

*Strategic Leadership and Effective Management in
Implementing an AI-Enhanced Online Parent-
Teacher Communication System for a Primary School
in the UAE*

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Abstract:

This study research introduces an AI-enhanced communication system designed to improve the interactions between teachers and parents at a school in Ras Al Khaimah, UAE. Our objective was to strengthen and personalize communication, thereby enhancing the educational experience. We utilized the Successive Approximation Model (SAM) to develop an application that specifically addresses user needs. Employing a mixed-methods approach, we gathered data through surveys and interviews. The findings demonstrate that the AI system effectively fills critical communication gaps, providing a unified platform that significantly improves the efficacy and quality of parent-teacher relationships. Despite the study coinciding with an examination period which limited some participants' availability we capitalized on this timing to access parents in waiting areas, enriching our data collection. Additionally, we conducted online surveys and remote testing of the prototype, showcasing the system's potential to support continuous educational communication enhancements.

Key words : *Strategic Leadership - Effective Management - AI-Enhanced Online Parent-Teacher - Communication System - Primary School*

Introduction

The advent of Artificial Intelligence (AI) in online educational systems marks a significant stride in the ever-evolving domain of educational technology. In recent times, a notable shift towards innovative educational

methodologies, centered around student engagement, has emerged, showing promising improvements in student performance, interest, and motivation (Kim & Kim, 2022). Central to this advancement is the role of effective communication between schools and parents, which is instrumental in shaping students' academic and developmental paths (Chen & Rivera-Vernazza, 2022).

AI is transforming industries and daily life with its advanced tools, significantly impacting education by integrating into teaching and learning, with educators using AI for decades to enhance learning management systems, assessment tools, and other supports in STEM subjects (Kim & Kim, 2022). AI references to Artificial Intelligence which is a multifaceted field of computer science dedicated to creating systems and machines that exhibit human-like intelligence and cognitive skills (Russel & Norvig, 2020).

Furthermore, AI can improve traditional classroom evaluation techniques through big data analysis, which adds a new level of engagement between teachers and parents. This entails offering perceptions of the learning styles and mental conditions of pupils, enabling a more complex comprehension of every student's academic path (Seo et al., 2021). Integrating AI into parent-teacher communication frameworks in the United Arab Emirates necessitates strategic leadership and effective administration.

Literature Review

The application of AI in education has revolutionized conventional wisdom in recent years, providing new approaches in improving students' educational experiences

and final grades. There is a vast diversity of educational applications for artificial intelligence (AI), including automated grading systems and personalized learning platforms (Leenders et al., 2019). Nevertheless, AI has demonstrated great potential in improving and streamlining communication between parents and educators. For children's well-rounded growth, parents and teachers must communicate effectively. Educators and carers work together to meet students' intellectual, social, and emotional needs in a nurturing learning environment (Seo et al., 2021). Parents may play an active role in their child's education by receiving frequent updates on their child's accomplishments, behaviours, and difficulties; this will allow them to reinforce learning at home and increase the effectiveness of school instruction.

Examining how artificial intelligence (AI) may improve communication between educators and their students' families is the overarching goal of this research review. This research aims to find all the resources that help teachers and parents communicate more effectively by reviewing the literature on AI-driven platforms, tools, and tactics (Kuusimäki et al., 2019). This research is also interested in defining how different channels of common communication channels student achievement, parental engagement, and the relationship between the school and the community. The research on AI-mediated teacher-parent communication aims to understand better its advantages, disadvantages, and ethical implications (Laho, 2019). In addition, we hope to draw attention to suggestions on effectively using AI in the classroom so that parents and educators may work together to their children's advantage.

Ultimately, this literature review aims to add to the continuing conversation on using AI to enhance the collaboration between parents and educators to help adolescents succeed academically and grow holistically. By explaining the possibilities of AI-powered communication tools, this research can educate stakeholders, including lawmakers, about new ways to encourage students to participate in school life and work together actively (Laho, 2019). By learning more about this subject, people hope to use AI's amazing abilities to make learning settings better and give students the tools they need to achieve in a world that is constantly changing and becoming more complex and interconnected.

