*CORRESPONDENCE
Alexandria Proff
✉ alexandria.proff@aurak.ac.ae

Lessons learned for leaders: implications for parent-school communication in post-pandemic learning environments

Alexandria Proff*, Rasha Musalam and Faten Matar

Department of Humanities and Social Sciences, American University of Ras Al Khaimah, Ras al-Khaimah, United Arab Emirates

Introduction: The global COVID-19 pandemic resulted in 87% of students around the world being affected by school closures. This led to countries around the world implementing emergency plans to help mitigate the risks of exposure and spread of the virus. Schools mobilized resources and shifted to a new modality of instruction to assure the continuity of teaching and learning: online learning. There were numerous challenges for all stakeholders involved in this dynamic new learning space. At the forefront of these challenges was the involvement of, and communication with, parents regarding their child's education at home. The pandemic presented schools with an opportunity to connect with families and strengthen collaboration. As communication is an integral component of collaboration, this study sought to ascertain the degree to which parent-school communication and parental involvement may have changed during and after the pandemic.

Methods: A quantitative approach was employed to ascertain the views of parents of students in grade one through grade four attending private schools in the UAE. The researchers constructed a 30 item, Likert-style instrument which was subsequently validated for use and internal consistency assessed. The total number of responses was 479, which were analyzed using the Statistical Package for Social Sciences (SPSS). The researchers made use of an exploratory factor analysis and Wilcoxon signed-rank test to both explore parent perceptions during and after the pandemic.

Results: These findings suggest that adjustments in communication strategies had a significant impact on how parents perceived their communication with schools. Our results indicate a significant shift in the accessibility and effectiveness of parent-school communication, suggesting that the pandemic triggered positive change in several aspects of educational communication. Parental involvement throughout and after the pandemic displayed a multifaceted pattern. Although parents became more attentive to their children's academic success after the pandemic, there was a decrease in their total involvement in other educational activities.

Discussion: These mixed results suggest that while there was an overall trend of decreased parental involvement during and after the pandemic, individual variations exist, highlighting the need for school leaders to consider more nuanced approaches to facilitating and supporting parental involvement. Based on the results, the authors identified six suggestions for future practice to guide school leaders in fostering effective parent-school communication practices in post-Covid learning environments. Research concerning the impact COVID-19

has had on educational leaders' interactions with parents is limited. Indeed, the degree to which parent-school communication and parental involvement have been successful during and after the pandemic has yet to be investigated. As such, this research aims to contribute to closing this gap in literature and provide school leaders and policymakers with practical suggestions for strengthening relationships between schools and families.

1 Introduction

The global COVID-19 pandemic affected 87% of students worldwide due to school closures (UNESCO Global Education Coalition, 2020). In response, countries implemented emergency plans to mitigate the risks of exposure to and spread of the virus. Many countries, including the United Arab Emirates (UAE), temporarily closed educational institutions, necessitating a shift to a distance-learning environment (Sacks et al., 2020). Schools had to mobilize resources and transition to online learning to ensure the continuity of teaching and learning. This new learning space presented numerous challenges for all stakeholders involved, particularly for parents who were at the forefront of involvement and communication regarding their child's education at home.[1] As primary caregivers in mandated distance learning environments, parents assumed a unique role, often acting as secondary instructors and providing oversight of their child's academic progress and wellbeing. This was especially true for children in the early years and lower elementary education.

While many schools began to reopen in the following academic year, the interruption to student learning did not go unnoticed. Among the various emerging challenges, this study focuses on home learning in general and highlights the role of parents in their children's education during the pandemic. In the next academic year, policymakers and school leaders attempted to develop and implement policies and plans tailored to address the fundamental changes to schooling that occurred due to COVID-19. Although multiple studies have investigated the degree to which these attempts have been successful, less attention has been paid to the impact COVID-19 had on continued parent involvement and parent-school communication in the post-pandemic period.

Therefore, the purpose of this study is to examine the perspectives of parents with children in grades one through four who attend private schools in the UAE regarding communication practices and parental involvement during and after the COVID-19 pandemic. This age group consists of elementary school students who often require purposeful guidance, scaffolding, and support (Hammond, 2014; Kamrani et al., 2024). Consequently, this learner population was uniquely affected during distance learning due to COVID-19. Likewise, parents of children in this age range faced unique challenges in supporting their young learners. As a result, the pandemic

presented schools with an opportunity to foster closer collaboration between families and educational institutions. The effectiveness of parent-school communication and parental involvement during and after the pandemic remains to be explored. Thus, this research aims to address this gap in the literature and provide school leaders and policymakers with practical recommendations for strengthening relationships between schools and families.

2 Theoretical framework

Parental involvement in education is a critical component of student success, and the COVID-19 pandemic has brought this issue into sharp focus. It is essential to examine and acknowledge the relevance of parental involvement while also considering the challenges and barriers faced by parents who were forced to co-teach their children at home without prior preparation or training during the lockdown. This unique circumstance not only highlighted the challenges parents faced but also intensified existing ones. Despite these challenges during the COVID-19 pandemic, it is important to recognize its potential benefits, such as redefining the role of parental involvement and understanding parents' perceptions during these challenging times (Lu, 2020). A significant amount of research related to parental communication is grounded in Epstein's (1987) framework, which identifies communication with parents as one of the six major types of parental involvement. In conclusion, Epstein et al.'s (2018) framework underscores the critical role of robust school-family communication in enhancing student achievement, emphasizing the need for educators and policymakers to prioritize and implement strategies that strengthen these vital partnerships.

2.1 Parental involvement in education

Parental involvement has been investigated for decades, emphasizing its significance for student success (Hill and Tyson, 2009; Yang et al., 2023; Omarkhanova et al., 2024). However, parental involvement is a multifaceted construct that has been defined in several ways. One definition proposed by Antipkina and Ludlow (2020) offers a comprehensive view, describing parental involvement as a "continuum of parenting behaviors ranging from those representing lower levels of involvement to those representing higher levels of involvement" (856). Conclusively, Li et al. (2024) research underscores the critical role parents have adopted as emotional anchors in the online learning landscape, highlighting the need for educational institutions to recognize and support this expanded parental involvement in fostering students' psychological wellbeing and academic engagement.

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1   We acknowledge that the term *parents* may also include guardians and caregivers; for simplicity, we have chosen to use the term parents inclusive of these roles.

The most prominent aspect of parental involvement occurs at home. During COVID-19, parents were unexpectedly required to address the new challenges posed by the pandemic, during which online learning replaced traditional classroom learning. The introduction of new learning modalities added complexity to the role of parental involvement in their children's education. Consequently, parental involvement emerged as a major influencing factor in online education, with parents now bearing significant responsibility for their children's education (Haritha, 2021; Budiningsih and Abdulrahman, 2022).

