of dynamic, video-based content. When asked about posts offering extras such as discounts or giveaways, most respondents (59%) were indifferent, while 22% preferred not to have these extras, and only 19% expressed a clear preference for them. This suggests that while promotional incentives may appeal to a subset of users, they are not a primary driver of engagement for most participants. Additionally, when it came to post topics, the highest interest was shown for content featuring players training for a competition (43.6%), followed by content showcasing a typical day in the life of an eSports player (30%), and finally, gaming on an average day (26.4%).

The analysis indicates notable gender differences across several of the dependent variables measured. For instance, males expressed a significantly stronger intention to share eSports content compared to females ($F = 7.638$, $p = 0.006$), and also reported higher levels of involvement in eSports-related activities ($F = 5.161$, $p = 0.02$). These patterns suggest a greater male inclination toward active participation in the eSports community. Differences become even more evident when considering commercial engagement. Males demonstrated a considerably higher intention to purchase eSports products ($F = 18.527$, $p = 0.000$) and were more likely to follow an eSports player ($F = 42.725$, $p = 0.000$), underscoring a stronger commercial affinity among male participants. Interestingly, no significant gender differences were observed in terms of

Dependent variable	Mean female	Mean male	F	p-value
eSports content engagement	3.28	3.26	0.032	0.857
Intention to share eSports content	2.66	2.98	7.638	0.006**
Involvement	2.96	3.23	5.161	0.02*
Intention to purchase eSports products	1.76	2.29	18.527	0.000***
Intention to follow an eSports player	2.31	3.32	42.725	0.000***

Table 2: Comparison of mean values between female and male participants for eSports-related constructs.

Notes: *p*-values are reported with asterisks. ***, **, * denote statistical significance level at $p < 0.001$; $p < 0.01$; $p < 0.05$, respectively.

general eSports content engagement ($F = 0.032$, $p = 0.857$), with both males and females reporting similar levels of interest. This balanced content engagement contrasts with the clear male dominance in interaction and commercial involvement, highlighting the complexity of gender dynamics within the eSports landscape.

Overall, these results underscore the nuanced ways in which gender influences eSports engagement. While males tend to exhibit higher levels of active participation and commercial involvement, content engagement remains relatively balanced across genders. This suggests that eSports content appeals broadly but that targeted strategies may be necessary to foster deeper engagement and commercial participation among different demographic groups.

5.2 Comparison of AI-generated and Human-generated Content

In this section, it is compared AI-generated content using tools like ChatGPT and Gemini with human-generated content for Instagram posts and stories. Both content types were created specifically for the eSports sector, with AI models producing visual and textual materials, including captions and stories. The aim of this comparison is to evaluate the effectiveness of AI in generating engaging content that matches or exceeds the performance of human-generated equivalents.

5.2.1 Posts

Four posts were created, with the AI recommending the use of videos/reels and light-hearted content (see Figure 2), as the players were either engaged in competitions or unavailable during the timeframe of the study, which limited the possibility of generating original content directly based on AI-driven instructions. As a result, the UCAM Esports marketing team provided four reels based on current trends (fun trends related to eSports), which partially aligned with the AI's requirements. The AI tools were then used to generate the copy (the text accompanying the post). Various prompts were created to explain the content depicted in the videos to the AIs.