Current Systems and the challenges:

The current communication system utilized in schools primarily involves WhatsApp, Telegram channels and few mentioned School' email. These platforms serve as conduits for disseminating school news and activities to parents. To streamline information distribution, each subject is assigned its own channel through which weekly tasks, homework, and exam details are shared. However, this system lacks a mechanism for delivering personalized information directly to each parent. Direct communication with individual parents, if needed, is typically conducted via WhatsApp messages or phone calls.

Regarding personalized information about students, such as academic performance and specific needs, it is traditionally provided to parents through annual meetings held at the school. These meetings offer a platform for a more in-depth exchange of information about each student's progress and challenges. However, it's notable

that not all parents are able to attend these annual meetings, potentially leading to gaps in communication and a lack of personalized engagement for some families.

Regarding the implementation of AI in schools, it is currently limited to an educational context rather than as a tool for communication. AI is taught to students as part of the curriculum, but it has not been integrated into the school-parent communication system. Communication between teachers and parents is largely carried out using personal smartphones, with teachers often having to use their private numbers. This approach, while straightforward, does not utilize any specialized application designed specifically for school-parent interactions. Each teacher has a school email, but most parents don't use it in communication, and they prefer applications like WhatsApp and Telegram for direct communication.

Additionally, some tasks and updates are communicated via a Learning Management System (LMS), which serves as a central hub for student activities and is linked to other applications such as Nahla and Nahel, used for reading. However, this system does not fully address the communication needs.

The primary challenges faced in the current system include:

1. **Privacy Concerns for Teachers:** Teachers sharing their private numbers with parents leads to potential intrusions into their personal time. Teachers have expressed discomfort with parents contacting them outside of work hours, underscoring the need for a more structured communication channel.

2. Overwhelming Information for Parents: Parents have reported challenges with the multiple communication channels for different subjects, particularly when they have more than one child. A parent noted the difficulty in managing and keeping track of information from various channels, suggesting a preference for a consolidated communication platform.

3. Task Management for Students: parents face the challenge of balancing the tasks for their kids as each teacher send the tasks without considering the other tasks that each student has for the other subjects.

Problem statement

The lack of efficient and private communication channel in Al Jazeera primary school in UAE. This research aims to enhance the current communication by developing a new system that is linked with the current LMS. The system also will use AI to create personalized information for each parent and will help teachers organize and notify the parents of all the tasks, homework, and exams.

Research Questions:

The main research question is how can an AI-enhanced online communication system effectively strengthen parent-teacher interactions and consequently improve student learning outcomes in a primary school setting in the UAE?

1. What effects does the use of AI in communication systems have on the efficacy and quality of parent-teacher relationships?

2. What are the Key AI Features that Facilitate Communication and Tracking of Student Progress?
3. What are the perceived benefits and challenges of using an AI-enhanced communication system from the perspectives of both teachers and parents?

Research Goals:

The purpose of this research is to improve communication between parents and teachers at a primary school by implementing an AI-enhanced online communication system. This innovative system is designed to streamline interactions, boost parental engagement, and deliver tailored educational insights, ultimately enhancing the educational environment for students in a primary school in the UAE. The primary goal of this research is to understand the challenges and the potential role of AI in improving these interactions for the benefit of students' educational experience.

Significance of the research

To help the school decide to integrate this system before we start, we have first to conduct a need analysis. The analysis will help schools tailor AI applications to their specific needs to enhance communication, expedite administrative procedures, and create a more cohesive and active learning community. This customized strategy guarantees that the technology adds value, improves learning outcomes and advances the school's overarching goal.

Population and sample:

The system will be implemented in the school, so the stakeholders will be all the teachers and the administrators.

Also, the system will connect the teachers with the parents, so parents are part of the system, and we have involved them in the study. Teachers and parents will gain the research focus as they will use the system the most. Furthermore, Administrators will play a supervisory role, ensuring the tool's integration aligns with institutional goals and policies.