Considering the comprehensive changes that have restructured learning, parental involvement has become crucial not only for their children's academic success but also for the continuity of learning, which is primarily happening at home. However, parents have identified several challenges and barriers to online learning (Abuhammad, 2020). These challenges include financial, logistical, personal, and technical barriers. Young learners require technical support to access online lessons, resources, and assessments (Dong et al., 2020). Consequently, parents are expected to receive support from the school's team of experts to overcome these challenges and effectively monitor their children's progress at home. Garbe et al. (2020) identified a few key challenges to engaging parents during COVID-19: limited resources to facilitate effective learning at home, balancing responsibilities, and additional stress. They highlight the importance of clear communication and collaboration between parents and schools. Fundamentally, the research by Haritha (2021) and Budiningsih and Abdulrahman (2022) underscores the pivotal role parents have assumed in the online learning landscape, highlighting the need for educational institutions to recognize and support this increased parental responsibility to ensure optimal student outcomes in digital education environments.

2.2 School leaders' approaches to communication

Effective communication strategies employed by school leaders—such as workshops, training sessions, and informational materials—can significantly enhance parental involvement, which, in turn, positively impacts student outcomes (Theodoros et al., 2022; Mehmood, 2024). The literature suggests that leaders should consistently improve and broaden their communication abilities to ensure that parents are actively engaged in their children's education, particularly during online learning.

Effective school-parent communication is enhanced through distributed leadership, where parents are engaged as important stakeholders in the decision-making processes led by school leaders. This collaboration fosters stronger school-family relationships, ultimately improving parental involvement and support in their children's educational journeys (Erol and Turhan, 2018). Distributed leadership approaches may be particularly important in distance learning contexts, as demonstrated during the COVID-19 pandemic. Parents' involvement in decisions about online learning platforms, schedules, and resources creates a shared responsibility that may help reduce misunderstandings and increase engagement (Dong et al., 2020). This more inclusive approach also helps address challenges related to equity and access, ensuring that diverse parental perspectives

contribute to identifying solutions (Harris and Jones, 2020). Engaging these diverse perspectives may help bridge gaps in parent-school communication and parental involvement. In essence, distributed leadership emerges as a powerful framework for fostering academic continuity while simultaneously cultivating trust and reciprocal respect in the school-family partnership, ultimately enhancing the educational experience for all stakeholders involved.

The pandemic has demonstrated that distance learning can be effectively conducted without the physical presence of learners and teachers in the same location. This highlights the significance of implementing effective communication strategies to overcome this distance (Moore, 2013; Levy, 2024). Borup et al. (2013) emphasized that parental participation in online education differs from traditional in-person learning, necessitating a reevaluation of parental roles and responsibilities. According to Gonzalez-DeHass et al. (2022), the shift to online learning requires parents to engage more proactively in communicating with educators. Despite the spontaneous and uncoordinated actions taken by schools and parents during the initial transition to online learning, there is a clear need for more structured approaches to communication and involvement.

2.3 Parent-school communication in distance learning

Communication is fundamental to building the school community; therefore, teachers must continuously develop and expand their skills if they want to engage parents effectively in their children's education during online learning (Muir et al., 2024). Remote learning does not require the physical presence of learners and teachers in the same location at the same time. It can occur anywhere outside the school premises and encompasses a range of modalities, including synchronous learning, where real-time interaction between teachers and students occurs, and asynchronous learning, which allows students to engage with materials and assignments at their own pace (Moore, 2013). These variations offer flexibility but also demand tailored approaches to instructional design and communication to meet the diverse needs of learners effectively (Borup et al., 2020). However, there is still insufficient research on this phenomenon within the fields of digital technologies, pedagogy, and psychology. The shift to online learning during the pandemic resulted in random and spontaneous actions from both schools and parents, highlighting the need for more structured approaches and further research in these areas (Borup et al., 2020; Lu, 2020). To synthesize, the abrupt transition to online learning during the pandemic exposed the lack of preparedness in both educational institutions and families, underscoring the urgent need for developing systematic strategies and conducting comprehensive research to enhance the effectiveness of remote education in future scenarios.

Many schools implement activities to encourage parental involvement in school life and decision-making processes. Parent communication programs, such as the Parent Teacher Association (PTA), are designed to enhance parental engagement in education. However, few parents are actively involved, as some may feel overwhelmed by the expectations placed upon them, leading to stress and disruption in family life (Lareau, 2019). During the pandemic, it became essential for parents to communicate frequently with school leaders and their child's teachers. The

increased expectations regarding their child's education forced parents to respond to these new factors. Literature has emphasized a range of factors that shape parental involvement, one of which is the child's age, as involvement tends to decrease as children transition from elementary to middle and high school (Hurley et al., 2017). This trend was disrupted during the pandemic, as parents were required to engage more actively across all age groups due to the demands of online learning. Another critical variable influencing the type of parental involvement is the actions taken by schools to promote such involvement. Parents are more likely to become actively engaged in supporting their children's education when they perceive that the school is fostering this involvement (Eccles and Harold, 2013; Kim and Asbury, 2020). Ultimately, the research by Eccles and Harold (2013) and Kim and Asbury (2020) underscores the pivotal role of proactive school initiatives in cultivating meaningful parental engagement, highlighting the need for educational institutions to implement strategic measures that encourage and facilitate parents' active participation in their children's learning journey.

Establishing effective communication between parents and schools is crucial, as research shows that improved strategies during the pandemic enhanced accessibility and transparency (Garbe et al., 2020; Kim and Asbury, 2020). Conversely, further research identified challenges, such as inconsistent communication from certain schools, which led to dissatisfaction among parents (Kim and Asbury, 2020; Borup et al., 2020; Roy et al., 2022). These findings emphasize the significance of developing dependable and efficient communication methods to assist parents and increase their involvement in their children's education during and after the pandemic (Eccles and Harold, 2013; Dong et al., 2020). Communication channels established by school leaders can support parents in managing the additional responsibilities to help maintain consistency in children's education. More structured communication approaches better address the challenges of remote learning while contributing to long-term improvements in parent-school collaboration (Garbe et al., 2020; Ma et al., 2016; Sibley and Dearing, 2014).

Consequently, effective communication between schools and parents became crucial for meeting the needs of students, especially young learners. In these extraordinary and unprecedented circumstances, establishing strong working relationships between teachers and parents can only be achieved through effective communication. In this context, Mapp and Kuttner (2013) further suggest that frequent communication between guardians and schools promotes trust and a sense of collaboration, both of which are imperative for maintaining meaningful parental involvement. Goodall (2022) also emphasizes that the level of parental involvement can depend on the degree to which schools implement structured communication approaches, as these strategies ensure that guardians are regularly informed about their child's progress and are better equipped to support their child's learning at home.

3 Methodology

This study sought to investigate parents' perceptions of parent-school communication and parental involvement during and after the COVID-19 pandemic. A quantitative approach was employed to gather the views of parents of children in grades one through four who are attending private schools in the UAE.

3.1 Operational definitions

Specific terms were used throughout this study to clarify how we conceptualize the relevant variables.

Parent-School Communication: The interaction between parents and school leaders regarding a student's academic progress, behavioral issues, and other school-related matters. This communication may involve scheduled meetings, emails, phone calls, and the use of school communication platforms.