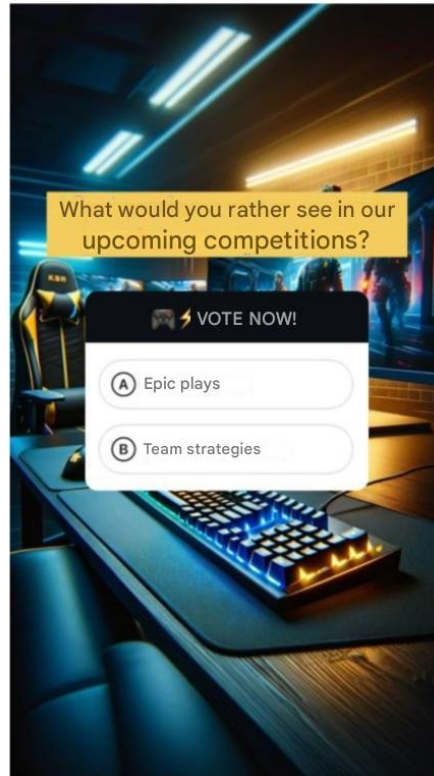


Figure 2: Image created with ChatGPT-4 using DALL-E, based on the prompt “UX Design Mentor”.

Regarding the human-generated reels, two of them were selected for comparison. The first reel, in terms of visual content, was similar to those used by ChatGPT 3.5 and Gemini 1.0 for generating their corresponding copy. The second reel featured a collaboration with a company, showcasing a gameplay highlight, which was also of interest to the profile and its followers. These reels provided a valuable reference point for evaluating the AI-generated content, allowing for a more comprehensive comparison of engagement and overall audience interaction between human-generated and AI-generated content.

The following insights were examined: reach, video views, interactions with the reel, and profile activity. These metrics were used to evaluate the performance of both AI-generated and human-generated content, providing a comprehensive analysis of engagement levels and user response. By assessing these key indicators, the comparison aimed to determine the effectiveness of each content creation method in driving audience interaction and profile activity. In terms of reach, as shown in Table 3, Gemini not only achieved the highest number of total accounts reached on average, but also obtained an almost equal distribution between followers and non-followers in the first reel. This indicates that Gemini was able to attract a broader audience beyond the existing followers

Instagram Reel Reach	ChatGPT 3.5	Gemini 1.0	Human-generated content
Total accounts	292	1210	748
% followers	76.5%	63.55%	76.65%
% non-followers	23.5%	36.45%	23.35%

Table 3: Average reach metrics for Instagram Reels between ChatGPT 3.5, Gemini 1.0, and human-generated content.

Indicator	ChatGPT 3.5	Gemini 1.0	Human-generated content
Total views	569.5	1980	1348
Initial views	320.5	1404	887
Replays	249	576	461
Watch time (% of reel viewed)	47.5%	45%	31.5%
Total watch time (hh:mm:ss)	00:33:45	01:42:19	01:28:26

Table 4: Average view comparison for Instagram Reels between ChatGPT 3.5, Gemini 1.0, and human-generated content.

of the UCAM Esports profile. This metric is significant for the potential growth of the account and its ability to engage with new audiences.

Another key parameter is the number of views, as shown in Table 4. In terms of average total views, the clear winner is Gemini, with an average of 1980 views across its posts, the highest among all analyzed. This result suggests that the content generated by Gemini may have been more engaging or relevant, likely due to the effectiveness of the copywriting, which plays a crucial role in maximizing user engagement and retention. This highlights the importance of well-integrated and strategically crafted copy in optimizing content performance on Instagram.

Regarding watch time, it was calculated proportionally by dividing the average time watched by the total duration of the reel. This approach provides a more accurate analysis of the percentage of the reel that each user viewed. ChatGPT 3.5 slightly outperformed the others, achieving an average of 47.5% retention rate across both of its posts, followed by Gemini 1.0 with 45%. In contrast, the human-generated content achieved a significantly lower average watch time (31.5%). However, when considering the total watch time across all reels, Gemini clearly leads with an average total watch time of 1 hour, 42 minutes, and 19 seconds, indicating that its content maintained viewer attention for a longer duration overall.

