



ORIGINAL RESEARCH PAPER

Parental involvement in digital learning environments: examining school-parent communication, parental self-efficacy, and students' positive digital agency

M. Namdari-Pejman^{*1}, M. Zandian²

¹ Department of Educational Administration, Farhangian University, Tehran, Iran

² Department of Educational Management, Faculty of Psychology and Education, University of Tehran, Tehran, Iran

ABSTRACT

Received: 09 September 2025
Reviewed: 16 October 2025
Revised: 19 November 2025
Accepted: 25 December 2025

KEYWORDS:

Parental Involvement
Digital Learning Environments
School-Parent Communication
Parental Self-Efficacy
Students' Positive Digital Agency

* Corresponding author

m.namdari@cfu.ac.ir

(+9821) 87751000

Background and Objectives: The rapid advancement of digital technologies and the expansion of online learning in the wake of the COVID-19 pandemic have profoundly highlighted the critical role of parents in supporting their children's education within digital environments. Previous studies consistently show that active parental involvement contributes significantly to improvements in students' academic performance, motivation, and digital literacy. Two key factors identified as influential in this parental engagement are the quality of school-parent communication and parents' self-efficacy in the digital domain. Effective school communication acts as a vital bridge between home and school, helping to mitigate the barriers posed by the digital divide. Concurrently, parental self-efficacy—the belief in one's ability to effectively support a child's online learning—empowers parents, fostering the motivation for constructive supervision and the modeling of positive digital behaviors. Despite this background, research has focused little on an integrated examination of these factors and the mediating role of parental engagement in shaping students' positive digital agency—defined as responsible, ethical, and creative behaviors in virtual spaces. The current study aims to address this gap by testing a conceptual structural model that explores the relationships between school-parent communication, parental self-efficacy, parental digital engagement, and students' positive digital agency. A central objective is to specifically investigate the mediating role of parental digital engagement in transmitting the effects of the two antecedent factors (school communication and self-efficacy) onto the development of positive digital agency. The findings of this research aim to provide empirical evidence to inform educational policy and empower families in the digital age.

Methods: This study employed a descriptive-correlational design with a quantitative approach, utilizing covariance-based structural equation modeling (SEM). The target population consisted of parents of elementary school students in Qazvin, Iran, during the 2025-2026 academic year, all of whom had at least one year of experience with their child's digital learning. A multi-stage cluster sampling method was used. After removing incomplete or unsuitable responses, the final sample size comprised 362 participants. Data were collected using four standardized Persian questionnaires: The Parental Self-Efficacy Scale, the School-Parent Communication Scale, the Parental Digital Engagement Scale, and the Students' Positive Digital Agency Scale. Data analysis involved checking preliminary assumptions (e.g., normality), conducting confirmatory factor analysis (CFA) to validate the measurement model, and testing the structural model. The significance of direct and indirect (mediating) effects was assessed using the bootstrap method with 5000 resamples.

Findings: The conceptual model demonstrated an acceptable fit with the data (CFI = 0.96, RMSEA = 0.07). All direct paths were statistically significant: school-parent communication to parental digital engagement ($\beta = 0.60$), parental self-efficacy to parental digital engagement ($\beta = 0.26$), and parental digital engagement to students' positive digital agency ($\beta = 0.53$). The analysis of indirect effects confirmed the mediating role of parental digital engagement, indicating it functions as a full mediator in the relationship between the two predictor variables (school communication and parental self-efficacy) and the outcome variable

(students' positive digital agency). Overall, the model explained 65% of the variance in parental digital engagement and 28% of the variance in students' positive digital agency.

Conclusion: The results underscore the necessity of harmonizing environmental factors (effective school communication) and individual factors (parental self-efficacy) through practical parental digital engagement to foster students' positive digital agency. To cultivate students as responsible and creative digital citizens, schools must strengthen two-way communication channels and actively empower parents. Practical applications of these findings include the design of targeted parent training workshops focused on digital skills and supportive strategies, as well as the integration of digital citizenship education into the core school curriculum. This study's limitations include its specific geographical focus (Qazvin) and reliance on self-reported data. For future research, it is recommended to investigate the role of potential moderating variables, such as socioeconomic status, and to test practical intervention programs on a larger scale to further validate and generalize the proposed model.



COPYRIGHTS

© 2026 The Author(s). This is an open-access article distributed under the terms and conditions of the Creative Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>)



NUMBER OF REFERENCES

44



NUMBER OF FIGURES

1



NUMBER OF TABLES

4

مقاله پژوهشی

مشارکت والدین در محیط‌های یادگیری دیجیتال: مطالعه‌ای در مورد ارتباطات مدرسه، خودکارآمدی والدین و کنشگری مثبت دیجیتال دانش‌آموزان

مهدی نامداری پژمان^{۱*}، محسن زندیان^۲

^۱گروه مدیریت آموزشی، دانشگاه فرهنگیان، تهران، ایران

^۲گروه مدیریت آموزشی، دانشکده روان‌شناسی و علوم تربیتی، دانشگاه تهران، تهران، ایران

چکیده

پیشینه و اهداف: پیشرفت سریع فناوری‌های دیجیتال و گسترش یادگیری برخط در پی همه‌گیری کووید-۱۹، به طور برجسته‌ای نقش حیاتی والدین را در حمایت از آموزش فرزندان در محیط‌های دیجیتال پررنگ کرده است. مطالعات پیشین به طور مستمر نشان می‌دهند که مشارکت فعال والدین به بهبود معنادار عملکرد تحصیلی، انگیزش و سواد دیجیتال دانش‌آموزان کمک می‌کند. دو عامل کلیدی مؤثر در مشارکت والدین، کیفیت ارتباطات مدرسه با والدین و خودکارآمدی والدین در حیطه دیجیتال است. ارتباط مؤثر مدرسه به‌عنوان پلی حیاتی بین خانه و مدرسه عمل کرده و به کاهش موانع ناشی از شکاف دیجیتالی کمک می‌کند. هم‌زمان، خودکارآمدی والدین - یعنی باور به توانایی حمایت مؤثر از یادگیری برخط فرزند - به والدین قدرت می‌بخشد و انگیزه نظارت سازنده و الگوسازی رفتارهای مثبت دیجیتال را تقویت می‌کند. علی‌رغم این پیشینه ثابت شده، بررسی یکپارچه این عوامل و نقش میانجی‌گر مشارکت والدین در شکل‌دهی به «کنشگری مثبت دیجیتال» دانش‌آموزان - که به‌عنوان رفتارهای مسئولانه، اخلاقی مدار و خلاق در فضای مجازی تعریف می‌شود - کمتر موردتوجه قرار گرفته است. هدف این مطالعه پر کردن این شکاف از طریق آزمون یک مدل مفهومی ساختاری است که روابط بین ارتباطات مدرسه با والدین، خودکارآمدی والدین، مشارکت دیجیتال والدین و کنشگری مثبت دیجیتال دانش‌آموزان را بررسی می‌کند. هدف اصلی، بررسی ویژه‌ی نقش میانجی‌گر مشارکت دیجیتال والدین در انتقال اثرات دو عامل پیشین (ارتباط مدرسه و خودکارآمدی) به توسعه کنشگری مثبت دیجیتال است. یافته‌های این پژوهش شواهد تجربی برای اطلاع‌رسانی به سیاست‌گذاری آموزشی و توانمندسازی خانواده‌ها در عصر دیجیتال ارائه می‌کند.