The school's name is Al Jazeera Al Hamraa Primary School, it's located in Ras Al Khaimah in UAE. The school has four grades from one to four. The teachers that will be involved are all the teachers in the school. Furthermore, the class supervisors and some of the school administrators will be involved in using the communication system. All student's parents are involved in this system, and they can access it using the student's email. Students at Al Jazeera School are enrolled based on their residential areas; consequently, all students come from Al Jazeera Al Hamra, Riffa, and Mina Al Arab in Ras Al Khaimah, UAE. In addition to that, the government help centre that is responsible for LMS will also be part of this research.

Teachers and parents have knowledge in using WhatsApp and Telegram. The device they use is their smartphone. The new app will have nearly the same private chat that they are familiar with, so they will not need training. Both teachers and parents have little knowledge of using AI applications. The number of parents is more than the number of teachers. Each grade has 7 teachers (Arabic and Islamic, Math, English, Science, Social studies, Sports teacher and Computer teacher). For each grade, they have nearly 5 classes and in each class, there are nearly 30 students (which means 30 parents for each class). The age range of the stakeholders will be over 20.

While the study aimed to include a comprehensive participant pool from Al Jazeera Al Hamraa Primary School, certain limitations affected the inclusion of all potential stakeholders. Specifically, parents of students in grades 1 and 2 were not involved in the interview phase of the research. This exclusion was due to the timing of the interviews, which coincided with a period when only grades 3 and 4 were present at the school for examinations. Consequently, parents whose children were in the lower grades and not required to be at school during this time were inadvertently excluded from the interview process.

However, to mitigate this gap and ensure broader inclusivity, the survey intended to gather broader insights was distributed to all parents across grades 1 to 4. This approach was designed to capture the perspectives of those who could not participate in the interviews. Additionally, teacher participation was structured through random selection to ensure a representative sample across different grades and subjects, thus providing a balanced view of the educational community's interaction with the AI-enhanced communication system.

Tools of research

Survey and interview Questions

Survey Questions (User Interface & Interaction Evaluation)

1. **How intuitive did you find the navigation within the app?** (Aims to gauge the ease of use and learnability of the interface.)
2. **Was the information presented by the AI chatbot relevant and useful?** (Seeks to evaluate the effectiveness of AI-driven personalization.)

3. **How effective was the communication feature for interacting with teachers/parents?** (Assesses the efficiency and reliability of the chat functionality.)
4. **How satisfied are you with the notification section and calendar to show the tasks for each day?** (Measures if the users can easily search for the tasks.)
5. **Did the app help in improving your engagement with the student's educational activities?** (Evaluate the app's impact on fostering parental and teacher engagement.)

Interview Questions (User Perception)

1. **What features do you find most beneficial in the app, and why?** (Understands user value perception and identifies key features.)
2. **Can you describe any difficulties you faced while using the app?** (Identifies usability issues or gaps in the user interface design.)
3. **How do you perceive the role of AI in providing personalized information about your child/student?** (Gauges trust and perceived value of AI-driven insights.)
4. **How has the app influenced your communication with teachers/parents?** (Assesses the qualitative impact on relationships and communication efficiency.)
5. **What additional features or improvements would you like to see in future updates?** (Collects user feedback for continuous improvement and innovation.)

Research Data Collection:

The primary data collection method for this study will be a mixed-method approach, integrating both quantitative and qualitative strategies to comprehensively assess the efficacy and user satisfaction of the app prototype. The choice to employ quantitative approaches stems from the study's goal, which is to gather measurable, objective data about the prototype's effectiveness and effects on learning outcomes. Correlations, comparisons, and changes that can guide the tool's future development and optimization can be evaluated using quantitative data (Cortina, 2020). In addition to that, I will use qualitative data, by talking directly to users using a professional interview. This way will give us detailed feedback about what users think and feel about the app. I want to know what works, what doesn't, and how I can make the app better based on their experiences (Creswell & Creswell, 2017). By combining both quantitative and qualitative methods, the study will seek to take advantage of each approach, thereby it will offer a richer and more detailed understanding of the prototype's impact and user engagement.