In terms of interactions, as shown in Table 5, Gemini and the human-generated content are almost equal in the number of likes, with only a minimal difference between them. When it comes to comments and saved reels, the audience barely perform those actions in the three cases. One possible explanation for the low number of comments and saved reels across the three cases could be the nature of the content and the typical interaction patterns on Instagram. While the reels may have captured attention visually and achieved a good number of views, they might not have provided enough perceived value or motivation for users to engage further by commenting or saving the posts. Additionally,

Interaction	ChatGPT 3.5	Gemini 1.0	Human-generated content
likes	16	35	31
Comments	0	0	0.5
Saves	0	0	0.5

Table 5: Average interactions for Instagram Reels between ChatGPT 3.5, Gemini 1.0, and human-generated content.

reels focused more on quick entertainment or trends might not naturally encourage discussion or reflection, which are often key drivers for users to leave comments or save content for later.

In terms of profile activity, none of the contestants obtained a significant amount of new followers. In particular, only the human-generated content gained one of them with the first reel. Again, this could be explained by the fact that, although the content—whether AI-generated or human-created—captured attention and generated interactions like views and likes, it did not provide enough incentive for users to follow the account. The posts might not have offered clear value-added elements such as exclusive content, contests, or a direct call to action that would motivate viewers to convert into followers.

5.2.2 Stories

The same procedure used for the creation of posts was followed for the development of stories. However, in this case, the AI tools not only generated the copy for the stories but also created the accompanying images. The text was produced based on data obtained from a survey conducted at the secondary school. For the human-generated content, the stories were created based on professional experience. Namely, they involved reposting a reel from the profile to the story section, with additional text added to enhance the content.

Several key indicators were analyzed to assess the performance and engagement levels of both AI-generated and human-generated content regarding these stories: (1) the total number of accounts reached, distinguishing between followers and non-followers of the profile; (2) interaction metrics, which account for likes, shares, and responses; (3) navigation metrics, including forward taps, exits, next story taps, and backward taps; (4) profile activity, measured by the number of profile visits generated from the story; and finally, (5) the results of any surveys conducted within the stories, reflecting user participation and voting behavior. These metrics provide a comprehensive understanding of the impact and effectiveness of the stories in driving user engagement.

The results presented in Tables 6 and 7 provide a comprehensive overview of the engagement and reach of the AI-generated and human-generated stories. In terms of reach, ChatGPT 4 led with 367 total accounts reached, closely followed by Gemini plus Stable Diffusion 2.0 with 332. The human-generated content lagged behind, reaching only 197 accounts. These figures suggest that AI-generated stories, particularly those created by ChatGPT, were more effective at capturing audience attention. However, when considering the proportion of non-followers reached, human-generated content performed better, reaching 7.1% non-followers, compared to 4.6% for Gemini and only

Reach	ChatGPT 4	Gemini plus Stable Diffusion 2.0	Human-generated content
Total accounts	367	332	197
% followers	98.6%	95.4%	92.9%
% non-followers	1.4%	4.6%	7.1%

Table 6: Average reach comparison for Instagram stories between ChatGPT 4, Gemini plus Stable Diffusion 2.0, and human-generated content.

1.4% for ChatGPT. This indicates that while AI-generated stories achieved greater overall reach, human-generated stories were slightly more successful at attracting new audiences beyond the existing follower base. A potential reason for this could be that human-generated content, drawing on professional expertise and prior knowledge of audience preferences, may resonate more authentically with users unfamiliar with the account, thus encouraging broader exploration and interaction from new followers.

Moving to interaction metrics, shown in Table 7, it is observed that active engagement—measured in terms of likes, shares, and responses—remained low across all content types. Gemini led this category with only 2 likes, while both ChatGPT and human-generated content received 1 like each. None of the stories generated shares or responses, which highlights a general trend of passive interaction with the content. Despite this, navigation metrics tell a different story, with ChatGPT achieving 463 total navigational actions, including 336 forward taps, indicating that users were engaging with the content by continuing to view the stories. Gemini also performed well in this regard, with 405 navigation actions, showing a similar level of user interaction. The relatively high number of forward taps for both AI-generated stories suggests that they were compelling enough to sustain user attention, even though they did not prompt deeper forms of interaction, such as likes or comments, as observed with the previous posts. A possible reason for this discrepancy may lie in the nature of the content itself, which could have been more informative or visually engaging, thus encouraging users to continue viewing rather than interact directly. Additionally, users may have viewed stories as passive content consumption, focusing more on observing than on engaging actively.