تاریخ دریافت: ۱۸ شهریور ۱۴۰۴

تاریخ داوری: ۲۴ مهر ۱۴۰۴

تاریخ اصلاح: ۲۸ آبان ۱۴۰۴

تاریخ پذیرش: ۰۴ دی ۱۴۰۴

واژگان کلیدی:

مشارکت والدین در محیط‌های یادگیری دیجیتال
ارتباطات مدرسه
خودکارآمدی والدین
کنشگری مثبت دیجیتال دانش‌آموزان

* نویسنده مسئول

m.namdari@cfu.ac.ir

۰۲۱-۸۷۷۵۱۰۰۰ (۱)

روش‌ها: روش‌ها: این پژوهش از طرح توصیفی - همبستگی با رویکرد کمی و با استفاده از مدل‌سازی معادلات ساختاری مبتنی بر کوواریانس استفاده کرد. جامعه آماری، والدین دانش‌آموزان ابتدایی شهر قزوین در سال تحصیلی ۱۴۰۴-۱۴۰۵ بودند که حداقل یک سال تجربه یادگیری دیجیتال فرزندشان را داشتند. از روش نمونه‌گیری خوشه‌ای چندمرحله‌ای استفاده شد و پس از حذف پاسخ‌های ناقص یا نامناسب، حجم نمونه نهایی ۳۶۲ نفر بود. داده‌ها با استفاده از چهار پرسش‌نامه استاندارد فارسی جمع‌آوری شد: مقیاس خودکارآمدی والدینی، مقیاس ارتباطات مدرسه - والدین، مقیاس مشارکت دیجیتال والدین و مقیاس کنشگری مثبت دیجیتال دانش‌آموزان. تحلیل داده‌ها شامل بررسی پیش‌فرض‌های اولیه (مانند نرمال بودن)، انجام تحلیل عاملی تأییدی برای اعتبارسنجی مدل اندازه‌گیری و آزمون مدل ساختاری بود. معناداری اثرات مستقیم و غیرمستقیم (میانجی) با استفاده از روش بوت‌استرپ با ۵۰۰۰ نمونه بازتولید، ارزیابی شد.

یافته‌ها: مدل مفهومی برازش قابل‌قبولی داشت ($CFI = 0.96$, $RMSEA = 0.07$). مسیرهای مستقیم ارتباطات مدرسه به مشارکت دیجیتال ($\beta = 0.60$)، خودکارآمدی والدین به مشارکت دیجیتال ($\beta = 0.26$) و مشارکت دیجیتال به کنشگری مثبت ($\beta = 0.53$) معنادار بودند. تحلیل اثرات غیرمستقیم، نقش میانجی‌گری مشارکت دیجیتال والدین را تأیید کرد و نشان داد که این متغیر به‌عنوان یک میانجی کامل در رابطه بین دو متغیر پیش‌بین (ارتباط مدرسه و خودکارآمدی والدین) و متغیر پیامد (کنشگری مثبت دیجیتال دانش‌آموزان) عمل می‌کند. در مجموع، مدل توانست ۶۵ درصد از واریانس مشارکت دیجیتال والدین و ۲۸ درصد از واریانس کنشگری مثبت دیجیتال دانش‌آموزان را تبیین کند.

نتیجه‌گیری: نتایج بر ضرورت هماهنگی عوامل محیطی (ارتباط مؤثر مدرسه) و فردی (خودکارآمدی والدین) از طریق مشارکت عملی دیجیتال والدین برای پرورش کنشگری مثبت دیجیتال دانش‌آموزان تأکید دارد. برای پرورش دانش‌آموزان به‌عنوان شهروندانی مسئول و خلاق در فضای دیجیتال، مدارس باید کانال‌های ارتباطی دوسویه را تقویت کرده و والدین را به طور فعال توانمند سازند. کاربردهای عملی این یافته‌ها شامل طراحی کارگاه‌های آموزشی هدفمند برای والدین با محوریت مهارت‌های دیجیتال و راهبردهای حمایتی، و همچنین ادغام آموزش شهروندی دیجیتال در برنامه درسی اصلی مدرسه است. محدودیت‌های این مطالعه شامل تمرکز جغرافیایی خاص (قزوین) و اتکا به داده‌های خودگزارشی است. برای تحقیقات آینده، توصیه می‌شود نقش متغیرهای تعدیل‌گر بالقوه، مانند وضعیت اقتصادی - اجتماعی، بررسی شده و برنامه‌های مداخله‌ای عملی در مقیاسی وسیع‌تر برای اعتباربخشی و تعمیم بیشتر مدل پیشنهادی آزمون شوند.

Introduction

Rapid advancements in technology have positioned digital technologies as increasingly central to transformations in education. The prioritization of integrating digital technologies into teaching and learning processes has become a key strategy in national and international educational policies [1]. The COVID-19 pandemic and the emergency responses in education during this period have highlighted its implications for educational processes, while post-COVID policies [2] signal the emergence of a new paradigm that has even engaged parents in online learning [3].

The rise of e-learning as an alternative to traditional education—which has dominated for several decades—has generated considerable excitement [4]. E-learning constitutes a form of distance education that employs digital infrastructures and resources to

deliver educational content to learners. This mode of education, also referred to as 'electronic learning,' 'distance learning,' or 'virtual learning,' enables learners to acquire information at their own preferred pace, according to Lown and colleagues [5]. In response to the rapid pace of technological innovation and the evolving educational environment, a comprehensive examination of e-learning methods, their effectiveness, and the factors influencing their successful implementation is essential [4][6].

Various factors contribute to the success of this learning mode, among which parental involvement plays a prominent role [3][7][8]. When parents actively participate in their children's activities, students perceive them as supportive figures, which can be expected to correlate with improved academic achievement and performance [9]. To assist children at home, parents must provide guidance,

instruction, understanding, collaboration, and supervision. At the same time, they need to monitor and control the activities and information children receive through digital media, offering appropriate explanations. Effective parental modeling is required to leverage technology for knowledge construction and to support children's learning [10]. Parental involvement shapes students' attitudes and behaviors in response to digital learning and is crucial because it influences communication patterns and interactions. In this digital model, parental involvement exerts a strong impact on children's development. One notable negative consequence for students who use technology without parental supervision is moral degradation, as the use of information technology is often not balanced with high ethical values from the real world [11]. Children are particularly vulnerable to the long-term effects of exposure to inappropriate content. Parents therefore have a responsibility to guide and accompany them in managing the negative impacts of technology use.

