

AI-DRIVEN CRM IN HYBRID LEARNING MODELS: BRIDGING THE GAP BETWEEN IN-PERSON AND DIGITAL EDUCATION

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*Corresponding authors | Received: 06/01/2025 | Accepted: 15/02/2025 | Published: 27/03/2025

Abstract

This study investigates the role of AI-Driven Customer Relationship Management (CRM) systems in enhancing hybrid learning models by bridging traditional in-person education and digital platforms. The research focuses on learners' perceptions, engagement, and satisfaction while addressing their expectations and concerns. A quantitative methodology approach was employed, incorporating data from 192 learners pursuing in hybrid learning. Key findings reveal that AI-Driven CRM systems significantly improve communication effectiveness, with learners reporting enhanced clarity, collaboration, and timely feedback. Personalization features, such as tailored recommendations and adaptive content, emerged as critical drivers of satisfaction, accounting for a substantial variance in positive learner outcomes. While engagement metrics were consistent across usage frequencies, the study highlighted the systems' ability to maintain learner interest and productivity. However, challenges persist, including concerns about data privacy, technical reliability, and potential loss of human interaction. Learners' familiar with AI technologies demonstrated higher acceptance, underlining the importance of digital literacy initiatives for seamless integration. The study underscores the transformative potential of AI-Driven CRM systems in hybrid learning but emphasizes the need for ethical, secure, and user-centric designs to maximize their effectiveness. This research contributes to the understanding of AI in education, offering actionable recommendations for developers, educators, and policymakers to optimize these systems for diverse learner needs.

Keywords: AI-Driven CRM, Hybrid Learning, Learner Engagement, Personalization, Digital Education.

Introduction

Redefining Learning: How COVID-19 Accelerated the Rise of Hybrid Digital Education

The COVID-19 pandemic marked a turning point in education, accelerating the adoption of digital tools and reshaping traditional learning systems. With schools and universities forced to close, the global education sector swiftly pivoted to remote learning to ensure continuity. This transition brought hybrid digital education to the forefront, blending online and in-person instruction into a cohesive model. Hybrid education became a necessity, offering flexibility and resilience in uncertain times.

AI-powered platforms played a pivotal role, delivering personalized learning experiences through adaptive content, real-time feedback, and virtual tutoring. These tools addressed diverse student needs, enhancing engagement and learning outcomes. Additionally,

immersive technologies like Virtual and Augmented Reality transformed learning into interactive experiences, helping students explore complex concepts beyond the confines of physical classrooms.

The pandemic also highlighted the need for equitable access to technology, as disparities in connectivity and devices created challenges for many students. Despite these hurdles, the rapid embrace of hybrid digital education demonstrated the potential of technology to make learning more inclusive, personalized, and scalable. As education systems continue to adapt post-pandemic, the innovations spurred by COVID-19 have laid the groundwork for a more flexible and future-ready approach to teaching and learning, aligned with Education 4.0 principles.

The Future Classroom: Where AI meets Human Creativity

Educators and technologists must work together to create a new educational paradigm where AI and human teachers operate as true partners. This vision sees teachers evolving into "learning architects" who orchestrate sophisticated educational experiences by leveraging AI tools while maintaining their crucial role as mentors and guides. The next five years will be critical in shaping this transformation. Educational institutions need to invest in both AI infrastructure and teacher training, ensuring educators are comfortable using these tools to enhance their teaching rather than feeling threatened by them.

Forward-thinking educational institutions are already establishing AI competency programmes for teachers, focusing on how to effectively integrate tools like adaptive learning platforms and GenAI into their teaching practice. The future of education lies not in choosing between AI and human teachers, but in embracing the powerful potential of their collaboration. The technology is ready and it's time for educational institutions, policy-makers and teachers to embrace this collaborative approach to create learning environments that are more personalized, equitable and effective than ever before. By combining the analytical power of AI with the irreplaceable human element of teaching, we can truly transform education for the next generation.