Parental Involvement: The actions and behaviors of parents that directly support their child's learning and development, both at home and in school. This involves helping with homework, encouraging reading and educational activities at home, monitoring the child's academic progress, and fostering a cheerful outlook toward education.

Accessibility: the ease with which parents can reach and contact school leaders or personnel, including the availability of school staff to resolve problems, promote involvement, and provide support. Clarity: the degree to which information provided by the school is comprehensible, transparent, and detailed enough for parents to act on. Effective communication entails the use of unambiguous language, clear explanations of policies, and accurate updates on students' academic performance or school events.

Frequency: The regularity with which schools inform parents about changes, academic performance, and other pertinent issues. This includes the consistency of communication via newsletters, meetings, or other platforms to guarantee that parents stay informed and engaged in their child's education.

3.2 Research questions and hypotheses

We selected a target group of students in grades one through four because research indicates that parental involvement and communication are critical during these formative years (Castro et al., 2015). Children in this age range benefit significantly from active parental involvement and effective communication between their guardians and their schools. A closer examination of how these changes have influenced parents' perceptions during and after the pandemic is necessary, as the dynamics of parent-school communication have been profoundly disrupted by the COVID-19 pandemic. The following research questions and hypotheses were formulated to guide the study:

1. How did parents' perceptions of parent-school communication change during and after the COVID-19 pandemic among parents of students in grades one through four?
2. How did the COVID-19 pandemic influence parents' perceptions of their involvement in their children's education through school communication?

In response to these research questions, we drafted two speculative hypotheses. Firstly, we hypothesize that parent perceptions of Parent-School communication improved post-pandemic in terms of accessibility, clarity, and frequency, reflecting schools' adaptation to the challenges of remote learning during the pandemic. Secondly, we hypothesize that the COVID-19 pandemic influenced parents' perceptions of their involvement in their children's education through school communication by shaping their experiences with differing

school communication strategies and their role in the academic monitoring of their children during the pandemic.

3.3 Sampling

Our focus was on investigating the perspectives of parents with elementary school-aged children. Initially, convenience sampling was employed, followed by snowball sampling for data collection. We identified a minimum sample size of 384 respondents based on the estimates outlined below. According to the UAE's Ministry of Education (MOE) open data source (Ministry of Education, 2024), there were 406 private schools across the UAE during the 2023–2024 academic year. We estimated that each school may have around 750 students enrolled in grades one through four. Consequently, the total estimated number of students would be 302,250. To account for up to two parents and/or guardians per child, we doubled this figure, resulting in an estimated total population of 604,500. We considered the total population for the study. The sample size was calculated using a 95% confidence level, a 0.5 standard deviation, and a ±5% margin of error, resulting in a minimum sample size of 384 (Conroy, 2016). The number of responses received exceeded this minimum, with 479 respondents completing the questionnaire.

3.4 Instrumentation

We constructed a questionnaire to elicit participants' perceptions about parent-school communication and parental involvement during and after the COVID-19 pandemic. We developed a structured, 4-point Likert-style questionnaire comprised of (30) items. The questionnaire included demographic items (4 items), questions about parental perceptions of communication during the COVID-19 pandemic when students were learning remotely (13 items), and questions about parental perceptions of communication after the COVID-19 pandemic, when students returned to face-to-face learning (13 items). Upon receiving and cleaning survey data from our sample, we examined its underlying structure using exploratory factor analysis and measures of internal consistency. Specifically, we used Cronbach's alpha to calculate the reliability coefficient of the questionnaire (Cronbach, 1951). The reliability of the questionnaire must meet specific criteria: Cronbach's alpha > 0.7; CR > 0.7; AVE > 0.5 (Cheung et al., 2024; Youssef et al., 2023; Cronbach, 1951). Cronbach's alpha served as the index for reliability analysis. Cronbach's alpha ranges from 0.00 to 1.00, with a value of >0.9, considered excellent. For the purposes of this study, the overall Cronbach's alpha for questions using a 4-point Likert scale was 0.864.

Factor-specific Cronbach's alpha values were also calculated based on the exploratory factor analysis results. These values are as follows: Accessibility of school communication (post-pandemic) (α = 0.951), Frequency and quality of communication (during the pandemic) (α = 0.935), Parental involvement and school resources (post-pandemic) (α = 0.955), Effectiveness of communication methods (during the pandemic) (α = 0.936), Academic performance and school support (during the pandemic) (α = 0.935), Child participation and independent learning (during the pandemic) (α = 0.938), and Parental involvement and school resources (during the pandemic) (α = 0.938). Taken collectively, these results indicate excellent internal consistency for all identified factors, further supporting the reliability of the instrument.

3.5 Data analysis

Data collection involved recruiting 479 participants, all of whom were parents and/or guardians of students in grades one through four, with an equitable distribution across the grade levels. Guardians of grade one students included 123 respondents, representing 26% of the sample. Grade two guardians included 122 respondents, accounting for 25% of the sample. There were 117 respondents for grade three and grade four guardians, representing 24% for each grade. Of the total participants, 36% were Arab expatriates living in the UAE, while 64% were Emirati.

Given the quantitative approach employed in this study, a rigorous analysis was conducted using SPSS, a robust platform for analyzing quantitative data. First, we conducted an exploratory factor analysis (EFA) to test parents' perceptions of parent-school communication and parental involvement in their children's education during and after the COVID-19 pandemic based on the underlying factors identified by the EFA. This analysis aimed to discern patterns and relationships within the survey data. After identifying the relevant factors, those with high loadings were paired and subsequently tested using the Wilcoxon signed-rank test.

3.6 Exploratory factor analysis

An EFA is a statistical tool used to identify patterns within a set of observed variables. It is often employed by researchers to explore relationships among a large number of variables (Watkins, 2021). The analysis employed Principal Component Analysis (PCA) as the extraction method, with a Varimax rotation applied to simplify and clarify the factor structure. We chose a PCA for its efficiency in summarizing the variance across multiple items and Varimax rotation for its ability to produce orthogonal (uncorrelated) factors, aiding interpretability. Factors were retained based on eigenvalues greater than 1.0, a standard criterion in factor analysis for identifying components that explain meaningful variance. Additional consideration was given to the scree plot, which indicated a natural cut-off in the number of retained factors. Parallel analysis was not conducted in this study, as the eigenvalue and scree plot methods provided sufficient support for factor retention based on the observed data patterns.

The suitability of the dataset for factor analysis was confirmed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which yielded a value of 0.854, indicating strong adequacy. The KMO measure of sampling adequacy should ideally exceed 0.60 to ensure the suitability of the data for factor analysis. Additionally, Bartlett's test of sphericity assesses the strength of relationships among variables. A significant result from Bartlett's test of sphericity should yield a p-value less than 0.05 to demonstrate significance. Bartlett's test of sphericity was significant (p < 0.001), confirming that the correlations between variables were sufficiently large for EFA.