Another key factor in this domain is school-home communication. Effective communication between teachers and parents is vital for enhancing children's learning both at school and at home. However, implementing such communication faces numerous challenges. Teacher-parent communication depends on coordinated and collaborative efforts from all key stakeholders (teachers, parents, students, and school administration) in the child's learning process. It is therefore recommended that each group actively contributes to improving and expanding these communications [12]. Effective interaction between home and school can lay the foundation for improving educational quality and students' academic progress. Such interaction also helps reduce educational and upbringing inconsistencies, thereby better

achieving the objectives of the education system [13]. Recent studies indicate that while digital tools and remote education have created new opportunities for school-family communication, they have also introduced new barriers. For instance, parents with limited digital skills or a lack of access to technology often find it difficult to engage in their children's education [14]. Moreover, many schools lack structured programs or policies to support diverse forms of parental involvement, particularly in multicultural or multilingual communities [15].

Furthermore, research demonstrates a bidirectional relationship between parental self-efficacy and positive parenting [16-17]. Parental self-efficacy can be defined as parents' belief in their capacity to support their child's development, learning, and attainment of desirable educational outcomes [18]. This concept reflects the degree of confidence parents have in their ability to perform effectively in the teaching-learning process and can be a critical factor influencing the quality and nature of their participation in students' educational activities [19]. With the expansion of digital education, parents play a significant role in supporting their children's learning. Studies have shown that parents who believe in their abilities within online environments can perform more effectively by reducing the stress associated with technology use [20-21]. Thus, parental self-efficacy not only enhances the quality of their support but can also positively influence students' engagement and success.

Several international studies have indicated that the use of digital technologies results in only modest improvements in academic performance [22-24]. In contrast, other studies [3][7][8] suggest that when parents are aware of digital learning environments and perceive themselves as efficacious [16-17], improvements in students' academic

performance are more likely. The present study aims to examine the role of efficacious parental involvement in students' learning through active engagement in digital learning environments, aligned with the school's academic objectives.

Literature Review

Parental Involvement in Digital Learning Environments

The transformations induced by the COVID-19 pandemic and the widespread adoption of educational technologies have significantly amplified the role of parents in their children's digital learning. Research consistently demonstrates that active parental involvement in online education contributes to enhanced student academic performance, as well as improved motivation and self-efficacy.

For instance, one study [25] found that parental involvement in online education at the primary school level is shaped by parents' competencies, emotional support, and educational infrastructure, ultimately leading to improved student learning outcomes. Another investigation [26] examined the relationships among digital literacy, parental mediation, and online education risks, with student self-control serving as a mediating factor. The findings revealed significant negative associations between digital literacy and parental mediation on the one hand, and online risks on the other. The mediating role of self-control in the relationships between parental mediation/digital literacy and educational risks was confirmed. Other researchers have emphasized that parents, through modeling responsible online behavior and engaging in discussions with their children, play a crucial role in fostering digital literacy and cyber responsibility [27].

At the international level, evidence indicates that parents served as facilitators of digital learning before, during, and after the COVID-19 pandemic, with their role evolving from assisting with homework to managing digital learning environments [28]. In another study, parental involvement in online English language learning was shown to increase students' intrinsic and extrinsic motivation, thereby promoting greater academic engagement [29]. Additional studies have underscored the importance of school–parent communication in digital learning contexts. A qualitative study conducted in Iran demonstrated that effective parental interaction with schools during virtual education supports children's emotional well-being and educational care [30]. In a similar vein, scholars have stressed the need to redefine parental roles in digital learning to strengthen students' moral development and resilience [31]. As explained, the literature suggests that parental involvement in digital learning not only contributes to improved academic performance among students but is also positively associated with enhanced digital literacy, academic motivation, and the quality of school–family communication.

School Communication and Students' Positive Digital Agency

In the current digital era, schools play a role far beyond the mere transmission of knowledge, evolving into central hubs for shaping students' behaviors and agency in virtual spaces. Positive digital agency refers to a set of responsible, ethical, and constructive behaviors and attitudes that students exhibit in their interactions with digital technologies and online environments. This concept encompasses components such as sharing beneficial content, engaging in respectful interactions, constructive criticism, participating in online communities for positive purposes, and

adhering to cybersecurity practices and privacy norms [32]. The development of this form of agency is strongly influenced by the quality and nature of school communication. Here, school communication encompasses all formal and informal interactions, channels, and strategies that occur between the school (including administration, teachers, and staff) and students, as well as among students themselves within the educational context [33].

Recent research indicates that school communication serves as a key factor in fostering positive digital agency. This influence operates through two primary pathways: first, through explicit and structured education, and second, through the creation of a supportive communicative culture and environment. In the explicit education pathway, schools develop and implement programs on digital literacy and digital citizenship education, teaching students not only to be passive consumers but also active, effective creators and agents in digital spaces. The content of these programs extends beyond basic technical skills to emphasize critical thinking, online ethics, awareness of the social impacts of online activities, and positive communication skills [34]. For example, findings from one study revealed that students participating in integrated curricula focused on responsible digital agency demonstrated greater involvement in online campaigns with social objectives (such as environmental protection or peer support) and higher proficiency in detecting misinformation compared to a control group [35]. The quality of teacher–student relationships is critical in delivering these educational efforts. Teachers who foster open, dialogue-oriented environments and position themselves as supportive guides (rather than mere transmitters of absolute knowledge) are more successful in modeling positive digital behaviors.

The profound impact of school communication, however, arises indirectly through the establishment of school culture. In schools where communication is grounded in mutual respect, trust, transparency, and collective participation, a safe and inspiring foundation is created for practicing and internalizing positive behaviors. Communication theories in educational settings support the notion that when students experience a sense of belonging and responsibility toward their school community, they extend this sense to the broader digital realm [36]. In other words, students who learn in school to express opinions respectfully, listen to diverse viewpoints, and collaborate on group projects are more likely to replicate these behavioral patterns on social media platforms and other online environments.

The role of digital communication channels within the school (such as learning management systems, school-specific social networks, and online forums) is also significant in this process. These channels provide a semi-protected, guided space where students can experiment with their initial digital agency experiences. A study in smart schools in Punjab, Pakistan, revealed that in institutions utilizing internal platforms for group discussions on social issues and collaborative projects, students not only acquired stronger technical skills but also exhibited more responsible attitudes toward information sharing and peer support in online spaces. These platforms, under indirect teacher supervision, enable practice, feedback, and behavioral refinement. In contrast, schools characterized by one-way, directive, or overly controlling communication—or those failing to leverage digital tools for meaningful interaction—miss opportunities to cultivate positive agency [37]. In such environments, students may perceive the digital space as disconnected from school

values or resort to minimal or risk-prone behaviors. Therefore, school communication acts as a driving force and model in shaping students' positive digital agency. This is achieved through a combination of direct digital citizenship education and, more importantly, the creation of a participatory and respectful communicative culture within the school. Investing in the enhancement of intra-school interactions and the purposeful use of digital tools to facilitate these interactions not only enriches the educational environment but also prepares the next generation for active, ethical, and constructive participation in the complex digital society.