Review of Literature

AI is seen by students as a useful instrument for enhancing engagement and communication in hybrid learning environments. AI tools improve student involvement, offer tailored feedback, and help teachers and students meet learning objectives. In hybrid contexts, AI solutions such as Interactive Class and MOVES-NL provide real-time interaction, discussion boards, and quizzes, increasing student happiness and involvement. (W. Villegas-Ch et al.,

2024) (Giulia et al., 2024). Additionally, by assisting students in testing and reflecting on their knowledge, AI systems improve conceptual comprehension. (Giulia Cosentino et al., 2024). AI improves the consistency and efficiency of assessments by providing instantaneous, tailored feedback. As evidenced by a 30% increase in participation and a 25% improvement in grades¹, this improves student performance and happiness.

AI graders are frequently seen as credible by students, particularly when feedback incorporates social support and immediacy cues, which strengthens the impression of AI's kindness and compassion. (Bryan et al., 2024). By supporting instructors with instructional duties, artificial intelligence (AI) enhances their talents and frees up teachers to concentrate on more intricate teaching activities and student interactions. (Giulia et al., 2024) (Pravin et al., 2022)

Notwithstanding the advantages, students frequently choose human communication over AI in learning environments because they value the human touch and the perceived empathy of teachers. (Patric et al., 2024).

Concerns regarding academic integrity, data privacy, and the possibility of an excessive dependence on automated systems are brought up by the use of AI in education. (Zishan et al., 2024). Learners have a good perception of AI in hybrid education, mainly because of its capacity to improve engagement, offer tailored feedback, and assist both teachers and students. The best use of AI in education, however, requires addressing issues like the desire for human contact and ethical considerations. Hence we develop the First Objective; To measure learners' perceived improvement in communication effectiveness using AI-Driven CRM systems in hybrid learning models.

AI-Driven technologies are becoming more and more integrated into hybrid education approaches, which combine online and in-person learning. In order to boost student engagement, these technologies are made to enhance cooperation, communication, and real-time feedback. Artificial intelligence (AI) has the potential to revolutionize hybrid education by fostering a more engaging and dynamic learning environment that enhances student and instructor autonomy. (Sylvester et al., 2024) (Amjad et al., 2023). AI-integrated customer relationship management (CRM) systems aim to improve user happiness and interaction quality in order to boost user engagement. CRM system compatibility has a little impact on user attitudes, but organizational users' attitudes and intentions to embrace AI technology are significantly impacted by these systems. (Sheshadri et al., 2021).

AI-Driven CRM systems may be adapted for use in educational settings to boost student

engagement by facilitating better teaching-student interactions and personalizing learning experiences. AI has several advantages for education, including improved learning outcomes, performance prediction, and resource mobilization. Intelligent tutoring systems and Chabots' are two AI-powered options that offer personalized, self-paced learning and can increase student retention and engagement. (Padmakali et al., 2024). These technologies also make it possible to provide students with assistive technology and generate predictive analytics to improve retention management. AI has the ability to completely transform hybrid learning, but it also poses challenges in maintaining students' interest and drive. (Amjad et al., 2023) (Sylvester et al., 2024). Teachers must appropriately integrate AI to ensure that technology complements traditional teaching methods and satisfies the diverse needs of pupils.

AI-Driven CRM solutions must be designed and implemented with user satisfaction and system compatibility in mind to maximize their effectiveness. (Sheshadri et al., 2021). AI-Driven CRM solutions may significantly boost student engagement in hybrid education by promoting improved communication and providing personalized learning experiences. However, for integration to be effective, user needs and system compatibility must be properly taken into account. As technology advances, AI's role in education is anticipated to increase, offering new opportunities to enhance student engagement and learning outcomes. Hence we develop the Second Objective; To evaluate the influence of AI-Driven CRM systems on learners' engagement levels in hybrid education.