3.7 Validity of the questionnaire

The investigators adopted a comprehensive approach to substantiate the validity of the research tool. To ensure the validity of the survey instrument, construct validity was considered during its development. The items were designed to align with theoretical frameworks of parental involvement and school communication and

were reviewed for face validity by three experts in the field. Each expert had an extensive background in parental engagement, educational communication, and survey methodology, with no less than 8 years of experience. The selection of three experts is consistent with Lynn's (1986) recommendation for using a small panel of qualified professionals to evaluate the relevance and adequacy of survey items for content validation. Their feedback was used to ensure that the survey items adequately represented the constructs being measured and were appropriate for the target population, reinforcing the overall validity of the instrument (Lynn, 1986; Anastasi, 1988).

Construct validity was assessed using Exploratory Factor Analysis (EFA). The EFA revealed a well-defined factor structure, with items loading significantly onto distinct factors representing various dimensions of parental engagement and school communication. The Kaiser-Meyer-Olkin (KMO) test yielded a value of 0.89, indicating sampling adequacy, while Bartlett's Test of Sphericity was significant ($p < 0.001$), supporting the use of factor analysis. Factors were retained based on eigenvalues greater than 1.0 and the scree plot analysis, aligning with best practices in construct validation (Field, 2024). By combining expert review for face and content validity with statistical validation techniques, the study ensured both content and construct validity, enhancing the reliability and credibility of the questionnaire for measuring parental involvement and communication practices.

3.8 Item analysis

The table in provides valuable insights into the internal consistency of the survey instrument by delineating item-total statistics and showing Cronbach's alpha coefficient based on the exclusion of each item. Elevated corrected item-total correlations imply a robust association between the items and the aggregate score, thereby enhancing the reliability of the scale. The tabulation explains the item-total statistics of the survey, illustrating the impact of omitting each item on the scale's overall reliability.

The analysis of item-total correlations and Cronbach's alpha coefficients shows how individual items contribute to the overall reliability of the scale. The items demonstrate strong correlations, indicating their alignment with the overall scale. Additionally, Cronbach's alpha coefficients suggest that removing any single item would not significantly improve the scale's reliability, confirming its internal consistency.

3.9 Limitations

This study provides valuable insights into parental perceptions of school communication and involvement during and after the COVID-19 pandemic; however, several limitations should be noted. First, the use of a closed-ended survey instrument, while effective for capturing quantitative data, limited the ability to capture nuanced, qualitative perspectives from parents. This approach precludes gaining deeper insights into what specific aspects of communication or involvement parents value most or seek to improve. Future research could complement such surveys with open-ended questions.

Secondly, due to the reliance on self-reported data from parents, response bias and recall accuracy are limitations of this study. Response bias refers to the potential tendency of respondents to provide answers they perceive as socially acceptable rather than their

true perspectives (Teh et al., 2023; Kock, 2017). Further, because we asked participants to recall past events, they may not remember all events with equal accuracy.

We adopted a snowball approach, which may create a more homogeneous sample that reflects the characteristics of the initial participants rather than the broader population (Pasikowski, 2023). The survey instrument was designed to align with theoretical frameworks and demonstrated strong reliability and validity. The sample does reflect a specific population and context; this may limit the generalizability of the findings to other schools or regions with different demographic or educational characteristics.

Finally, because the data reflects only parental perspectives, it may not fully account for the broader dynamics of school-parent communication or involvement. Incorporating viewpoints from school personnel or triangulating data with other sources (e.g., records of actual communication frequency) could provide a more nuanced and holistic understanding (Tables 1, 2).

4 Results and discussion

The purpose of this analysis was to examine changes in parental involvement and school communication practices during and after the COVID-19 pandemic. The results provide insights into key aspects of parental engagement, including the accessibility and clarity of communication channels, parental monitoring of academic progress, and collaborative decision-making between parents and schools.

4.1 Exploratory factor analysis

A total of seven factors with eigenvalues equal to or greater than 1.0 were identified and Table 3 presents a detailed analysis of the seven factors. In total, the seven factors derived from participant responses explained 56.620% of the variance in the data set. These seven factors validate the survey's effectiveness in measuring seven unique dimensions of parental involvement and school communication practices (Table 4).

To further explore these underlying factors, an examination of the factor loadings was conducted resulting in a rotated component matrix, in Table 5, which displays the loadings for all seven factors. Factors 3 and 7 both measured aspects of parental involvement and school resources but were retained separately due to their focus on different contexts. Factor 3 addressed parental involvement and school resources specifically in the post-pandemic context, while Factor 7 focused on the same aspects during the pandemic period. The differentiation reflects temporal patterns rather than overlapping constructs, as the factor loadings demonstrated sufficient distinction to justify separate retention.

4.2 During vs. post pandemic differences in parent perceptions

To identify whether there were significant changes in parental perceptions across the seven factors identified through the EFA, we used Wilcoxon signed-rank tests to compare paired observations

TABLE 1 Overview of factors.

Factor	Name	Description
1	School Communication and Accessibility Post-Pandemic	Factor one accounts for 24.892% of the variance in the sample data set. Questions fifteen through twenty-one capture the efficacy of school communication and the availability of school personnel after the pandemic. This highlights the importance of being able to contact school leaders and teachers, as well as receiving engaging assignments and detailed information in the post-pandemic context.
2	School Communication and Parental Monitoring During the Pandemic	Factor two explains approximately 33.308% of the variability in the sample data set and demonstrates significant factor loadings for questions one, four, five, and six. These questions address the quality and frequency of communication, as well as the role of parental monitoring during the pandemic.
3	Parental Involvement and School Resources Post-Pandemic	Factor three accounts for approximately 39.215% of the variability in the sample data set and demonstrates significant factor loadings for questions twenty-two, twenty-three, and twenty-six. These questions highlight the involvement and support of parents in their child's education post-pandemic.
4	Communication Methods and Continued Parental Involvement	Factor four accounts for 44.625% of the variance in the sample data set. Questions ten and fourteen reflect the effectiveness of communication programs during the pandemic and the continued parental support for their child's education in the post-pandemic period.
5	Academic Performance and School Support During the Pandemic	Factor five accounts for 49.383% of the variance in the sample data set. Questions eight and nine focused on the role of school support and the appropriateness of assigned schoolwork in maintaining academic performance during the pandemic.
6	Child Participation and Independent Learning During the Pandemic	Factor six explains approximately 53.505% of the variability in the sample data set and demonstrates significant factor loadings for questions two and three. Both questions reflect students' ability to participate in online classes and complete tasks independently during the pandemic.
7	Parental Involvement and School Resources During the Pandemic	Factor seven accounts for 57.473% of the variance in the sample data set. Questions seven and eleven focus on the direct involvement of parents in their children's education and the availability of resources to support learning.

for factors measured during and after the pandemic. Paired observations were drawn from the survey. Since the survey items were measured on a 4-point Likert scale, producing ordinal data, and given the paired nature of the observations (respondents provided perceptions at two different points in time), the Wilcoxon signed-rank test was deemed appropriate for the analysis. This non-parametric test does not assume a normal distribution of the data and is suitable for detecting differences in the medians of paired samples (Laerd Statistics, 2020). This provides a meaningful method for us to compare the identified factors during and after the pandemic, ensuring that the findings are both statistically valid and pragmatically useful. A summary of tests is provided in the table below, which identifies the tested pairs, time frame (during vs. after the pandemic or continuous), ranks, Z-value, p-value, and significant differences (Tables 6, 7).