Parental Self-Efficacy and Students' Positive Digital Agency

Parental involvement in the teaching–learning process enhances students' motivation, leading to greater engagement and academic participation. As a result, students exhibit more active presence in class, greater interest in completing assignments, heightened responsibility toward learning, and more positive responses to teachers and peers. Ultimately, these factors contribute to increased satisfaction and improved academic performance [38]. In today's complex digital environment, parental self-efficacy—defined as parents' belief in their ability to effectively guide their children's learning and online experiences—has emerged as a strong predictor of students' positive digital agency. Parents with higher feelings of competence and control in the digital realm experience less anxiety and are more likely to actively participate in their child's educational activities while creating a richer digital home environment [36]. This supportive environment, in turn, substantially increases the likelihood of responsible and constructive online behaviors among students.

This influence operates through several mechanisms. First, parents with high self-efficacy are more inclined and able to establish clear structures and rules for technology use. These rules are not merely restrictive; they are often accompanied by constructive dialogue, explanations of rationales, and instruction in self-regulation skills. This interactive approach helps students develop a deeper understanding of the 'why' behind appropriate digital behaviors and internalize them. Second, such parents serve as effective role models. When children observe their parents using technology for learning, meaningful communication, or problem-solving (rather than passive entertainment), they are likely to adopt similar positive attitudes [32]. Third, efficacious parents shift from mere supervision and control to acting as digital guides or coaches. They identify learning opportunities, collaborate on digital projects, and build their child's resilience in facing online challenges (such as misinformation or cyber conflicts).

Despite the importance of this role, many parents face challenges in achieving adequate self-efficacy due to generational digital divides, limited specialized knowledge, or feelings of helplessness in the face of rapidly evolving technologies [18]. This underscores the critical role of schools and educational institutions. Schools can systematically empower parents through targeted intervention programs. The most effective programs go beyond basic technical training to focus on enhancing parents' parenting, communication, and critical media literacy skills [39]. Practical, evidence-based strategies include interactive workshops, parent support networks, and accessible resources delivered through diverse communication channels (e.g., messaging apps or school portals). The outcome of such collaborative investment between home and school is the cultivation of a generation of

students who are not passive consumers but informed, creative, and responsible agents in the digital era.

Parental involvement in digital learning environments, particularly following the COVID-19 pandemic, plays a pivotal role in improving students' academic performance, motivation, and digital literacy. Domestic studies emphasize that factors such as parental competence, emotional support, digital literacy, and mediation reduce online education risks and facilitate learning. Internationally, research highlights the shift in parental roles toward facilitating digital learning and enhancing academic engagement through active participation. This involvement is positively associated not only with effective school–home communication but also with the promotion of digital ethics and student resilience. School communication, as a key environmental factor, supports academic progress by fostering belonging, motivation, and timely feedback. Studies stress the quality of teacher–parent interactions and the purposeful use of digital tools to support home-based learning. Furthermore, parental self-efficacy—as belief in one's capacity to support children's learning—is linked to positive parenting and better academic outcomes. Research indicates that parents with high self-efficacy perform more

effectively in monitoring, guiding, and transferring educational responsibilities, ultimately leading to greater student satisfaction and positive agency. Collectively, these factors exert synergistic effects on success in digital environments. Figure 1 illustrates the expected relationships in this study as a conceptual model.

Method

The present study employed a descriptive-correlational design with a quantitative approach. The primary objective was to test a conceptual model and examine the structural relationships, based on the theoretical framework, among school–parent communication in digital learning environments, parental self-efficacy, parental involvement in digital learning, and students' positive digital agency. To test this theoretical model, covariance-based structural equation modeling (CB-SEM) was utilized. This approach is considered a standard and valid method in behavioral and educational research due to its ability to simultaneously test the measurement and structural models, provide overall model fit indices, and accommodate theoretical model testing.

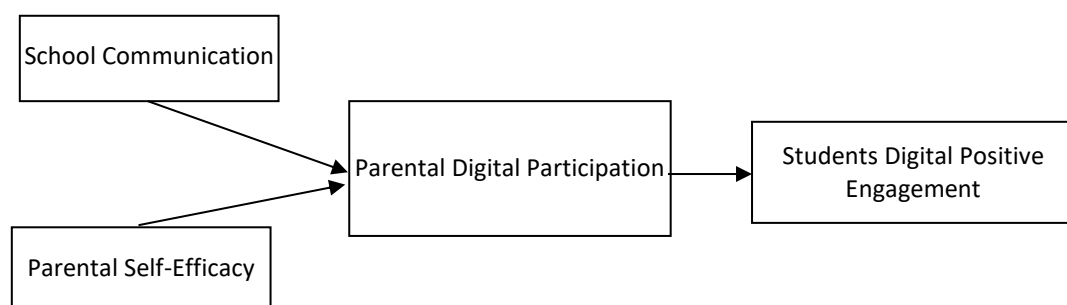


Fig. 1: Research model

Participants

The statistical population consisted of parents of primary school students in Qazvin city during the 2025–2026 academic year (1404–1405 in the Persian calendar), whose children had at least one year of experience with digital learning (fully online or blended). Multi-stage cluster sampling was employed: first, 10 public and private schools were randomly selected; subsequently, eligible classes within each school were identified, and parents of the students were invited to participate. Sample size was determined based on the requirements of covariance-based structural equation modeling, the complexity of the conceptual model, and the need to achieve adequate statistical power. Accordingly, a minimum sample size of over 200 participants was estimated. To enhance parameter estimation precision, a total of 385 questionnaires were collected. After excluding incomplete responses and multivariate outliers, 362 valid questionnaires (response rate: 94%) were retained for final analysis. Demographic characteristics of the sample indicated that 68% of respondents were mothers. The mean age of parents was 42.3 years ($SD = 5.7$), and the distribution of parental educational levels was relatively balanced.

Instruments

Data were collected using four standardized questionnaires. All instruments were translated into Persian, localized, and their validity and reliability were examined in the present sample.

Parental Self-Efficacy: The Parental Self-Efficacy Scale developed by Eslam Panah Amleshi and colleagues [40] was used. This scale comprises 41 items across 8 subscales: emotion-affect (5 items), play-enjoyment (5 items), empathy-understanding (5 items), inhibitory control (6 items), discipline-

boundaries (5 items), pressure (5 items), self-acceptance (5 items), and learning-knowledge (5 items). Items are rated on a 5-point Likert scale (1 = never to 5 = always). The Cronbach's alpha for the total scale was 0.94. Given the structural equation modeling approach, construct reliability and validity were assessed in the measurement model through composite reliability, average variance extracted (AVE), and factor loadings.