In general, learners are satisfied with personalized AI-CRM systems in education since they improve learning experiences by customizing interactions and information to meet the needs of each learner. However, in order to optimize their efficacy, some issues and concerns must be taken into account. Personalized AI systems in education offer customized evaluations and material that match learners' preferences and understanding levels, enhancing learning results and happiness. (Mir Murtaza et al., 2022) (Gina et al., 2024) (Shweta et al., 2024). Better learner-instructor interactions are made possible by AI technologies, which improve communication and a sense of community by automating repetitive activities and offering individualized help. (Kyoungwon et al., 2021) (Ramteja et al., 2024). It has been demonstrated that AI-Driven customization enhances academic achievement, engagement, and pleasure by providing tailored learning experiences. (Chelsea et al., 2023) (Shweta et al., 2024).

Learners' confidence and pleasure with these systems may be impacted by worries about data privacy, spying, and the moral use of AI in education. (Kyoungwon et al., 2021) (Setareh et

al., 2021). The quality of the recommendation algorithms and how well they integrate with current educational frameworks determine how effective AI-CRM solutions are. It is essential to provide explainability and human monitoring. (Sihem et al., 2022) (Sheshadri et al., 2021) (Qian, 2022). In order to provide fair learning chances, AI systems must efficiently accommodate a variety of learner backgrounds and preferences, which calls for complex algorithms and data management. (Chelsea et al., 2023) (Setareh et al., 2021). Overall, by offering individualized learning experiences and enhancing the caliber of interactions, customized AI-CRM systems in education greatly increase student happiness.

However, in order to fully achieve their potential and sustain high levels of pleasure, it is imperative to resolve privacy problems, ensure ethical use, and create strong systems. Hence we develop the Third Objective; To assess learners' satisfaction with the personalization features of AI-Driven CRM systems.

According to this research, students anticipate that AI-CRM would improve communication, tailored learning, and operational effectiveness in the classroom, but they are also concerned about social boundary breaches, agency, accountability, and monitoring. When it comes to the use of AI-CRM (Artificial Intelligence-Customer Relationship Management) solutions in the classroom, students have both expectations and reservations. Although these technologies create significant concerns, they also promise to improve educational experiences. It is anticipated that AI systems would enhance communication and connections between students and teachers by customizing assistance and content to meet the requirements of each individual student. (Kyoungwon et al., 2021) (Padmakali et al., 2024). Routine chores may be automated by AI-CRM systems, freeing up teachers to spend more time interacting with pupils. Better learning results and more satisfaction may result from this. (Kyoungwon et al., 2021) (Padmakali et al., 2024).

Through the provision of individualized learning paths and improved digital efficacy, AI technologies are expected to promote autonomous learning, which may boost student motivation and inventiveness. (Ling et al., 2024) (Padmakali et al., 2024). Significant worries exist over data privacy and the possibility that AI systems could cross social borders, resulting in problems with agency loss and monitoring. (Kyoungwon et al., 2021). Teachers and students are concerned about control and accountability for AI systems, wondering who is responsible for AI judgments. (Kyoungwon et al., 2021). The use of AI in education raises questions regarding fair access to learning opportunities and technology, which might lead to a wider divide between various student groups. (Sihem et al., 2022). AI-CRM systems

have the potential to create individualized, effective, and captivating educational experiences. That being said, they also present issues with accountability, privacy, and equity.

Maximizing the advantages of AI in educational contexts requires addressing these issues via thoughtful design and execution. Hence we develop the Forth Objective; To identify key learner expectations and concerns regarding the integration of AI-Driven CRM systems in hybrid learning environments.

Several important criteria influence how learners' adoption of AI-Driven CRM systems in hybrid learning settings is correlated with their experience with AI technology. Here is an analysis derived from the available data: Knowledge of AI technology has a big impact on how people feel and act toward AI-powered systems. According to the Technology Acceptance Model (TAM), familiar learners are more likely to believe that AI technologies are practical and simple to use. (Lazar et al., 2020). When engaging with complicated systems, familiarity fosters confidence and lowers fear. Learners' perceptions of the system's quality and suitability for their learning requirements are influenced by familiarity.