For quantitative data collection, an online survey will be conducted using SurveyMonkey. This platform was selected because it has a track record of dependability, is simple to use, and can connect with a broad range of participants, including parents and instructors. To guarantee that the survey questions are both relevant to the research goals and understandable to the participants, a comprehensive examination of the body of literature on user feedback collecting and educational technology assessment was conducted before the survey instrument was developed (Nayak & Narayan, 2019).

Furthermore, with the survey link, a short video will be sent that explains the application to the user. This will

ensure that the participant has a clear idea about the application functions and jobs.

In the qualitative part of this study, the method for collecting data was through conducting interviews with a small but significant group: three teachers and three parents. This method is selected for its ability to dive deep into personal experiences, beliefs, and suggestions. Interviews are particularly effective because they provide a direct, personal way to gather detailed insights and nuanced understandings of the app prototype from those who interact with it closely in educational settings. The decision to focus on both teachers and parents ensures a well-rounded perspective, capturing the experiences of those who teach with the tool and those whose children are directly impacted by its use. This approach aligns with the view that interviews can uncover rich, detailed data that surveys alone might miss (Cohen, Manion, & Morrison, 2018). By choosing interviews, this study aims to gather valuable, in-depth feedback that can reveal complex interactions and opinions on the app's effectiveness, usage, and areas for improvement.

The questions were pilot-tested with a small group of parents and educators who were part of the main study population to address any potential validity and reliability issues with the survey instrument and interview questions. The instrument's validity and reliability were increased by using the feedback from this pilot test to improve the structure, remove ambiguities, and reword the questions. In addition, the research will utilize statistical methods to evaluate the dependability of the survey answers, like computing Cronbach's alpha for scales that gauge concepts like perceived utility and user pleasure (Field, 2013). Through this procedure, the validity and reliability of the survey instrument for assessing the targeted constructs

within the research framework are ensured. Similarly, for the interview questions, pilot feedback ensured that questions were open-ended yet focused enough to elicit detailed and relevant responses, thereby supporting the validity and reliability of the qualitative data collected.

The survey distribution was strategically designed to maximize participation while ensuring the privacy and understanding of participants. For parents, the survey was disseminated through WhatsApp groups, employing a random selection process to ensure a diverse representation of responses. Each participant received a survey link accompanied by an introductory message. This message explained the study's purpose and assured participants of their privacy, facilitating informed consent and encouraging engagement (Wright, 2005). Similarly, for teachers, the survey was shared via school email addresses and, in some cases, through private messages on WhatsApp or Telegram. This multi-channel approach not only diversified the reach of the survey but also accommodated the preferences and accessibility of participants, potentially increasing the response rate and the effectiveness of the data collection process (Nayak & Narayan, 2019). By leveraging widely used communication platforms and providing clear, concise information about the survey's goals and confidentiality measures, this method is expected to be highly effective in garnering meaningful insights from parents and teachers.

The interview was conducted physically at school with three teachers. For the parents the interviews were conducted with one parent at the school and two through online meetings. Before sending the survey and doing the interview, I went to school to get the administration's approval to make sure that the study's objectives and methods were in alignment with ethical standards and

institutional policies. Along with highlighting the study's objectives and participant confidentiality, the introduction message that came with the survey link also guaranteed participants' freedom to leave the study at any moment without facing repercussions. This methodology adhered strictly to informed consent norms, which are fundamental to ethical research methods. Participants were also told that the data would only be utilized for the study's objectives and that all findings would be provided in aggregate form, preventing the identification of specific responses (Smith & Dugan, 2002; Johnson, 2014).

Copies of the survey, video, and interview questions will be provided in the appendices.