School–Parent Communication (School Bonding): To measure this construct, the Parental Involvement and Engagement Questionnaire by Fan and Williams [41] was employed. This instrument includes 42 items across 8 subscales: parental enthusiasm (6 items, $\alpha = 0.82$), parental participation in extracurricular activities (5 items, $\alpha = 0.74$), parental recommendations (6 items, $\alpha = 0.85$), parent–school communication related to student school issues (6 items, $\alpha = 0.83$), school contact with parents (5 items, $\alpha = 0.79$), parental attendance at school gatherings (5 items, $\alpha = 0.82$), family regulations (5 items, $\alpha = 0.81$), and socioeconomic base (4 items, $\alpha = 0.81$). Responses are recorded on a 5-point Likert scale. (Note: The reported Cronbach's alpha values are for the subscales; overall internal consistency reliability was assessed accordingly.)

Parental Involvement in Digital Learning Environments: This construct was measured using the 19-item instrument developed by Amelia and colleagues [42]. The questionnaire consists of four subscales: use of technology for educational games (4 items), use of technology for studying (3 items), fostering children's critical thinking skills based on images and words (6 items), and describing websites accessible to children (6 items). The tool possesses content, construct, and empirical validity, with responses recorded on a 5-point Likert scale [42].

Students' Positive Digital Agency: To assess this construct, the scale developed by Yasa and Rahaya [43] was utilized. The instrument uses a 5-point Likert scale and comprises 10 items across three subscales: digital literacy and cognitive-learning competence (5 items), social and ethical digital agency (3 items), and creative digital agency (2 items). Parental agreement is evaluated based on their observations of their child's behaviors and skills in using digital tools and engaging in virtual spaces. The internal consistency in the original study was reported as 0.89.

Data Analysis

Data analysis was conducted at both descriptive and inferential statistical levels using covariance-based structural equation modeling. In the first phase, data were screened for completeness, multivariate outliers (identified via Mahalanobis distance), and statistical assumptions. Multivariate outliers were removed where appropriate. Normality of variable distributions was evaluated through skewness and kurtosis indices and multivariate tests. Given the adequate sample size, analyses were considered robust to minor deviations from normality. Next, the measurement model was tested via confirmatory factor analysis (CFA) to evaluate construct validity and reliability. Standardized factor loadings, composite reliability (CR), and average variance extracted (AVE) were computed. Factor loadings above 0.50, CR values greater than 0.70, and AVE values exceeding 0.50 were regarded as evidence of internal reliability and convergent validity.

Discriminant validity was confirmed by comparing the square root of AVE for each construct with inter-construct correlations. Following confirmation of the measurement model, the structural model was estimated to test the hypothesized relationships among

constructs. Standardized path coefficients, standard errors, and statistical significance of paths were examined. Path significance was assessed using Z-statistics at the 0.05 level. Additionally, the explanatory power of the model was evaluated by reporting coefficients of determination (R^2) for endogenous constructs.

Results

Table 1 presents the descriptive statistics, internal reliability, and convergent validity indices for the constructs. This table includes means (M), standard deviations (SD), Cronbach's alpha (α), composite reliability (CR), average variance extracted (AVE), and factor loadings for each construct and its indicators.

The measurement model demonstrated satisfactory validity and reliability. Internal consistency reliability for all constructs was excellent, with Cronbach's alpha coefficients exceeding 0.89 across the board. To evaluate convergent validity, three key indices were examined. First, all standardized factor loadings were statistically significant ($p < 0.01$) and generally above 0.50, indicating that each indicator adequately contributed to defining its respective construct. Second, composite reliability (CR) values for all constructs ranged from 0.77 to 0.93, surpassing the recommended threshold of 0.70 and reflecting excellent internal consistency among the indicators of each construct. Third, average variance extracted (AVE) values exceeded 0.50 for three constructs (positive digital agency, parental self-efficacy, and parental involvement), while the AVE for parental involvement in digital learning was close to 0.50 (0.47). This suggests that, for most constructs, the shared variance among indicators was greater than the variance due to measurement error, thereby establishing convergent validity.

Table 1: Descriptive Statistics, Reliability, and Convergent Validity of the Constructs

Construct/Indicator	Mean	SD	SD λ	α	CR	AVE
Parental Self-Efficacy				0.94	0.93	0.58
Empathy-Understanding	21.81	2.81	0.81	-	-	-
Discipline- Setting Boundaries	21.06	3.05	0.81	-	-	-
Learning-Knowledge	21.20	2.67	0.79	-	-	-
Emotion Regulation	22.44	3.85	0.76	-	-	-
Play-Enjoyment	22.58	2.64	0.68	-	-	-
Self-Acceptance	25.01	3.01	0.66	-	-	-
Emotion-Affection	20.75	3.08	0.44	-	-	-
Pressure	24.35	3.71	0.38	-	-	-
School Communication				0.91	0.92	0.56
Family Rules	20.93	3.06	0.69			
Parent-School Communication	25.74	3.78	0.66			
Parental Advice	26.67	2.95	0.66			
School Meetings	18.54	4.12	0.60			
Extracurricular Activities	19.98	3.33	0.59			
School Contact	18.62	4.03	0.50			
Parental Aspiration	26.16	3.49	0.53			
Socioeconomic Status	14.81	3.53	0.44			
Digital Participation				0.90	0.78	0.47
Educational Play	15.48	3.06	0.71			
Studying	11.60	2.19	0.53			
Critical Thinking	10.02	2.17	0.34			
Website Description	14.42	4.33	0.26			
Positive Engagement				0.89	0.77	0.53
Learning Literacy	11.68	2.45	0.70			
Creative Engagement	16.71	7.10	0.31			
Social-Ethical	7.34	1.96	0.43			

Although the AVE for parental involvement in digital learning falls slightly below the conventional 0.50 threshold, it remains acceptable given the high composite reliability (0.78) and the overall strength of the other indices, consistent with guidelines that allow flexibility when CR is adequate and AVE is near the cutoff. Table 2 presents the inter-construct correlations (values above the main diagonal) and the square root of the AVE for each construct (bolded values on the main diagonal) to assess discriminant validity.

Discriminant validity (distinctiveness of the constructs from one another) was assessed using the Fornell-Larcker criterion. This criterion compares the correlations between each pair of constructs with the square root of the average variance extracted (VAVE; bolded

values on the diagonal) for the same construct. Discriminant validity is established if the VAVE for a construct exceeds its correlation with every other construct in the model. As shown, this condition holds for all construct pairs. For example, the VAVE for parental self-efficacy (0.76) is greater than its correlation with positive digital agency (0.35) and with other constructs. This indicates that each construct captures a unique portion of variance in the model and does not substantially overlap with others. Furthermore, the correlation matrix provides the necessary prerequisites for testing the structural model. Table 3 reports the standardized path coefficients, standard errors, t-statistics, significance levels, and explained variance.