While new users could find it difficult to match CRM functions with their expectations, users who have already worked with AI are better able to incorporate these technologies into their workflows. (Chatterjee et al., 2021). Algorithm aversion is generally lower among learners who are used to AI technology. They are more inclined to accept AI systems' learning potential and have faith in them, particularly if they act responsively and adaptively. (Berger et al., 2020). Learners' self-efficacy is increased by familiarity, which strengthens their desire to use AI-powered CRM solutions. Contextual elements like the standard of instruction and exposure to AI in learning environments lend more credence to this. (Kashive et al., 2020). One important aspect affecting learners' adoption of AI-Driven CRM systems in hybrid learning is their level of familiarity with AI technology. Stronger behavioral intents to adopt these systems, decreased fear, and increased trust are all displayed by familiar learners. Adoption rates and efficacy can be increased by fostering familiarity via exposure and training. Hence we develop the Fifth Objective; To analyze the relationship between learners' familiarity with AI technology and their acceptance of AI-Driven CRM systems in hybrid learning.

Research Gap

Existing research on AI-Driven Customer Relationship Management (CRM) systems has predominantly concentrated on their technological capabilities and the benefits they offer to institutions, such as improved operational efficiency, better resource management, and

enhanced institutional communication. While these studies highlight the advantages of CRM systems from an institutional perspective, there is a notable lack of research examining the learners' perspectives on these systems, particularly in hybrid learning environments. The experiences, perceptions, and attitudes of learners toward AI-powered CRM systems have received limited attention, leaving a gap in understanding how these systems influence student engagement, satisfaction, and academic outcomes. Specifically, there is little exploration into how AI-Driven CRM systems impact learners' experiences in terms of personalized support, timely communication, and interaction with both academic content and support services. This study aims to fill this gap by focusing on learners' experiences with AI-Driven CRM systems in hybrid learning environments, providing insights into how these systems influence engagement, satisfaction, and academic success. By centering on the learner's viewpoint, the research will contribute to a more holistic understanding of the potential of AI-Driven CRM systems in modern education.

Objectives of The Study

1. To measure learners' perceived improvement in communication effectiveness using AI-Driven CRM systems in hybrid learning models.
2. To evaluate the influence of AI-Driven CRM systems on learners' engagement levels in hybrid education.
3. To assess learners' satisfaction with the personalization features of AI-Driven CRM systems.
4. To identify key learner expectations and concerns regarding the integration of AI-Driven CRM systems in hybrid learning environments.
5. To analyze the relationship between learners' familiarity with AI technology and their acceptance of AI-Driven CRM systems in hybrid learning.

Scope of the Study

This study focuses on learners enrolled in hybrid learning models across various educational institutions, including universities, colleges, and EdTech platforms. It aims to delve into learners' perceptions, attitudes, and overall experiences with AI-Driven Customer Relationship Management (CRM) systems, which have become an integral part of the educational experience in these settings. Specifically, the research seeks to understand how AI technologies embedded within CRM systems are influencing students' interactions with their learning environments, including their engagement with course materials, academic support services, and personalized learning experiences. The study will also conduct a

comparative analysis to examine how learners' experiences differ in hybrid learning environments with and without AI-Driven CRM integration. This comparison will explore whether the presence of AI in CRM systems leads to enhanced learner satisfaction, more effective communication with instructors and support staff, and a greater sense of personalization in their educational journeys. By gathering insights from learners in diverse educational settings, the research aims to offer a deeper understanding of the role of AI in transforming CRM systems and their impact on student engagement and success in hybrid learning environments.

Research Methodology

This study employs a quantitative approach to measure learners' perceptions, engagement, satisfaction, and concerns to examine the impact of AI-Driven Customer Relationship Management (CRM) systems in hybrid learning models.

Population and Sample: The study focuses on learners enrolled in hybrid learning environments across various educational institutions, including universities, colleges, and EdTech platforms. A stratified random sampling method ensures representation across different demographic and academic backgrounds. A total of 192 participants were selected to provide statistically significant insights.