Research Data Analysis:

For the study that was conducted at Al Jazeera Primary School, where teachers and parents were randomly selected to participate in surveys and interviews, our data analysis will follow a structured and methodical approach to ensure clarity, relevance, and depth in our findings. Here's how we plan to analyse the collected data:

Data Preparation and Cleaning: First, we'll look through all the survey answers and interview notes to make sure everything is correct and matches up. If anything is missing or seems out of place, we'll fix it just like other researchers do. This step is really important to make sure our information is solid and reliable before we dive into what it all means. As highlighted by Van den Besselaar and Sandström (2016), ensuring data quality through thorough cleaning and disambiguation is crucial for the reliability of research findings, especially when the data set is used for evaluating research performance.

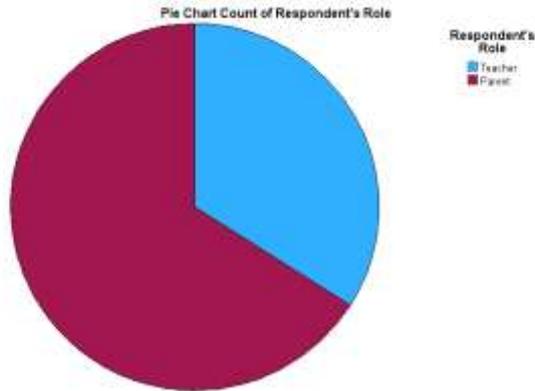
Quantitative Analysis: We're going to use computer programs like SPSS to look at our survey answers, these

tests examine averages and relationships between variables to understand how people feel about the app. First, we'll check out simple stuff like averages and the most common answers to understand the basics of what people say. Then, we'll go deeper to see how different things are connected, like if people who like certain features of the app are happier with it. We'll also use special math tests to see if teachers and parents think differently about the app. This way, we can get a clear picture of what's going on with the data we collected. We also use graphs to represent our results and help us analyse the data.

Research statistical analysis:

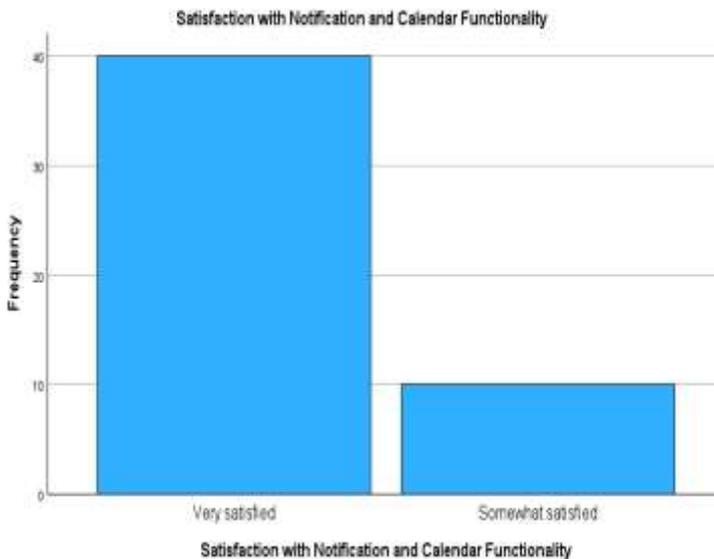
The table shows the dependent and independent variables for the Survey Questions:

Survey Question	Dependent Variable Description	Independent Variable Description
Q1. Based on the video, how intuitive do you anticipate the navigation within the app to be?	Perceived intuitiveness of the app's navigation.	Features of the app's navigation
Q2. Do you think using an AI chatbot, as demonstrated, would be useful in this context?	Perceived usefulness of the AI chatbot.	Functionality of the AI chatbot
Q3. Based on the video, how effective do you expect the communication feature for interacting with teachers/parents to be?	Expected effectiveness of the communication feature.	Communication features of the app
Q4. How satisfied are you with the demonstrated functionality of the notification section and calendar for showing tasks for each day?	Satisfaction with the notification and calendar functionalities.	Functionality of the notification section and calendar
Q5. from what you saw, do you believe the app would help in improving engagement with the student's educational activities?	Belief in the app's ability to improve student engagement.	Overall presentation and capabilities of the app