It is also worth noting the higher number of exits recorded for the three cases—ChatGPT, Gemini and human-generated stories—. ChatGPT had 59 exits, and Gemini 65, while human-generated content had 52. This could suggest that, while the stories initially captured user attention, they were not always successful in retaining it until the end. Finally, in terms of profile activity, ChatGPT was the only content type that generated a profile visit, albeit just one, further indicating that despite higher reach and navigation metrics, AI-generated stories struggled to convert this engagement into tangible profile actions, in line with previous indicators.

5.2.3 Engagement Rate Comparison

To provide a normalized comparison of content performance, we also calculated the Engagement Rate (ER), as defined in Section 4.1. The results, summarized in Table 8, indicate that while Gemini-generated content reached a wider audience, human-generated posts achieved a slightly higher ER, suggesting a more efficient conversion of visibility

Interactions	ChatGPT 4	Gemini plus Stable Diffusion 2.0	Human-generated content
likes	1	2	1
Shares	0	0	0
Responses	0	0	0
Navigation	463	405	216
Forward taps	336	303	140
Exits	59	65	52
Next story taps	47	22	24
Back taps	21	15	0

Table 7: Average interaction comparison for Instagram stories between ChatGPT 4, Gemini plus Stable Diffusion 2.0, and human-generated content.

Content Type	Total Interactions	Number of Followers	ER (%)
ChatGPT 3.5	16	1245	1.28
Gemini 1.0	35	1245	2.81
Human	32	1245	2.57

Table 8: Engagement Rate (ER) for Instagram Reels by content type. The ER was computed as $(Likes + Comments + Shares) / Followers \times 100$, using the account's 1,245 followers during the campaign.

into interaction. ChatGPT-generated content, despite lower reach, showed comparable performance in relative terms. These findings support the importance of analyzing both absolute and relative engagement metrics when evaluating content strategies.

These findings highlight an important nuance: while GenAI tools may optimize content distribution and visibility, human-generated content might resonate more deeply with the existing audience. This aligns with previous findings in the survey analysis and reinforces the conclusion that authenticity and contextual familiarity continue to play a key role in digital engagement—especially on platforms like Instagram, where user interaction is shaped not only by reach, but also by perceived relevance and trust.

6 Discussion

6.1 Theoretical implications

The primary objectives of this study were to evaluate the performance of AI-generated content in engaging users on Instagram and to compare these results with those of human-generated content. Both objectives have been successfully addressed through the analysis of key engagement metrics, such as likes, comments, shares, overall reach, and navigational interactions. By using a comprehensive dataset from Instagram content generated by ChatGPT, Gemini, and human creators, this study was able to provide a detailed comparative analysis of how AI tools perform in terms of engagement and audience reach. The results offer valuable insights into the effectiveness of AI-generated

content, particularly in terms of interactive elements and reach, while also highlighting the strengths of human-generated content in attracting new audiences.

Additionally, the study addressed its two main objectives: (1) to evaluate the performance of AI-generated content in engaging users on Instagram; and (2) to compare it with the performance of human-generated content. The findings offer a nuanced perspective on these aims. AI-generated content performed strongly in specific engagement metrics, particularly in relation to interactive features. For instance, ChatGPT excelled at fostering user interaction through polls, especially in Instagram Stories, leading to elevated navigation activity. Gemini achieved the highest total reach, engaging both followers and non-followers. In contrast, human-generated content proved more effective at attracting a higher proportion of non-followers, indicating a greater potential to broaden the audience beyond the existing base. These results suggest that while AI-generated content is effective at stimulating engagement among current followers, human-generated content offers a relative advantage in expanding audience reach. Each approach thus demonstrates distinct strengths depending on whether the goal is to enhance interaction or increase visibility.