Data Collection: Quantitative data were collected using structured questionnaires, assessing communication effectiveness, engagement levels, and satisfaction with personalization features.

Instruments: The questionnaire included Likert-scale items to quantify perceptions and engagement, while interview guides explored themes such as data privacy and human-AI interaction. The instruments were validated through pilot testing with a subset of the population.

Data Analysis: Quantitative data were analyzed using descriptive statistics, t-tests, ANOVA, and regression analysis to evaluate the impact of AI-Driven CRM systems.

Data Analysis & Interpretation

Perceived Communication Effectiveness – Descriptive Statistics:

Table No.1: Table Showing the Descriptive Analysis of Perceived Communication Effectiveness Using AI-Driven CRM Systems

Perceived Communication Effectiveness Statements	N	Mean	Std. Deviation
The AI-driven CRM system has made communication with instructors more efficient	192	2.94	1.448
I find it easier to collaborate with my peers using the CRM system	192	3.05	1.309
Notifications and updates provided by the system are timely and relevant	192	2.81	1.435
The CRM system has improved the clarity of communication within the hybrid learning model	192	3.17	1.446
Overall, I feel the system has enhanced my communication experience in hybrid learning	192	3.03	1.456

Findings

- The statement with the highest mean (3.17) was, "The CRM system has improved the clarity of communication within the hybrid learning model," indicating moderate agreement among learners about improved communication clarity.
- The statement with the lowest mean (2.81) was, "Notifications and updates provided by the system are timely and relevant," showing that this area is perceived as less effective.
- The standard deviations for all statements range between 1.309 and 1.456, suggesting moderate variability in learners' responses.

Perceived Communication Effectiveness – One-Sample T-Test

Null Hypothesis (H₀): The mean perceived communication effectiveness score for learners using AI-driven CRM systems is equal to the test value of 3.

Table No. 2: Table showing One-Sample Statistics

Factor	N	Mean	Std. Deviation	Std. Error Mean
Perceived Communication Effectiveness	192	15.01	3.166	0.229

Table No. 3: Table showing One-Sample Test Result

Factor	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Perceived Communication Effectiveness	52.536	191	0.000	12.005	11.55	12.46

Findings

- The composite mean score of 15.01 is significantly higher than the test value of 3 ($t = 52.536$, $p < 0.001$). The confidence interval for the mean difference (11.55 to 12.46) indicates a consistent perceived improvement.

Inference

- The mean perceived communication effectiveness score (15.01) is significantly higher than the test value of 3 ($p < 0.001$). This result strongly rejects the null hypothesis, indicating that learners perceive a significant improvement in communication effectiveness when using AI-Driven CRM systems. The confidence interval suggests a substantial positive difference from the test value, highlighting the system's effectiveness in facilitating communication.

Learners' Engagement Levels – One-way ANOVA

Null Hypothesis (H_0): There is no significant difference in learners' engagement levels (platform interaction frequency, participation and discussion, task completion) across different usage frequency groups (Daily, Weekly, Monthly, and Rarely).

Table No.4: Table Showing the Descriptive Statistics of Learners' Engagement Levels

Learners' Engagement Levels		N	Mean	Std. Deviation	Std. Error
Platform Interaction Frequency	Daily	55	15.85	3.319	0.448
	Weekly	39	15.33	3.271	0.524
	Monthly	49	15.86	3.240	0.463
	Rarely	49	14.45	2.902	0.415
	Total	192	15.39	3.216	0.232
Participation and Discussion	Daily	55	15.84	3.671	0.495
	Weekly	39	15.72	2.772	0.444
	Monthly	49	15.08	2.783	0.398
	Rarely	49	14.71	3.588	0.513
	Total	192	15.33	3.277	0.236
Task Completion	Daily	55	15.49	3.490	0.471
	Weekly	39	14.49	2.771	0.444