		Respondent's Role			Cumulative Percent
		Frequency	Percent	Valid Percent	
Valid	Teacher	17	34.0	34.0	34.0
	Parent	33	66.0	66.0	100.0
Total		50	100.0	100.0	

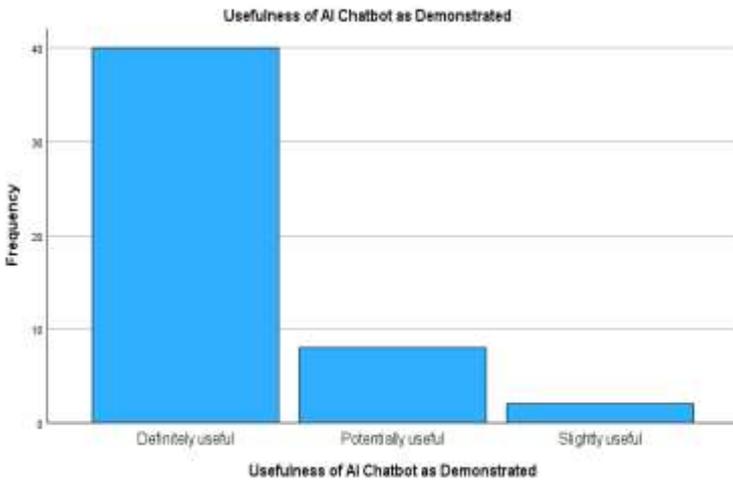
In the survey, most of the responses were from parents, as their numbers are higher than the teachers.



Satisfaction with Notification and Calendar Functionality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very satisfied	40	80.0	80.0	80.0
	Somewhat satisfied	10	20.0	20.0	100.0
	Total	50	100.0	100.0	

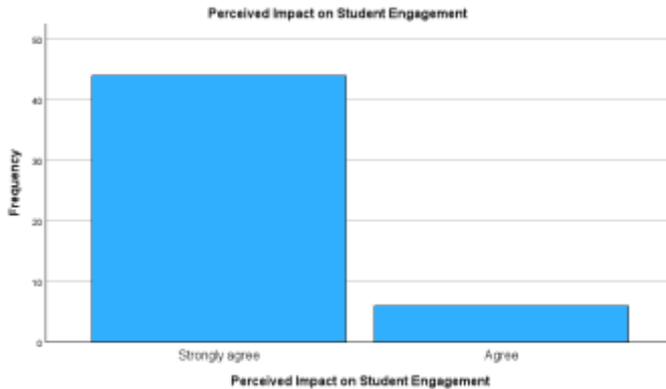
Most of the responses show that users are happy with the application features like notifications and calendars.



Usefulness of AI Chatbot as Demonstrated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely useful	40	80.0	80.0	80.0
	Potentially useful	8	16.0	16.0	96.0
	Slightly useful	2	4.0	4.0	100.0
Total		50	100.0	100.0	

The table displays the responses regarding the AI Chatbot's usefulness. A significant majority, 80% (40 respondents), rated it as 'Definitely useful.' Additionally, 16% (8 respondents) found it 'Potentially useful,' and a small fraction, 4% (2 respondents), considered it 'Slightly useful.'



Perceived Impact on Student Engagement

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly agree	44	88.0	88.0	88.0
Agree	6	12.0	12.0	100.0
Total	50	100.0	100.0	

A large majority, 88% (44 respondents), strongly agreed that the application enhances student engagement. Overall, the charts summarize the opinions of 50 respondents, indicating strong support for the application's effectiveness in increasing communication.

Statistics							
		Respondent's Role	Perceived Intuitiveness of App Navigation	Usefulness of AI Chatbot as Demonstrated	Effectiveness of Communication Features	Satisfaction with Notification and Calendar Functionality	Perceived Impact on Student Engagement
N	Valid	50	50	50	50	50	50
	Missing	0	0	0	0	0	0
Mean		1.66	1.30	1.24	1.14	1.20	1.12
Std. Deviation		.479	.505	.517	.351	.404	.328
Percentiles		100	2.00	3.00	2.00	2.00	2.00

This table shows the mean, standard deviation of the quantitative result.

