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AI DRIVEN DIGITAL BRAND COMMUNICATION FOR PARENTAL ENGAGEMENT IN STEM EDUCATION

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ABSTRACT

This study proposes an AI-based conceptual framework to evaluate digital communication and parental trust in children's STEM learning centers. As educational institutions increasingly rely on online communication, many early-stage learning centers lack structured approaches to assess how parents respond to digital messaging across diverse contexts. Using a conceptual literature review approach, this study synthesizes prior research on digital branding, parental engagement, and artificial intelligence in educational communication. The proposed framework positions AI-driven tools, such as sentiment analysis and media monitoring systems, as strategic mechanisms for interpreting parental responses and improving communication effectiveness. This study contributes by integrating AI perspectives into digital branding research and offers practical guidance for learning centers seeking to strengthen parent-institution relationships through data-informed communication strategies.

KEYWORDS: Digital Branding; Parental Trust; AI-Based Communication Analysis; Sentiment Analysis; STEM Learning Centers; Educational Marketing

INTRODUCTION

The rapid growth of digital education has intensified competition among children's learning centers, particularly those offering STEM based programs. As skills such as coding, digital literacy, and problem solving become increasingly important, learning institutions are required not only to deliver innovative curricula but also to communicate their educational value effectively to parents. In this context, parents act as the primary decision makers, evaluating institutions based on credibility, transparency, perceived innovation, and alignment with family values rather than academic outcomes alone.

Digital branding therefore plays a critical role in shaping parental perception and trust. It extends beyond visual identity to function as a strategic communication system that influences emotional connection, reputation, and long term engagement. For children's STEM learning centers, effective digital communication can strengthen parental confidence and increase willingness to engage, recommend, and enroll their children. However, many early-stage educational startups still rely on basic digital marketing practices without systematically evaluating how parents respond to their communication efforts.

At the same time, advancements in artificial intelligence (AI) have transformed how organizations assess communication effectiveness. AI-driven tools such as sentiment analysis, media monitoring, and engagement analytics enable the evaluation of audience perception, emotional responses, and interaction patterns across digital platforms. These tools



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have been widely applied in commercial branding and public communication, yet their adoption within the educational sector particularly for analyzing parental engagement remains limited. This gap is especially evident in children’s STEM learning centers that aim to position themselves as innovative but lack analytical frameworks to support data-informed branding strategies. While previous studies have examined digital branding and parental trust separately, few have integrated AI-supported communication analysis as a mechanism for understanding and improving parent institution relationships.

Therefore, this study proposes a conceptual framework that links digital branding, AI-driven communication analysis, parental trust, and engagement within children’s STEM learning environments. This research aims to contribute to educational marketing literature by highlighting the strategic role of AI in optimizing digital communication and supporting trust-based parental engagement.

MATERIALS AND METHODS

Research Design

This study adopts a conceptual literature review approach to examine how digital branding influences parental engagement in children’s STEM learning centers. The proposed framework is developed through a synthesis of theories and empirical findings from 20 Scopus indexed journal articles published between 2020 and 2025, focusing on digital branding, parental trust, engagement behavior, education marketing, and data analytics. As MindCraft Indonesia is still in the business planning stage, the study conceptually highlights the potential role of data analytics in identifying parental engagement indicators across digital platforms, drawing insights from existing practices in comparable STEM education brands.

Data Sources and Collection

The research utilizes two main sources of data:

1. Literature Based Data:

A total of 51 journal articles were initially retrieved from the Scopus database using the keywords: “digital branding,” “parental engagement,” “STEM education,” “data analytics,” and “education marketing.” After applying filters for relevance, publication year (2020–2025), and journal quality (Q1–Q2), 20 core articles were selected for in-depth review and synthesis.

2. Digital Engagement Data (Secondary):

Simulated digital data were obtained from open-access engagement statistics of comparable learning centers’ online platforms (Instagram, websites, and YouTube). Metrics such as post interactions, comments, likes, average time on site, and page visits were analyzed to represent parental engagement indicators. The literature data served as the theoretical foundation for model development, while the engagement data provided empirical support for variable relationships and operationalization.

Variables and Indicators

Based on the conceptual model, this study identifies five key constructs:

Table 1: Variables and Indicators

Variable	Indicator Example	Source
Digital Branding (DB)	Visual identity, social media consistency, brand tone	Liu & Ghasemy (2025); Sahli et al. (2024)
Parental Trust (PT)	Transparency, communication quality, credibility	Hamm & Mousseau (2023)
Parental Engagement (PE)	Interaction frequency, feedback participation, event involvement	Blake & Mestry (2022)
Parental Loyalty (PL)	Word-of-mouth, retention intention	Yashwanth (2024)
Data Analytics Insight (DAI)	Content reach, engagement rate, traffic analysis	Oré-Calixto & Vicente-Ramos (2021)

Each variable is defined conceptually and operationally to fit the context of children’s STEM learning centers, particularly within digital interaction environments.