	Monthly	49	14.49	3.305	0.472
	Rarely	49	14.84	3.145	0.449
	Total	192	14.86	3.222	0.233

Table No.5: Table Showing the ANOVA Statistics Learners' Engagement Levels

Factors		Sum of Squares	df	Mean Square	F	Sig.
Platform Interaction Frequency	Between Groups	66.078	3	22.026	2.168	0.093
	Within Groups	1909.625	188	10.158		
	Total	1975.703	191			
Participation and Discussion	Between Groups	41.568	3	13.856	1.297	0.277
	Within Groups	2009.098	188	10.687		
	Total	2050.667	191			
Task Completion	Between Groups	34.051	3	11.350	1.095	0.352
	Within Groups	1948.428	188	10.364		
	Total	1982.479	191			

Findings:

Descriptive Statistics:

1. Across all engagement metrics (platform interaction, participation, and task completion), the mean scores ranged from 14.45 to 15.86, indicating moderate engagement.
2. Daily users of the platform consistently scored higher in engagement metrics compared to those using the platform less frequently (e.g., monthly or rarely).

One-Way ANOVA:

1. For **Platform Interaction Frequency**, no significant differences were observed among groups ($F = 2.168$, $p = 0.093$).
2. Similarly, no significant group differences were found for **Participation and Discussion** ($F = 1.297$, $p = 0.277$) or **Task Completion** ($F = 1.095$, $p = 0.352$).

Inference:

- The p-values for all three metrics (platform interaction frequency, participation and discussion, task completion) exceed the significance level of 0.05, indicating no statistically significant differences in engagement levels across the usage frequency groups. Therefore, the null hypothesis cannot be rejected, suggesting that engagement with the AI-Driven CRM system remains consistent regardless of how frequently learners use the platform. This uniformity in engagement could reflect the system's ability to maintain learner interest and productivity across diverse usage patterns.

Regression Analysis

Table No.6: Table Showing the Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.866 ^a	0.751	0.748	1.339
a. Predictors: (Constant), Adaptive Content, Tailored Recommendation				

Table No.7: Table Showing the ANOVA Output

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1019.582	2	509.791	284.306	0.000 ^b
	Residual	338.897	189	1.793		
	Total	1358.479	191			
a. Dependent Variable: Learner Satisfaction						
b. Predictors: (Constant), Adaptive Content, Tailored Recommendation						

Table No.8: Table Showing the Coefficients

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.364	0.775		1.759	0.080
	Tailored Recommendation	0.601	0.031	0.708	19.373	0.000
	Adaptive Content	0.391	0.024	0.585	16.008	0.000
a. Dependent Variable: Learner Satisfaction						

Findings:

Regression Model:

- The model explained 75.1% of the variance in learner satisfaction ($R^2 = 0.751$), highlighting the strong influence of personalization features.
- Tailored Recommendation** had a larger impact ($B = 0.601$, $Beta = 0.708$, $p < 0.001$) than **Adaptive Content** ($B = 0.391$, $Beta = 0.585$, $p < 0.001$), though both were highly significant.

ANOVA Results:

- The overall model fit was excellent ($F = 284.306$, $p < 0.001$), reinforcing the importance of these features.

Inference:

- Learners' satisfaction with AI-Driven CRM systems is significantly influenced by the personalization features. Tailored recommendations are particularly valued, suggesting that

providing individualized and actionable suggestions should remain a priority in platform design. Adaptive content also plays a key role, but its impact is slightly less pronounced than tailored recommendations.

Frequency Analysis

Table No.9: Table Showing the Frequency Analysis of Learner Expectations Regarding the Integration of AI-Driven CRM Systems

Sl.No.	Learner Expectations Statements	Yes	No	Total
1	I expect the CRM system to provide clear and prompt communication.	110	82	192
2	The CRM system should cater to my individual learning needs.	106	86	192
3	I anticipate that the system will improve my engagement in the hybrid learning model.	99	93	192
4	The CRM system should integrate seamlessly with my existing learning methods.	104	88	192
5	I expect the system to provide personalized and relevant learning content.	102	90	192

Findings

Learner Expectations:

- Most learners (57.3%) expect the CRM system to provide clear and prompt communication.
- Around 55% expect the system to cater to individual learning needs, and a similar percentage anticipate improved engagement.