Regarding the second objective, which focused on comparing AI-generated and human-generated content, the findings point to a differentiated impact on engagement quality and audience perception. AI tools such as ChatGPT and Gemini proved effective in fostering user interaction, particularly through interactive and visually engaging formats like polls and stories. Nevertheless, the fact that human-generated content attracted a greater proportion of non-followers suggests a distinct advantage in terms of reach expansion. This divergence may not necessarily stem from differences in creativity or contextual awareness, but rather from the way each content type resonates with audiences. AI-generated content appears particularly well-suited for engaging existing followers, whereas human-generated content may be more successful in appealing to new users. Therefore, while both approaches contribute to engagement, they do so in complementary ways: AI-generated content strengthens interaction within the existing community, and human-generated content supports audience growth.

6.2 Managerial implications

The practical implications of this study are significant for marketers and content creators, particularly within the eSports industry. The findings suggest that integrating AI tools into content creation strategies can enhance user engagement by producing timely, relevant, and interactive content. Tools like ChatGPT and Gemini proved effective in driving engagement through features such as polls and visually appealing images, particularly in Instagram Stories. These AI-driven interactive elements are valuable in maintaining engagement, especially among existing followers.

However, human-generated content demonstrated a distinct advantage in attracting new audiences, specifically non-followers, suggesting that it may be more effective in expanding reach beyond the current follower base. This indicates that marketers should carefully balance AI-generated content with human creativity to capitalize on both engagement and audience growth. A hybrid approach could involve using AI to generate interactive and scalable content while leveraging human expertise to craft personalized messages and strategies that appeal to new users.

Adapting marketing strategies to include AI-generated content can lead to more efficient and scalable content production processes. For instance, AI can be used to generate routine posts, analyze engagement data, and adapt content strategies in real-time based on user interactions. This allows marketers to respond quickly to trends and audience

preferences, maintaining a dynamic and engaging online presence. Additionally, AI's ability to analyze data and optimize content in real-time can help marketers personalize content more effectively, enhancing the relevance of the content to existing followers.

The study also revealed that male users exhibited higher engagement with eSports content, particularly in terms of sharing, involvement, and commercial actions like following players and purchasing products. This insight is valuable for marketers looking to develop targeted strategies that enhance engagement, especially when aiming to connect with male-dominated segments of the eSports audience.

7 Conclusions and Future Work

This study provides valuable insights into the effectiveness of AI-generated content in engaging the eSports audience on Instagram. While AI tools such as ChatGPT and Gemini demonstrated strong performance in driving user interaction, particularly through interactive elements and visual appeal, human-generated content excelled in attracting new followers, indicating the importance of balancing AI-generated content with human creativity to maximize reach. The study's limitations stated above, including the exclusive focus on Instagram and constraints on multimedia content, suggest that future research should explore the use of AI across multiple platforms and in diverse content formats to obtain a more comprehensive understanding of its potential. By addressing these limitations and leveraging the evolving strengths of AI, future studies can help refine and optimize the use of AI in digital marketing, particularly within dynamic sectors like eSports.

Several limitations were encountered throughout the research process. One primary limitation was the reliance on Instagram as the sole social media platform for data collection. While Instagram is a significant platform for eSports marketing, the results may not be fully generalizable to other social media platforms that cater to different types of engagement dynamics and user behaviors. Future research could expand the scope to include multiple platforms such as Twitch, Discord, or YouTube to provide a more comprehensive understanding of AI's impact on social media engagement across diverse user groups. This direction aligns with calls to move beyond platform-agnostic analyses, such as those identified by [Zhang et al., 2024], and to empirically test platform-specific user behaviors.

These future directions are also supported by key limitations identified in recent empirical studies, as outlined in Section 3. Thus, building on the concerns about perceived authenticity raised by [Brüns and Meißner, 2024], future studies should examine how transparency regarding GenAI usage affects user trust and engagement in dynamic, real-world settings. Furthermore, following [Haq and Chiu, 2024], future research could explore whether GenAI-generated content can replicate the social and persuasive effects typically associated with human influencers, particularly among more diverse audience segments.