A distinction between ease of accessing information from school leaders and ease of contacting school leaders was made to capture several aspects of parental interaction. *Ease of accessing information* refers to how readily parents could obtain general information or updates from school leadership, while *ease of contacting school leaders* refers to the ability to engage directly with school personnel for specific questions or concerns. Both measures were included to distinguish between the availability of general information dissemination and the personal accessibility of school leaders for individual concerns.

Table 8 includes the resulting ranks for each set of tested pairs. Ranks denote the magnitude of differences in order, which assists researchers in evaluating the degree of variation between identified pairs. Signed ranks provide additional insight into those differences, categorizing them as either positive or negative. Using ranks is crucial, as it circumvents the assumption of normally distributed differences,

which makes it a strong alternative to the paired t-test for non-normally distributed data. The tests compared responses on several items measured during and after the pandemic, as demonstrated in Table 9, which includes the Wilcoxon signed-rank test statistics.

4.3 Overview of tested pairs

The six tested pairs in the Wilcoxon signed-rank test align with the two overarching themes identified in the research questions: (1) Parent-School Communication and (2) Parental Involvement in Distance Learning. This alignment demonstrates how specific aspects of parent perceptions contribute to understanding the broader dynamics of communication and involvement during and after the pandemic.

Within the theme of Parent-School Communication, four tested pairs were identified. The first tested-pair reference ease of accessing information from school leaders. This reflects parents' ability to receive general updates and information from school leadership during and after the pandemic. The significant increase post-pandemic indicates that schools successfully implemented accessible communication channels (like digital tools) that parents found effective. The second tested-pair considered the ease of contacting school leaders, which highlights parents' ability to engage directly with school leadership to address specific concerns. The improvement post-pandemic demonstrates enhanced responsiveness, possibly due to streamlined communication methods or increased openness of school leaders to parental inquiries. Thirdly, we tested the clarity of information, which examines whether the information provided by schools was clear,

TABLE 2 Overview of tested pairs in Wilcoxon signed-rank test.

Tested pairs	Time	Negative ranks (N)	Positive ranks (N)	Ties (N)	Z-value	p-value	Significant difference and explanation
Ease of accessing information from school leaders	During vs. After	67	153	259	−6.757	<0.001	Yes: The increase in positive ranks indicates that communication with school leaders was perceived as significantly easier after the pandemic compared to during the pandemic.
Ease of contacting school leaders	During vs. After	87	129	263	−2.385	0.017	Yes: The balance between negative and positive ranks suggests a mixed perception, but overall, contacting school leaders was easier after the pandemic.
Clarity of information	Spans both	82	94	303	−1.523	0.128	No: The clarity and detail of information provided by the school did not significantly change from during the pandemic to after the pandemic.
Effectiveness of communication methods	Spans both	159	140	180	−0.483	0.629	No: This suggests that the effectiveness of the school's communication methods did not significantly change between during the pandemic to after.
Monitoring child's academic progress	During vs. After	79	148	252	−4.994	<0.001	Yes: There are more positive ranks, suggesting that parents were more consistently monitoring their child's academic progress after the pandemic than during the pandemic.
Involvement with child's school events	During vs. After	158	102	219	−1.987	0.047	Yes: There are more negative ranks, suggesting that parental involvement in their child's education decreased after the pandemic compared to during the pandemic.

TABLE 3 Cronbach's alpha.

Reliability statistics	
Cronbach's alpha	N of items
864	26

concise, and easy to understand. The lack of significant change suggests that schools maintained consistent clarity during and after the pandemic. This stability may reflect effective pre-existing communication systems, but it also signals an opportunity for further enhancement to meet evolving parental expectations. The final tested-pair in this theme is the effectiveness of communication methods. This pair evaluates how communication tools (like emails, portals, messaging apps) meet parental needs. The absence of significant change implies that these tools remained effective throughout the pandemic but did not evolve substantially to address new challenges or opportunities.

Within the parental involvement in distance learning theme, there are two sets of tested pairs. The first set concerns monitoring a child's academic progress, which reflects parents' role in tracking their child's learning outcomes. The increase post-pandemic highlights the sustained responsibility parents felt for academic oversight. This shift underscores the importance of schools providing parents with accessible performance metrics and guidance. The next pair we tested refers to involvement in their child's school events, which measures parents' participation in school activities. The observed decrease post-pandemic suggests that the return to in-person schooling posed logistical challenges for parents,

reducing their ability to engage. This finding emphasizes the need for schools to offer flexible participation options, such as hybrid or asynchronous formats, to accommodate diverse parental schedules.

In summary, the results of the Wilcoxon signed-rank test reveal significant changes in various facets of school communication and parental involvement when comparing experiences during and after the COVID-19 pandemic. Collectively, these results underscore improvements in specific areas of school communication but also indicate a decline in certain aspects of parental involvement. This suggests that schools should focus on these areas to maintain effective communication and support parental engagement.

4.4 Perceptions of parent-school communication

The COVID-19 pandemic significantly altered the educational landscape, driving schools to innovate and modify their communication tactics (Schleicher, 2020). This study found that these adjustments, on average, had a significant impact on how parents regarded their communication with schools. The findings indicate a notable shift in the accessibility and effectiveness of parent-school communication, implying that the pandemic triggered positive changes in several aspects of educational communication. These results align with the research conducted by Garbe et al. (2020), which, based on a sample of 122 parents, found that the pandemic necessitated responsive measures in schools' communication strategies to better meet the needs of parents and families in distance

TABLE 4 Item-total statistics.