Table No.10: Table Showing the Frequency Analysis of Learner Concerns Regarding the Integration of AI-Driven CRM Systems

Sl. No.	Learner Concerns Statements	Yes	No	Total
1	I am concerned about the privacy of my data when using the CRM system.	94	98	192
2	I worry that the system may not be intuitive or easy to use.	92	100	192
3	I am uncertain about the reliability of the system's recommendations.	87	105	192
4	I fear the system may reduce the human touch in the learning process.	89	103	192
5	I am concerned about potential technical issues affecting my learning experience.	91	101	192

Findings

Learner Concerns

- Data privacy is a major concern for nearly half of the learners (48.9%), followed by concerns about technical issues (47.4%).

- Fewer learners (45.8%) are worried about the system's ease of use or its ability to preserve the "human touch."

Inference:

- Learners value personalization, seamless integration, and clear communication as primary expectations from AI-Driven CRM systems. However, concerns about data privacy and technical reliability highlight areas that need to be addressed to enhance trust and adoption.

Correlations Analysis

Table No.11: Table Showing the Correlation Analysis

Factors	Learners Familiarity	Learners Acceptance
Learners Familiarity	1	0.744**
Learners Acceptance	0.744**	1
**. Correlation is significant at the 0.01 level (2-tailed).		

Findings

- A strong positive correlation was observed between learners' familiarity with AI technology and their acceptance of AI-Driven CRM systems ($r = 0.744$, $p < 0.01$).
- Learners who reported higher familiarity with AI systems were significantly more likely to adopt and trust the CRM platform.

Inference:

- Familiarity with AI technology is a crucial factor influencing acceptance. Educational institutions and CRM system providers should focus on increasing learners' exposure to and comfort with AI technologies through training and hands-on experiences to foster greater adoption.

Overall Discussion and Recommendations

One revolutionary strategy that aims to close the gap between conventional in-person education and digital learning is the incorporation of AI-Driven Customer Relationship Management (CRM) systems into hybrid learning models. This study offers insightful information on how AI-CRM systems might improve learner acceptability, satisfaction, communication, and engagement.

Enhanced Communication Effectiveness: The findings reveal that learners perceive AI-Driven CRM systems as effective tools for improving communication within hybrid

learning environments. A significant improvement was observed in communication clarity, timeliness of notifications, and overall efficiency. Learners rated their ability to collaborate with peers and instructors as moderately positive, emphasizing the system's role in facilitating seamless interactions. These results align with prior research suggesting that AI-powered systems can enhance real-time communication and reduce delays in feedback loops. However, certain aspects, such as the relevance and timeliness of notifications, require further refinement to meet learner expectations consistently.

Engagement Levels across Usage Patterns: The analysis of engagement metrics, including platform interaction frequency, participation in discussions, and task completion, indicates a moderate level of engagement among learners. Interestingly, although descriptive statistics showed slightly higher engagement scores among daily users, these differences were not statistically significant. This finding suggests that the AI-Driven CRM system delivers consistent engagement benefits irrespective of usage frequency. This could be attributed to the system's ability to maintain user interest through features like reminders, gamification, and adaptive content. However, the lack of significant differences may also point to the need for more dynamic and user-specific engagement strategies.

Personalization as a Key Driver of Satisfaction: Personalization emerged as a critical determinant of learner satisfaction, with tailored recommendations and adaptive content significantly influencing outcomes. The regression analysis highlights that tailored recommendations had a stronger impact than adaptive content, indicating that learners highly value actionable and personalized suggestions. This underscores the importance of AI algorithms in analyzing individual learning patterns and delivering recommendations that align with their goals. The findings suggest that developers and educators should prioritize the refinement of these features to enhance learner satisfaction further.