Results and finding:

From the surveys and the interviews with people at Al Jazeera Primary School, it's clear that both teachers and parents like the educational app that we designed. They think it's easy to use, with things like simple menus, direct messages, and smart help from AI. Everyone agrees that the app will make communication with each other easier. Also, it will facilitate organizing schoolwork by using task screens and calendar pages, this will help in getting more involved in learning easier. The smart chatbot was a great idea, by showing how using AI can facilitate learning in schools. But people also said they want better instructions for some parts of the app and more fun features like sharing pictures and making a community of parents where they can help each other and share their experiences. All this feedback shows the app is doing great but also tells us how we can make it even better for everyone.

Results Discussion

The research goal was to explore how an AI-enhanced communication application could effectively strengthen parent-teacher interactions and consequently improve student learning outcomes in a primary school in the UAE. The finding shows that the application will facilitate communication and enhance student learning. Below are the findings of our research questions:

1- Impact of AI on Parent-Teacher Relationships

The finding shows that using AI in the communication system will improve the quality of interaction between

parents and teachers. Some features that facilitate communication are automated updates on student progress and alerts for upcoming school events, these features ensure a timely exchange of information. Teachers reported that the AI system reduced the administrative burden associated with manual updates, allowing more time for pedagogical planning and direct engagement with students. Parents valued the personalized updates, which helped them feel more involved in their children's educational processes and more equipped to support learning at home. This aligns with research suggesting that effective communication systems can bridge informational gaps between schools and families, thereby fostering a cooperative educational environment.

2- Key AI Features Facilitating Communication

The system used several features supported by AI to improve communication and track students' progress in each subject. The system is able to analyze students' performance data and provide tailored feedback to parents. With the use of this feature, messages might be specifically targeted, giving parents information relevant to their child's academic requirements and accomplishments. The system's capacity to automatically notify users of upcoming school activities and deadlines was also cited as a critical component in improving communication effectiveness. All of these elements worked together to create a

communication environment that was more organized and interesting, which is important in elementary school settings where parent involvement is essential to student achievement.

3- Perceived Benefits and Challenges

The benefits of the new system were recognized by both teachers and parents. The main advantage where the direct communication chat that the new application has. Also, the personalized list task for each grade makes it easier for parents to teach their kids and finish the daily tasks. Also, the real-time update of the AI system to each student's progress kept parents informed about their children's academic status and school activities.

During the study, several obstacles were discovered, including the initial mistrust that some parents had for utilizing online communication platforms, especially with regard to data protection and the dependability of digital information delivery. Moreover, during the implementation phase, the timing of surveys and interviews coincided with examination periods, which may have limited some participants' ability to engage fully with the system. This was mitigated somewhat by accessing parents in waiting areas, where we found parents that have time to test our prototype and answer questions.

Another challenge noted was the low number of responses to testing online prototypes, indicating that people are either reluctant or not used to using digital platforms. This shows the importance of continued efforts

to educate and familiarize stakeholders with new technologies to increase their trust and comfort.

Research Conclusion:

Using an AI-enhanced online communication system in a UAE primary school showed great promise for improving how parents and teachers communicate. It successfully overcame many usual communication problems but also showed areas needing more work, especially in building trust and participation in digital platforms. Future efforts should address these issues to fully benefit from AI in education.

More research should be done to examine the use and efficacy of such AI-enhanced communication systems in private schools. In contrast to public schools, a lot of private establishments create custom software or use a range of proprietary and third-party programs like Seesaw and ClassDojo. Examining these situations could provide a more detailed understanding of how various instruments and strategies influence stakeholder satisfaction and the effectiveness of communication in educational contexts. This research may also provide insightful comparisons that improve AI communication tools and better adapt them to the various requirements of UAE educational institutions.

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