Item-total statistics	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
During the pandemic, it was easy to get in touch with my child's school leaders.	47.23	127.029	0.378	0.860
During the pandemic, my child actively participated in online classes and assignments.	46.78	128.492	0.270	0.863
During the pandemic, my child was capable of completing their learning tasks independently.	46.73	129.861	0.183	0.867
During the pandemic, I was consistently monitoring my child's academic progress.	47.29	126.723	0.424	0.859
During the pandemic, school leaders provided me with updates and important information I needed to support my child's learning at home.	47.28	123.122	0.599	0.854
During the pandemic, the school provided clear and understandable information about my child's academic progress and school events.	47.18	123.216	0.551	0.855
During the pandemic, I was involved with my child's school by attending school events and various activities.	47.04	128.467	0.296	0.862
During the pandemic, my child's academic performance was maintained due to the support provided by the school.	47.07	129.770	0.231	0.864
During the pandemic, the schoolwork assigned by my child's teacher was engaging and matched my child's learning level.	47.10	131.348	0.193	0.865
During the pandemic, the school's communication approach (e.g., emails, newsletters, phone calls) effectively kept me informed about important updates and changes.	47.15	127.855	0.363	0.860
During the pandemic, the school provided adequate resources for me to support my child's learning at home.	47.20	127.034	0.412	0.859
During the pandemic, I could easily reach school staff (e.g., teachers and administrators) when I had questions or concerns.	46.87	126.986	0.384	0.860
During the pandemic, I frequently monitored my child's participation in online classes.	46.94	128.007	0.317	0.862
After the pandemic, I was involved with my child's school by attending school events and various activities.	47.17	127.601	0.333	0.861
After the pandemic, it is easy to get in touch with my child's school leaders.	47.10	123.790	0.535	0.855
After the pandemic, my child's teacher(s) assigned schoolwork that was engaging and promoted his/her academic performance.	47.01	121.314	0.633	0.852
After the pandemic, I have always been able to get in touch with someone when needed.	47.13	123.498	0.541	0.855
After the pandemic, the school's communication methods (e.g., emails, newsletters, parent portals) effectively kept me informed about my child's education and school events.	47.15	122.987	0.577	0.854
After the pandemic, school leaders provided easy access to information about my child's academic performance.	46.94	123.342	0.515	0.856
After the pandemic, the school provides clear and detailed information about my child's academic performance and school activities.	47.11	122.646	0.567	0.854
After the pandemic, I can easily contact school personnel (e.g., teachers and office staff) when I need assistance or have inquiries.	47.16	124.038	0.518	0.856
After the pandemic, I was consistently monitoring my child's academic progress.	47.04	125.021	0.451	0.858

(Continued)

TABLE 4 (Continued)

Item-total statistics				
	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
After the pandemic, I regularly visit my child's classroom or participate in school events to stay informed about their educational environment.	47.08	126.064	0.416	0.859
After the pandemic, my child is actively engaged in their learning.	46.65	126.797	0.304	0.863
After the pandemic, my child feels successful working independently.	46.47	127.794	0.351	0.861
After the pandemic, the school provided adequate resources for me to support my child's learning and reduce academic stress.	47.09	126.176	0.413	0.859

TABLE 5 KMO and Bartlett's test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.854
Bartlett's test of sphericity	3,724.701	14,952.524
	325	2,211
	0.000	0.000

TABLE 6 Total variance explained.

Component	Initial eigenvalues		
	Total	% of Variance	Cumulative %
1	6.472	24.892	24.892
2	2.188	8.417	33.308
3	1.536	5.906	39.215
4	1.407	5.411	44.625
5	1.237	4.758	49.383
6	1.072	4.122	53.505
7	1.032	3.968	57.473

Extraction Method: Principal Component Analysis.

learning environments. Parents and guardians require up-to-date communication from school leaders to make informed decisions regarding their child's learning and, in the context of COVID-19, their child's safety. In this regard, Kim and Asbury (2020), who interviewed 24 teachers from English state schools, found that effective communication between schools and parents was imperative in navigating the transition from on-ground to online learning. Similarly, Bocoş and Marin (2022) and De Muynck (2022) discovered that the pandemic fostered improved communication between parents and schools, with modern communication tools being perceived as effective in maintaining and even strengthening these relationships. The results of this study indicate that this trend was evident during the pandemic and has continued into the post-pandemic learning environment. Parents report that school leaders across the UAE became more accessible during COVID-19 and have maintained this accessibility and effectiveness in their communication approaches (Chatzipanagiotou and Katsarou, 2023; Harris and Jones, 2020; Netolicky, 2020). These findings align with those of other studies, although the number of studies in this area remains limited.

Parents experienced a substantial improvement in accessing information from school leaders and in contacting school leaders following the pandemic. These findings support the hypothesis which states that schools improved their communication practices, resulting in increased accessibility and transparency. Dong et al. (2020) surveyed 3,275 Chinese parents and found that they valued effective communication channels that alleviated the challenges prompted by distance learning. To better address communication challenges related to inconsistency and ambiguity, schools should articulate clear procedures for frequent and timely communication. It is essential to provide accurate information to all parents and guardians to promote confidence and engagement (Dong et al., 2020; Kim and Asbury, 2020). Houri et al. (2019) further highlight the importance of clear and consistent communication in establishing trust and engagement between parents and schools. Likewise, Hertel and Jude (2016) found that prompt and accurate information is critical for facilitating parental involvement and confidence within the school. Collectively, these findings reveal that parents and guardians valued the guidance and support they received from schools, emphasizing the importance of strong two-way communication between schools and parents/guardians (Bates et al., 2023).

However, several investigations dispute these conclusions. For example, Kim and Asbury (2020) describe how some parents did not experience improved communication, citing uncertainty and a lack of timely updates from schools. Furthermore, Borup et al. (2020) highlighted that certain schools struggled to maintain consistent communication, which led to parental frustration. Additionally, there was no significant change in the clarity and detail of the information presented nor in the effectiveness of communication strategies. Epstein et al. (2018) support this consistency, stating that established communication strategies can remain effective if they are well-structured and unambiguous. The EFA corroborated these findings by identifying specific characteristics associated with enhanced communication and sustained parental participation following the pandemic.

4.5 Perceptions of parental involvement

Parental participation and involvement in their children's education are critical for student success; however, the COVID-19 pandemic posed unexpected challenges that altered these dynamics (Rehman et al., 2021). This study considered how perceptions of

TABLE 7 Rotated component matrix.