Table 2: Correlation Matrix and Extracted Average Variance

Construct	(1)	(2)	(3)	(4)
(1) Parental Self-Efficacy	0.76			
(2) School Communication	0.65	0.75		
(3) Parental Digital Participation	0.67	0.78	0.69	
(4) Student Positive Engagement	0.35	0.41	0.53	0.73

Table 3: Results of Structural Model Analysis (Direct and Indirect Path Coefficients)

Direct Paths	β	SD	t	p	Result
School Communication → Parental Digital Engagement	0.60	0.09	6.06	<0.001	Supported
Parental Self-Efficacy → Parental Digital Engagement	0.26	0.08	3.39	<0.001	Supported
Parental Digital Engagement → Student Positive Digital Activism	0.53	0.08	6.02	<0.001	Supported
Indirect Effects					
School Communication → Parental Digital Engagement → Student Positive Digital Activism	0.32	0.06	4.89	<0.001	Supported
Parental Self-Efficacy → Parental Digital Engagement → Student Positive Digital Activism	0.14	0.05	3.03	<0.001	Supported
R^2					
Parental Digital Engagement	0.65				
Student Positive Digital Activism	0.28				

The structural model was evaluated using bootstrapping with 5000 resamples and 95% confidence intervals. All direct paths were statistically significant ($|t| > 2.58$, $p < 0.01$). School–parent communication emerged as the strongest predictor of parental involvement in digital learning ($\beta = 0.60$), followed by parental self-efficacy ($\beta = 0.26$). Parental involvement in digital learning, in turn, was a significant and strong predictor of students' positive digital agency ($\beta = 0.53$).

To test indirect effects, the bootstrapping method was employed. Since the 95% confidence intervals for both indirect effects did not include zero—school–parent communication via parental involvement in digital learning [0.20, 0.45]; parental self-

efficacy via parental involvement in digital learning [0.05, 0.24]—these mediated effects were statistically significant at the 95% confidence level. These findings support complete mediation (full mediation) by parental involvement in digital learning, as the direct effects of school–parent communication and parental self-efficacy on students' positive digital agency became non-significant in the presence of the mediator.

The model explained 65% of the variance in parental involvement in digital learning and 28% of the variance in students' positive digital agency, indicating moderate to good explanatory power overall. Table 4 presents the absolute, incremental, and parsimony fit indices for the overall evaluation of the model.

Table 4: Goodness-of-Fit Indices for the Measurement and Structural Models

Fit Category	Index Acronym	Model Value	Desired Value	Judgment
Absolute Fit Indices	χ^2	990.83 (df=226)	-	-
	χ^2/df	4.38	< 5.0	Acceptable
	RMSEA	0.07	< 0.08	Acceptable
	SRMR	0.05	< 0.08	Acceptable
	GFI	0.98	> 0.90	Acceptable
	CFI	0.96	> 0.90	Acceptable
Incremental Fit Indices	NFI	0.94	> 0.90	Acceptable
	TLI (NNFI)	0.72	> 0.90	Acceptable
Parsimonious Fit Indices	PNFI	0.92	> 0.50	Acceptable
	PGFI	0.91	> 0.50	Acceptable

Overall evaluation of the model using a range of fit indices indicates that the model exhibits relative or acceptable fit with the data. Absolute fit indices show: the χ^2/df ratio of 4.38, which falls within the acceptable range (typically < 5.0, though preferably < 3.0–4.0 in many guidelines). The RMSEA value of 0.07, while higher than the excellent threshold (≤ 0.05 –0.06), remains within the commonly accepted range (0.05–0.10), suggesting a reasonable approximation error. The SRMR of 0.07 is at the border of acceptability (≤ 0.08). On the positive side, the GFI value of 0.98 exceeds the desirable threshold (> 0.90–0.95). Incremental fit indices all surpassed the standard threshold of 0.90, indicating ideal incremental fit relative to the baseline (null) model. Parsimony-adjusted indices (PNFI = 0.92, PGFI = 0.91) demonstrate that the model, despite a moderate number of parameters, accounts for a substantial portion of fit without excessive complexity.

This pattern—strong parsimony and incremental indices alongside somewhat elevated χ^2/df and RMSEA—is frequently observed in complex models with relatively limited sample sizes or in applied educational/behavioral research. It may reflect minor unmodeled cross-loadings, correlated

measurement errors, or the sensitivity of χ^2 -based statistics (including RMSEA) to sample size and model degrees of freedom, rather than severe misspecification. In covariance-based SEM, researchers commonly prioritize a combination of indices (e.g., Hu & Bentler, 1999 guidelines: CFI/TLI ≥ 0.95 combined with SRMR ≤ 0.09 or RMSEA ≤ 0.06 with SRMR ≤ 0.09) over any single index. Here, the overall profile supports proceeding with interpretation of the structural parameters, while acknowledging that minor local misspecifications (e.g., omitted error covariances) could contribute to the elevated χ^2/df .

Discussion

Consistent with the paradigmatic shifts in the post-COVID era [2] and the prioritization of educational policies on technology integration [1], this study tested a causal model to examine the predictive roles of school–parent communication and parental self-efficacy on students' positive digital agency, mediated by parental involvement in digital learning. The empirical findings from structural equation modeling provided strong support for the conceptual model. The results not only

demonstrated acceptable model fit but also confirmed all direct and indirect paths at high levels of statistical significance.

A central finding of this study is the strong positive effect of school–parent communication on parental involvement in digital learning, which is theoretically and empirically well-grounded. This result directly aligns with Bronfenbrenner's ecological systems theory [44], which posits that individual development (here, student agency) occurs within a nested system of interconnected environments, beginning with microsystems (family and school) and extending to meso-, exo-, and macrosystems. The quality of linkages between microsystems—termed the mesosystem by Bronfenbrenner—is critical for optimal development. The present findings indicate that a robust mesosystem, characterized by effective, multi-channel, and purposeful school–parent communication [12], directly enhances parental engagement within the home microsystem in digital contexts. This is consistent with recent domestic and international research emphasizing that effective home–school interactions reduce educational inconsistencies and elevate instructional quality. In digital settings, such interactions require redefining communication channels and content [13]. Other scholars have highlighted the need to redefine parental and school roles in the digital age to foster students' ethics and resilience [31]. Our results suggest that schools leveraging digital tools not merely for one-way information dissemination but for bidirectional dialogue, consultation, and genuine parental involvement in learning processes [15] are more successful in transforming parents into active facilitators of digital learning. Conversely, barriers such as parents' limited digital skills can be substantially mitigated through supportive, education-oriented school communication [14]. Thus, this

finding underscores both the importance of communication quality and positions the school as the primary catalyst and facilitator of family involvement in the digital domain.