Learner Expectations and Concerns: The study underscores the duality of learner perceptions, combining high expectations with notable concerns. Most learners expressed a strong desire for clear communication, personalized content, and seamless integration with existing learning methods. On the other hand, data privacy emerged as the most significant concern, followed closely by fears of technical issues and loss of the human touch. These findings highlight the importance of addressing ethical considerations, such as data security and transparency, to foster trust and ensure long-term acceptance of AI-Driven CRM systems.

The Role of Familiarity in Acceptance: A strong correlation between familiarity with AI technology and acceptance of AI-Driven CRM systems emphasizes the need for digital

literacy initiatives. Learners who were more comfortable with AI systems were more likely to trust and adopt them. This insight points to the necessity of providing training and support to help learners navigate and maximize the benefits of these platforms. Increasing familiarity can also alleviate apprehensions related to the usability and reliability of AI-Driven systems.

Future Research Directions

Building on the findings of this study, several areas for further research are recommended to optimize the integration of AI-Driven CRM systems in hybrid learning models:

1. **Enhancing Personalization Algorithms:** Enhancing the algorithms that power customization features should be the main goal of future research. Research might examine how more sophisticated machine learning methods, including deep learning and reinforcement learning, can offer suggestions that are more precise and tailored to the situation. Further insights into the effectiveness of customization may also be obtained by examining how these aspects affect various learner groups according to demographics or learning preferences.
2. **Addressing Privacy and Ethical Concerns:** Given the significant concerns about data privacy and security, further research is needed to explore ethical AI practices in educational CRM systems. Studies could examine the effectiveness of privacy-preserving technologies, such as differential privacy or block chain, in safeguarding learner data. Additionally, understanding learners' perspectives on transparency and consent in data collection would help build trust in these systems.
3. **Improving Engagement Strategies:** While this study found no significant differences in engagement based on platform usage frequency, future research could investigate the role of gamification, real-time feedback, and peer interaction in enhancing engagement. Longitudinal studies could provide insights into how engagement levels evolve with prolonged exposure to the system.
4. **Exploring the Human-AI Balance:** Research should examine how AI-Driven systems can complement rather than replace human interaction in education. Mixed-method approaches could evaluate the psychological and emotional effects of AI systems on learners, particularly in preserving the human touch in hybrid models.
5. **Expanding Digital Literacy:** Future studies should assess the effectiveness of training programs aimed at increasing familiarity with AI systems. Investigating how different levels of digital literacy influence acceptance and usage behavior across varied learner profiles would be valuable.

6. **Cultural and Institutional Contexts:** Finally, cross-cultural and institutional studies are recommended to understand how AI-Driven CRM systems perform in diverse educational settings, including low-resource environments, to promote equitable access and adoption globally.

Conclusion

This study underscores the transformative potential of AI-Driven CRM systems in bridging the gap between in-person and digital education within hybrid learning models. The findings reveal that these systems significantly enhance communication effectiveness, with learners reporting improved clarity, collaboration, and efficiency in interactions. However, certain aspects, such as timely notifications, require further refinement to meet learner expectations.

Engagement metrics suggest consistent benefits across usage frequencies, indicating that the platform effectively maintains learner involvement regardless of usage patterns. Personalization features, particularly tailored recommendations and adaptive content, emerged as strong predictors of learner satisfaction, highlighting the importance of individualized learning experiences.

While learners expressed high expectations for clarity, personalization, and seamless integration, concerns about data privacy, technical reliability, and the human touch highlight areas requiring immediate attention. Additionally, a strong correlation between familiarity with AI technology and system acceptance emphasizes the need for digital literacy initiatives to enhance adoption rates.

Overall, AI-Driven CRM systems present a viable solution for fostering a connected and engaging learning environment in hybrid models. Addressing ethical, technical, and usability challenges will be crucial for their widespread acceptance. Future research should focus on refining these systems to ensure equitable, learner-centric, and effective integration across diverse educational contexts.

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