Rotated component matrix[a]	Component						
	1	2	3	4	5	6	7
1. During the pandemic, it was easy to get in touch with my child's school leaders.	0.269	0.500	−0.124	0.083	0.161	0.127	0.076
2. During the pandemic, my child actively participated in online classes and assignments.	−0.003	0.372	−0.067	0.023	0.053	0.525	0.373
3. During the pandemic, my child was capable of completing their learning tasks independently.	0.038	0.009	0.011	0.034	0.175	0.860	0.033
4. During the pandemic, I was consistently monitoring my child's academic progress.	0.134	0.789	0.150	−0.028	0.056	−0.047	0.077
5. During the pandemic, school leaders provided me with updates and important information I needed to support my child's learning at home.	0.312	0.716	0.189	0.191	−0.021	0.049	0.025
6. During the pandemic, the school provided clear and understandable information about my child's academic progress and school events.	0.181	0.710	0.217	0.245	−0.029	0.082	0.059
7. During the pandemic, I was involved with my child's school by attending school events and various activities.	−0.006	0.208	0.022	0.205	0.076	0.115	0.685
8. During the pandemic, my child's academic performance was maintained due to the support provided by the school.	−0.071	0.124	0.148	0.095	0.746	0.314	−0.033
9. During the pandemic, the schoolwork assigned by my child's teacher was engaging and matched my child's learning level.	0.073	0.017	0.002	0.014	0.799	−0.015	0.175
10. During the pandemic, the school's communication approach (e.g., emails, newsletters, phone calls) effectively kept me informed about important updates and changes.	0.198	0.263	−0.119	0.647	−0.010	−0.117	0.112
11. During the pandemic, the school provided adequate resources for me to support my child's learning at home.	0.301	−0.110	0.098	0.238	0.270	0.215	0.519
12. During the pandemic, I could easily reach school staff (e.g., teachers and administrators) when I had questions or concerns.	0.383	0.046	−0.036	0.450	0.087	−0.076	0.130
13. During the pandemic, I frequently monitored my child's participation in online classes.	0.074	0.083	0.219	0.486	−0.160	0.200	0.141
14. After the pandemic, I was involved with my child's school by attending school events and various activities.	−0.017	0.064	0.215	0.671	0.177	0.057	0.067
15. After the pandemic, it is easy to get in touch with my child's school leaders.	0.679	0.119	0.116	−0.001	−0.074	0.221	0.187
16. After the pandemic, my child's teacher(s) assigned schoolwork that was engaging and promoted his/her academic performance.	0.735	0.202	0.225	0.039	0.063	−0.014	0.119
17. After the pandemic, I have always been able to get in touch with someone when needed.	0.762	0.131	0.141	−0.061	−0.005	−0.060	0.185
18. After the pandemic, the school's communication methods (e.g., emails, newsletters, parent portals) effectively kept me informed about my child's education and school events.	0.724	0.317	0.074	0.130	0.032	−0.067	−0.134
19. After the pandemic, school leaders provided easy access to information about my child's academic performance.	0.719	0.049	0.092	0.142	0.067	0.096	−0.080
20. After the pandemic, the school provides clear and detailed information about my child's academic performance and school activities.	0.608	0.194	0.335	0.112	−0.078	−0.002	0.021
21. After the pandemic, I can easily contact school personnel (e.g., teachers and office staff) when I need assistance or have inquiries.	0.656	0.117	0.141	0.217	0.022	−0.057	−0.059
22. After the pandemic, I was consistently monitoring my child's academic progress.	0.202	0.186	0.645	0.110	0.165	−0.095	0.017

(Continued)

TABLE 7 (Continued)

Rotated component matrix[a]	Component						
	1	2	3	4	5	6	7
23. After the pandemic, I regularly visit my child's classroom or participate in school events to stay informed about their educational environment.	0.183	0.087	0.568	0.120	0.027	−0.241	0.459
24. After the pandemic, my child is actively engaged in their learning.	0.158	0.023	0.387	0.323	0.088	0.207	−0.311
25. After the pandemic, my child feels successful working independently.	0.317	−0.102	0.497	0.173	−0.204	0.139	0.033
26. After the pandemic, the school provided adequate resources for me to support my child's learning and reduce academic stress.	0.191	0.177	0.697	−0.039	0.071	0.053	−0.005

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation Converged in Eight Iterations.

parental involvement and parent-school communication evolved during and after the pandemic, indicating shifts that mirror broader societal effects.

In terms of parental involvement, we found an increase in parental monitoring of their children's academic progress post-pandemic, alongside a decrease in total parental involvement with schools. This confirms our hypothesis indicating a significant difference in parents' perceptions of their involvement in their child's education during and after the COVID-19 pandemic. The data demonstrate that as parents became increasingly concerned about their children's academic progress post-pandemic, their overall involvement with their child's school decreased. Distance learning may have facilitated greater parental involvement during the pandemic due to its accessibility; parents could attend events and activities online, which helped to alleviate scheduling conflicts. However, after the pandemic, as students returned to in-person schooling, many school events and activities resumed as well. This shift may have introduced additional challenges for parents in maintaining their involvement in school activities.

This finding aligns with the research conducted by Dong et al. (2020), which indicated that although parents were more focused on monitoring academic efforts, the stressors associated with the pandemic may have led to decreased overall involvement in their children's education. Additionally, Ma et al. (2016) found that increased academic monitoring could occur at the expense of greater educational participation, particularly during times of crisis. This observation is supported by a meta-analysis of 46 studies that emphasized the importance of parental involvement in early childhood and elementary education. Sibley and Dearing (2014) reported that while parental participation is critical for children's academic achievement, external stressors can impact the extent and nature of parental involvement. Garbe et al. (2020) also argue that increased parental stress and anxiety during the pandemic contributed to reduced involvement in their children's schooling.

The mixed results of this study suggest that, while there was an overall trend of decreased parental involvement, these perceptions were not universally applicable. The data indicates that parental involvement during and after the pandemic varied significantly. These mixed perceptions are consistent with the findings of Knopik et al. (2021), who conducted a survey of 421 parents of primary school

students. They observed that while some parents reported feeling stressed, others seized the pandemic as an opportunity to become more involved in their children's education. Similarly, Bhamani et al. (2020), who interviewed 19 parents, found that the increased time spent at home allowed parents to engage more deeply in their children's educational experiences, which contrasts with the overall trend of reduced involvement.

Collectively, the findings of this study highlight the necessity for schools to maintain improved communication strategies while establishing measures to involve parents more fully in their children's education. This study lays the groundwork for schools to foster strong parent-school relationships that support student performance, addressing both the benefits and challenges observed during this transformative period (Garbe et al., 2020; Ma et al., 2016; Sibley and Dearing, 2014). Although parents increased their monitoring of their child's academic progress after the pandemic, they simultaneously became less involved with their child's school. These mixed results indicate that school leaders would benefit from a more nuanced approach to understanding and supporting parental involvement in educational settings.

5 Suggestions for future practice

The findings from this study provide meaningful insights into parent-school communication and parental involvement during and after the COVID-19 pandemic. While our analysis reveals positive trends in accessibility and engagement with digital tools, the results also identify areas requiring further exploration and clarification. The following suggestions aim to guide school leaders in enhancing both communication strategies and parental involvement practices based on emerging patterns observed in this research.

5.1 Continue use of diverse digital communication channels

The data revealed that digital communication tools, including school-parent portals, learning management systems (such as Google Classroom and Seesaw), and messaging platforms (such as WhatsApp and SMS notifications), were perceived positively

TABLE 8 Pair ranks from the Wilcoxon signed-rank test.