Although the team at UCAM Esports imposed certain restrictions on the publication of AI-generated videos or images due to concerns about reputational risks, this limitation had minimal impact on the overall study. While generative AI tools can occasionally produce inappropriate or distorted content when applied to multimedia, such deviations were highly specific and occurred only once during the study. As a result, the content was generally able to adhere to the guidelines provided by UCAM Esports without significantly affecting the diversity or creativity of the posts. This allowed for a robust

evaluation of the potential of AI tools like DALL-E and Stable Diffusion in generating visually engaging content, while still maintaining adherence to necessary standards.

Moreover, the engagement metrics used in this study, such as likes, comments, shares, and reach, while valuable, might not capture the full spectrum of user interaction. Metrics like passive viewing, scroll-throughs, or sentiment analysis (rarely addressed in prior reviews like [Taherdoost, 2023]) could provide a more nuanced picture of content effectiveness. Future studies should aim to incorporate a broader range of engagement metrics, including more subtle forms of interaction, to evaluate how both AI and human-generated content affect user behavior and perceptions more holistically.

Another limitation of this study lies in the potential bias associated with the surveyed audience. The study's primary data was collected from a secondary school demographic, which may not fully represent the wider eSports audience. Expanding the sample to include a more diverse age group and different levels of engagement with eSports content could yield more generalizable results.

Another limitation of this study is that, while it provides a robust empirical evaluation of AI- and human-generated content based on real engagement metrics, it does not incorporate a theoretical model to explain the cognitive or motivational mechanisms behind user interactions. Future research could address this limitation by applying well-established theoretical frameworks, such as the Elaboration Likelihood Model (ELM) or the Technology Acceptance Model (TAM), to investigate how variables like perceived credibility, relevance, or usefulness influence user engagement. Incorporating validated constructs and testing structural models would offer a deeper understanding of the psychological factors shaping user behavior and complement the empirical findings presented in this study.

Likewise, an exciting avenue for future research lies in the exploration of the newly upgraded multimodal capabilities of commercial AI tools like ChatGPT and Gemini or other GenAI models that may be released. These advancements allow the tools to process not only text but also voice commands and visual inputs, opening up numerous experimental possibilities. Future studies could investigate how these multimodal features can be used to address the current absence of empirical evaluations of multimodal GenAI tools in prior literature, including the studies reviewed in Section 3. This could include experiments in generating and analyzing visual content, integrating voice commands for more interactive posts, and exploring the synergy between different content formats (e.g., video, images, and text) to maximize user engagement. Investigating how these features perform across different platforms and user demographics would also provide a broader understanding of their potential. Finally, the development of a modular framework capable of adapting as new GenAI models emerge, allowing the seamless integration of alternative models or switching between them depending on specific characteristics, constitutes another future work of this study.

Overall, this study not only addresses multiple gaps in existing research but also lays a foundation for future explorations into the role of GenAI in dynamic, high-engagement digital environments like eSports.

Declarations

Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contributions

Conceptualization, J.M.G. and A.S.; methodology, J.M.G., C.X.A.M. and A.S.; software, I.R.P.; validation, J.M.G., C.X.A.M. and A.S.; formal analysis, J.M.G., C.X.A.M. and A.S.; investigation, I.R.P., J.M.G., C.X.A.M. and A.S.; writing—original draft preparation, J.M.G., C.X.A.M. and A.S.; writing—review and editing, J.M.G., C.X.A.M. and A.S.; visualization, I.R.P. and A.S.; supervision, J.M.G. and A.S.; project administration, J.M.G. and A.S.; funding acquisition, J.M.G. and A.S.

Consent to publish

All authors have read and agreed to the published version of the manuscript.

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Availability of data and materials

All data and materials are available on request from the authors of this paper.

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