The positive and significant influence of parental self-efficacy on digital involvement provides compelling evidence for the application of Bandura's social cognitive theory to digital parenting. According to this theory, self-efficacy refers to individuals' beliefs in their capacity to organize and execute courses of action required to manage prospective situations. Parents with high digital self-efficacy believe they can navigate challenges in digital learning environments, benefit their children, and influence learning outcomes [18]. This belief enhances their motivation and persistence in activities such as assisting with online assignments, managing screen time, or discussing web content with their child [20]. This aligns with studies demonstrating bidirectional relationships between parental self-efficacy and positive parenting [16–17], particularly those showing that self-efficacy reduces technology-related anxiety and empowers parents in supportive roles [19]. Notably, the path coefficient for self-efficacy was lower than that for school communication, potentially indicating that, in the cultural context of this study, exogenous environmental factors (school role) exert a stronger influence on motivating parental digital involvement than endogenous individual factors (self-efficacy beliefs). This interpretation warrants further exploration in cross-cultural comparative studies. Nonetheless, it does not diminish the importance of self-efficacy but highlights the need for psychological empowerment of parents alongside environmental facilitation through communication.

The strongest outcome-level finding was the profound positive effect of parental digital involvement on students' positive digital

agency, forming the core of the conceptual model and affirming the study's central premise: engaged and informed parents cultivate responsible, creative, and ethical digital citizens among their children. This relationship can be interpreted through multiple theoretical lenses. From Bandura's social learning theory perspective, parents serve as primary behavioral models. When parents actively and critically engage with digital content, participate in creative digital projects, or discuss online ethics, they directly model positive agency [42]. From Self-Determination Theory, high-quality parental involvement can satisfy students' basic psychological needs for competence, autonomy, and relatedness in digital environments. Parental support fosters feelings of competence in technology use, autonomy within clear boundaries, and positive emotional bonds through shared digital activities—thereby enhancing intrinsic motivation for positive, self-regulated behaviors. From activity theory (rooted in Vygotsky's framework), learning occurs within meaningful social activities. Parental involvement transforms students' digital learning from solitary individual activity into collaborative social practice. Parents act as 'more knowledgeable others', providing scaffolding to guide the child from current to potential developmental levels. This finding directly supports prior research emphasizing appropriate parental modeling for constructive technology use [7-9], the role of dialogue and modeling in developing digital literacy and cyber responsibility [27], and the link between parental involvement and increased academic engagement (a component of positive agency) [29]. Our results add comprehensiveness by demonstrating that parental involvement extends beyond academic performance improvements [9] to influence students' digital literacy, ethics, and

creativity—the very dimensions underpinning positive digital agency [32].

A key contribution of this study is the identification of complete mediation by parental digital involvement. This implies that the effects of school–parent communication and parental self-efficacy on students' positive digital agency are fully transmitted through increased parental participation, with no significant direct paths remaining. This finding holds theoretical importance in two respects:

(a) Clarification of mechanisms: It elucidates how distal factors operate to produce outcomes, rejecting a "black box" approach. Schools foster opportunities through improved communication; self-efficacy provides the motivation and confidence to seize them, but it is parents' observable behavioral involvement that directly permeates the child's learning environment and shapes agency. This underscores the complexity and sequential nature of influence processes in educational ecosystems.

(b) Validation of an integrated model: The results strongly endorse a unified model in which parental involvement serves as the essential connective link between external/environmental factors (school) and internal/individual factors (parental beliefs) on the one hand, and student outcomes on the other. This integrated approach offers clear advantages over single-factor models focused solely on school or parental elements. It aligns with dynamic systems perspectives, wherein changes in one subsystem (e.g., enhanced school communication) transfer to another (student agency) only when the intermediary subsystem (parental involvement) functions effectively.

Employing rigorous quantitative methodology (covariance-based structural equation modeling), this study successfully tested and validated an integrated causal model

explaining how school-level (communication) and parent-level (self-efficacy) factors, through a key behavioral mechanism at the family level (digital involvement), influence advanced student outcomes in the digital era (positive agency). The findings clearly demonstrate that cultivating students who are active, creative, and ethical digital citizens—rather than passive consumers—requires coordinated strengthening of the school–parent–student triad: schools invite and empower parents through effective supportive channels; parents, believing in their capabilities, become models and guides through active engagement; and students, in this enriched context, internalize positive digital agency as part of their identity. This study also emphasizes the need to move beyond single-factor or mechanistic views of complex educational phenomena. Success in digital learning environments emerges from dynamic, nonlinear interactions among multilevel factors. Accordingly, any educational intervention or policy must adopt this systemic, ecological perspective.

Conclusion

In summary, this study successfully tested and validated an integrated causal model demonstrating that school–parent communication and parental self-efficacy positively influence students' positive digital agency, but only through the full mediation of parental involvement in digital learning. The findings confirm that cultivating active, creative, and ethical digital citizens requires coordinated action across the school–parent–student triad: schools must initiate bidirectional, supportive communication; parents, empowered by their self-efficacy beliefs, must translate that into behavioral engagement; and students, in turn, internalize

positive digital agency as part of their developmental identity.

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inferences despite the theoretical causal ordering. Second, data were collected via self-report measures, which may be subject to social desirability and common method bias. Third, the sample was drawn from a specific cultural and educational context, which may limit the generalizability of the findings to other regions or school systems. Fourth, the study focused on parental involvement as the sole mediator; other potential mediators (e.g., student–teacher interaction, peer influence) were not examined.

Future studies should employ longitudinal or experimental designs to establish temporal precedence and causal relationships. Cross-cultural comparative research is particularly needed to examine whether the relative weights of school communication versus parental self-efficacy vary across different educational systems. Additionally, incorporating qualitative methods (e.g., interviews with parents and students) could enrich understanding of the processes underlying parental digital involvement. Exploring moderators such as parental digital literacy, child's age, or socioeconomic status would also extend the current model.

Practically, the findings offer clear guidelines for educational policy and practice. Schools should invest in digital communication platforms that enable genuine two-way dialogue, not just information broadcasting, and provide training for teachers on how to engage parents constructively in digital learning. Parental empowerment programs should include both skill-building (digital literacy) and psychological components (self-efficacy enhancement) to reduce technology-related anxiety and increase active

participation. Policymakers are advised to adopt an ecological, systemic perspective when designing interventions, recognizing that student outcomes in the digital era emerge from dynamic interactions among family, school, and individual factors—not from isolated efforts. This study provides empirical support for moving beyond single-factor approaches toward integrated, multi-level strategies for fostering positive digital citizenship among youth.

Authors' Contribution

The first author (corresponding author) was responsible for overall supervision, conceptualization, guidance of the research process, data analysis, interpretation of results, drafting the discussion section, and writing the conclusion. The second author contributed to the formulation of the problem statement, literature review, development of the theoretical framework, and writing the methodology section. The third author was responsible for data collection, questionnaire administration, data entry, and initial data cleaning.

Acknowledgments

The authors express their sincere gratitude to all teachers, school administrators, and colleagues who assisted in the distribution and completion of the questionnaires and supported the data collection process.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work.

References

[1] Qualter D. From digital exclusion to digital inclusion: shaping the role of parental involvement in home-based digital

learning—a narrative literature review. *Comput Sch.* 2024;41(2):120–44. doi:10.1080/07380569.2024.2322167.