Data Analysis Technique

Data were analyzed using descriptive analysis for conceptual synthesis and correlational modeling for the simulated engagement data.

The analytical procedures include:

1. Literature Synthesis: Key themes and theoretical constructs were identified through systematic mapping of 20 core Scopus-indexed articles related to digital branding, parental trust, engagement, and AI-supported communication in education.
2. Descriptive Analytics: Parental engagement indicators such as interaction frequency, comments, and digital content exposure were discussed conceptually based on secondary references from comparable STEM education platforms. These indicators illustrate how AI-based tools, such as sentiment analysis and media monitoring systems, can be used to interpret parental responses to digital communication.
3. Conceptual Model Validation: A structural conceptual framework was developed to describe the relationship between Digital Branding → Parental Trust → Parental Engagement → Parental Loyalty, with Data Analytics Insight acting as a supporting mechanism for communication evaluation and strategic decision-making.

Future empirical studies may validate the proposed model quantitatively using methods such as Partial Least Squares–Structural Equation Modeling (PLS-SEM) with analytical tools including SmartPLS or AMOS.

Ethical Considerations

This study is conceptual in nature and does not involve direct human participants. All



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data sources are derived from Scopus-indexed literature and publicly accessible digital information. No personal or sensitive data were collected or analyzed. The study adheres to academic integrity principles and responsible use of artificial intelligence concepts.

RESULTS AND DISCUSSION

The synthesis of twenty core Scopus-indexed articles published between 2020 and 2025 provides an integrated understanding of how digital branding, parental trust, and data-driven communication interact within children's STEM learning environments. Rather than presenting isolated findings, the results are discussed as a series of interconnected themes that reflect the evolving role of artificial intelligence and analytics in educational communication strategies. Four dominant conceptual clusters emerge from the literature, explaining the mechanisms through which digital branding influences parental engagement and decision-making.

Digital Branding

The first cluster highlights digital branding in education, as discussed by Liu and Ghasemy (2025) and Sahli et al. (2024). These studies argue that branding functions not only as a visual identity but also as a strategic tool for communicating institutional credibility, innovation, and emotional connection with stakeholders. Consistency in messaging and digital presence strengthens parents' perception of the institution's reliability and reputation.

Similarly, Gambhir and Sharma (2024) emphasize that higher education institutions increasingly rely on digital marketing tools and audience behavior analytics to attract and engage prospective students.

Parental Trust

The second cluster focuses on parental trust and engagement. Blake and Mestry (2022) and Hamm and Mousseau (2023) found that trust serves as the main mediator between brand perception and parents' behavioral intentions. Parents' willingness to recommend or engage with an educational institution depends largely on transparency, empathy, and perceived value alignment. In this context, trust becomes an emotional currency that reinforces brand loyalty.

Data Analytics

The third cluster deals with data-driven insights in educational marketing. Oré-Calixto and Vicente-Ramos (2021) demonstrated that integrating digital marketing analytics enables institutions to map customer behavior and improve relationship management. Metrics such as post interaction, click-through rates, and session duration provide actionable insights into parental engagement. Wang et al. (2025) also showed that analyzing such data allows educational platforms to personalize communication and enhance user experience.

Technology Driven Learning

The fourth cluster emphasizes technology-driven learning as a brand differentiator. Studies by Su and Yang (2024) and Lin and Yang (2025) demonstrated that integrating emerging technologies such as robotics, AI, and STEAM-based learning tools enhances both the child's learning experience and the parent's perception of institutional innovativeness. In this way, educational technology becomes part of the branding strategy, not merely an instructional tool. These clusters collectively illustrate that digital branding plays a dual role:



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as a communication strategy and as a relationship-building mechanism. Through consistent branding supported by data analytics, institutions can enhance parental trust, which in turn increases engagement and long-term loyalty.

CONCLUSIONS

This study synthesizes insights from twenty core Scopus-indexed articles and confirms that digital branding in children's STEM learning centers operates as a strategic communication mechanism rather than merely a visual identity. The literature consistently demonstrates that transparent, value-driven, and consistent digital branding enhances institutional credibility and emotional connection, which subsequently fosters parental trust and sustained engagement.

The findings further indicate that parental trust plays a pivotal mediating role in shaping behavioral intentions, including enrollment decisions, platform adoption, loyalty, and advocacy. Trust is strengthened through clear communication, perceived technological competence, and a positive institutional reputation. In addition, parental engagement is influenced not only by the quality of educational offerings but also by how accessible, interactive, and responsive information is communicated across digital channels.

The integration of data analytics into branding practices enables institutions to better interpret parental behavior, personalize communication strategies, and improve engagement effectiveness. Analytics-derived insights from digital interactions and engagement metrics support more adaptive and targeted branding approaches.

Overall, the intersection of digital branding, parental trust, and data-driven communication forms a strategic foundation for strengthening parent-institution relationships in STEM-based learning centers. Future studies are encouraged to empirically validate these relationships using primary parental data or digital platform analytics to further assess branding effectiveness.

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