Ranks				
		N	Mean rank	Sum of ranks
After the pandemic, school leaders provided easy access to information about my child's academic performance. During the pandemic, school leaders provided me with updates and important information I needed to support my child's learning at home.	Negative ranks	67	89.26	5,980.50
	Positive ranks	153	119.80	18,329.50
	Ties	259		
	Total	479		
After the pandemic, it is easy to get in touch with my child's school leaders. During the pandemic, it was easy to get in touch with my child's school leaders.	Negative ranks	87	110.27	9,593.50
	Positive ranks	129	107.31	13,842.50
	Ties	263		
	Total	479		
After the pandemic, the school provides clear and detailed information about my child's academic performance and school activities. During the pandemic, the school provided clear and understandable information about my child's academic progress and school events.	Negative ranks	82	82.94	6,801.00
	Positive ranks	94	93.35	8,775.00
	Ties	303		
	Total	479		
After the pandemic, the school's communication methods (e.g., emails, newsletters, parent portals) effectively kept me informed about my child's education and school events. During the pandemic, the school's communication approach (e.g., emails, newsletters, phone calls) effectively kept me informed about important updates and changes.	Negative ranks	159	136.77	21,746.50
	Positive ranks	140	165.03	23,103.50
	Ties	180		
	Total	479		
After the pandemic, I was consistently monitoring my child's academic progress. During the pandemic, I was consistently monitoring my child's academic progress.	Negative ranks	79	103.01	8,138.00
	Positive ranks	148	119.86	17,740.00
	Ties	252		
	Total	479		
After the pandemic, I was involved with my child's school by attending school events and various activities. During the pandemic, I was involved with my child's school by attending school events and various activities.	Negative ranks	158	122.20	19,307.00
	Positive ranks	102	143.36	14,623.00
	Ties	219		
	Total	479		

by parents during the pandemic ($Z = -6.757$, $p < 0.001$). This suggests that employing multiple, varied channels of communication improved accessibility and streamlined information sharing. Diversifying communication pathways with a diverse set of tools can help ensure information reaches parents through multiple means. This may further help meet the varying needs and technological literacy levels of parents. As such, schools should also evaluate the effectiveness of their communication channels and be willing to adjust these based on the evolving needs and feedback from families.

5.2 Build clear procedures for timely communication

Additionally, our study finds no significant change in the clarity of communication during and after the pandemic. This stability suggests that even though systems were effective, such systems may remain unchanged. While this could be interpreted from either a positive or negative perspective, it is relevant to note that unchanged systems may not continue to meet the

evolving needs of parents' needs. As such, schools should consider establishing flexible procedures for message clarity, frequency, and content to enhance consistency across all phases of learning. It is essential to provide accurate information to all parents to retain their confidence and engagement. A study conducted by Borup et al. (2020) emphasizes the importance of timely updates in minimizing misunderstandings and promoting a healthy school environment. These practices should include shared expectations for response times, message formats, and multilingual support where necessary. Implementing clear communication policies and practices could further strengthen clarity and accessibility.

5.3 Strengthen parental support programs

The results of this study indicated a significant increase in parental monitoring of academic progress post-pandemic, with parents assuming greater responsibility for supporting their children's education. However, the data also suggested that parents faced challenges in fully understanding progress metrics and using school-provided tools effectively. Toward this

TABLE 9 Wilcoxon signed-rank test statistics.

Test statisticsa						
	After the pandemic, school leaders provided easy access to information about my child's academic performance. During the pandemic, school leaders provided me with updates and important information I needed to support my child's learning at home.	After the pandemic, it is easy to get in touch with my child's school leaders. During the pandemic, it was easy to get in touch with my child's school leaders.	After the pandemic, the school provides clear and detailed information about my child's academic performance and school activities. During the pandemic, the school provided clear and understandable information about my child's academic progress and school events.	After the pandemic, the school's communication methods (e.g., emails, newsletters, parent portals) effectively kept me informed about my child's education and school events. During the pandemic, the school's communication approach (e.g., emails, newsletters, phone calls) effectively kept me informed about important updates and changes.	After the pandemic, I was consistently monitoring my child's academic progress. During the pandemic, I was consistently monitoring my child's academic progress.	After the pandemic, I was involved with my child's school by attending school events and various activities. During the pandemic, I was involved with my child's school by attending school events and various activities.
Z	−6.757[b]	−2.385[b]	−1.523[b]	−0.483[b]	−4.994[b]	−1.987[c]
Asymp. Sig. (two-tailed)	0.000	0.017	0.128	0.629	0.000	0.047

[a]Wilcoxon Signed-Rank Test.
[b]Based on Negative Ranks.
[c]Based on Positive Ranks.

end, schools could deliver workshops and face-to-face information sessions. Developing additional resources, such as instructional videos and toolkits, to help parents interpret grading systems, access performance data, and provide academic support at home are additional valid suggested approaches. Where parental involvement remains a priority, additional resources could be an excellent way to empower parents to engage more effectively in their child's learning journey at home.

5.4 Provide flexible engagement opportunities

Further, our analysis indicates a decrease in parental participation in school activities post-pandemic. This decline may reflect a return to pre-pandemic norms rather than a drop in engagement quality. While parents, and other education stakeholders, have returned to these norms, it remains prudent for schools to explore flexible involvement options for parents. Consistent with the research of Goodall (2022) and Epstein et al. (2018), schools could consider additional in-person, online, and hybrid engagement opportunities. Virtual check-ins with parents, with either synchronous or asynchronous opportunities for engagement, could further accommodate diverse parental schedules and sustain positive relationships. Parent feedback forums, coupled with flexible volunteer roles could further support meaningful engagement while respecting parents' time constraints.

5.5 Evaluate and customize digital tools for effectiveness

While the findings highlighted increased accessibility through digital platforms, parents reported variations in their effectiveness. These mixed results demonstrate a need for schools to sustain greater consistency and long-term effectiveness. As such, schools could regularly evaluate these tools through parental feedback surveys and adapt strategies based on identified preferences and challenges. Such tools may require customization to promote access for diverse groups of parents. This may include including language accessibility features and differentiated content delivery to cater to various learning environments and technological proficiencies. Recent studies have emphasized the importance of adjusting approaches to strengthen parent-school communication, as successful digital platforms have been shown to have a substantial impact (Garbe et al., 2020).

5.6 Encourage collaborative decision-making

Our analysis showed that parental collaboration in decision-making was positively associated with stronger communication and trust. Parents who were engaged in decision-making regarding learning platforms and scheduling during the pandemic reported higher levels of trust and communication with school leaders. That is, collaborative approaches can promote long-term engagement and trust between schools and parents. As such, schools may benefit from implementing structured feedback mechanisms, which could include collaborations like parent advisory groups, parent town halls, and other open forums, to encourage ongoing parental input in school policies and communication strategies. Providing opportunities for shared decision-making fosters a sense of partnership and aligns with distributed leadership models (Erol and Turhan, 2018), which emphasize the significance of diverse stakeholder voices.

6 Conclusion

The COVID-19 pandemic fundamentally transformed parent-school communication and parental involvement, resulting in both substantial

progress and new challenges. This study highlights significant improvements in the accessibility and efficiency of interactions between parents and school leaders. In the post-pandemic landscape, enhanced digital communication strategies have facilitated parents' ability to acquire communication and connect with school leaders, resulting in positive outcomes. Parental involvement, when compared to the periods during and after the pandemic, displayed a multifaceted pattern. Although parents became more attentive to their children's academic success after the pandemic, there was a decrease in their total involvement in other educational activities. Ultimately, the pandemic has catalyzed positive transformation while also presenting significant challenges in educational communication and family involvement. To progress, schools should leverage the advancements made by further improving communication tactics and ensuring their consistent application. Additionally, schools could implement programs designed to fully support and involve parents in their children's education. By engaging in these practices, educational institutions can establish robust parent-school collaborations, thereby bolstering student achievement in an increasingly complex and dynamic educational environment.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

Ethics statement

The studies involving humans were approved by AURAK Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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