[2] NamdariPejman M. Practicum analysis in the conditions of Corona pandemic: inference of post-corona policies. *Theory Pract Teach Educ.* 2024;10(17):1–17. [In Persian]. <https://doi.org/10.48310/itt.2024.3564>

[3] Liu X, Liu J, Demmans Epp C, Cui Y. Exploring the effect of parental involvement on student engagement and academic performance using process data from a learning management system. *Educ Technol Res Dev.* 2025;73(2):1071–92. doi:10.1007/s11423-024-10440-3.

[4] Bashir S, Lapshun AL. E-learning future trends in higher education in the 2020s and beyond. *Cogent Educ.* 2025;12(1):2445331. doi:10.1080/2331186X.2024.2445331.

[5] Lone SA, Puju JA, Mir MT. Invigoration of e-learning in education: challenges and opportunities. *Int J Indian Psychol.* 2023;11(2):1285–92. doi:10.25215/1102.138.

[6] Zine M, Harrou F, Terbeche M, Sun Y. Evaluating e-learning readiness using explainable machine learning and key organizational change factors in higher education. *Educ Inf Technol.* 2025;30:12905–37. doi:10.1007/s10639-025-13335-9.

[7] Lasut EMM, Maramis JG. Parents' involvement during science online learning of junior high school students and their learning outcome. *J Penelit Pendidik IPA.* 2024;10(Special Issue):514–20. doi:10.29303/jppipa.v10iSpecialIssue.8317.

[8] Li Y, Rahman MN. Parental involvement in digital learning during elementary school education: a systematic literature review. *Eur J Educ.* 2025;60(3):e70186. doi:10.1111/ejed.70186.

[9] Abraha KW. Effects of parental involvement on students' learning at public primary schools in Tigray, Ethiopia. *Am J Qual Res.* 2025;9(3):26–46. doi:10.29333/ajqr/16528.

[10] Herwin H, Dahalan SC. Technological integration factors in parental involvement during distance learning. *Int J Inf Educ Technol.* 2022;12(7):637–42. doi:10.18178/ijiet.2022.12.7.1664.

[11] Shahzad MF, Xu S, Zahid H. Exploring the impact of generative AI-based technologies on learning performance through self-efficacy, fairness and ethics, creativity, and trust in higher education. *Educ Inf Technol.* 2025;30(3):3691–716. doi:10.1007/s10639-024-12949-9.

[12] Mutangira DT, Tandika P, Edward G. Effective teacher-parent communication strategies for enhancing children's learning in early-grade classes: a cross-contextual study. *Educ Dimens.* 2026;15:108–27. doi:10.55056/ed.900.

[13] Mosayebi Ardakani M, Rezapour Mirsaleh Y, Behjati Ardakani F. Examining the participation of primary school

students' families in virtual education during the COVID-19 pandemic: a qualitative study. *Q J Fam Res.* 2025;21(4):65–84. [In Persian]

[14] Owens M, Ravi V, Hunter E. Digital inclusion as a lens for equitable parent engagement. *TechTrends.* 2023;1–11. doi:10.1007/s11528-023-00859-5.

[15] Zou Y, Kuek F, Feng W, Cheng X. Digital learning in the 21st century: trends, challenges, and innovations in technology integration. *Front Educ.* 2025;10:1562391. doi:10.3389/educ.2025.1562391.

[16] Glatz T, Lippold M, Chung G, Jensen TM. A systematic review of parental self-efficacy among parents of school-age children and adolescents. *Adolesc Res Rev.* 2024;9(1):75–91. doi:10.1007/s40894-023-00216-w.

[17] Waid J, Abusaleh K, Marsalis S. Approaches to strengthen parental self-efficacy: an umbrella review of systematic reviews. *Child Youth Serv Rev.* 2025;177:108483. doi:10.1016/j.childyouth.2025.108483.

[18] Holzer J, Korlat S, Pelikan E, Schober B, Spiel C, Lüftenegger M. The role of parental self-efficacy regarding parental support for early adolescents' coping, self-regulated learning, learning self-efficacy and positive emotions. *J Early Adolesc.* 2024;44(2):171–97. doi:10.1177/02724316231162306.

[19] Liu X, Zhao L, Su YS. Impact of parents' attitudes on learning ineffectiveness: the mediating role of parental self-efficacy. *Int J Environ Res Public Health.* 2022;19(1):615. doi:10.3390/ijerph19010615.

[20] Banić L, Orehovački T. A comparison of parenting strategies in a digital environment: a systematic literature review. *Multimodal Technol Interact.* 2024;8(4):32. doi:10.3390/mti8040032.

[21] Bayar ME, Kulaksiz T, Toran M. How does parental media mediation regulate the association between digital parental awareness and the parent-child relationship? *Early Child Educ J.* 2026;54:773–87. doi:10.1007/s10643-025-01879-x.

[22] Valverde-Berrocoso J, Acevedo-Borrega J, Cerezo-Pizarro M. Educational technology and student performance: a systematic review. *Front Educ.* 2022;7:916502. doi:10.3389/educ.2022.916502.

[23] Al-Abdullatif AM, Gameil AA. The effect of digital technology integration on students' academic performance through project-based learning in an e-learning environment. *Int J Emerg Technol Learn.* 2021;16(11):189–210. doi:10.3991/ijet.v16i11.19421.

[24] Milkova E, Moldoveanu M, Krcil T. Sustainable education through information and communication technology: a case study on enhancing digital competence and academic

performance of social science higher education students. *Sustainability.* 2025;17(10):4422. doi:10.3390/su17104422.

[25] Jafarzadeh A, Taheri M, Taheri M. Antecedents, contextual factors and consequences of parents' participation in the online education process of primary schools. *Teach Learn Res.* 2023;20(2):1–17. [In Persian] doi:10.22070/tlr.2024.18168.1483.

[26] Mehrparsa S. The effect of digital literacy and parental mediation on the risks of online education: the mediating role of students' self-control. *Technol Scholarsh Educ.* 2022;1(2):35–45. [In Persian]. doi:10.30473/t-edu.2021.8718.

[27] Vali-Moradi S, Abbasi F. Investigating the role of parental involvement in developing students' digital literacy and cyber responsibility. In: *Proceedings of the First International Conference on Recent Developments in Educational Systems;* 2025 May 12–24; Bushehr, Iran. [In Persian]

[28] Panduwiyasa H, Rifqi F, Alexandra E, Putri M, Mannan I. Digital learning: indispensable impact of parental involvement toward children's learning beyond the pandemic era. In: *Proceedings of the 3rd International Conference on Psychology and Health Issues (ICoPHI 2024);* 2024 Nov 2; Padang, West Sumatra, Indonesia. EAI; 2025. doi:10.4108/eai.2-11-2024.2354566.

[29] Shebani Z, Aldhafri S, Alsaidi F. The effect of parental involvement on academic passion: the mediating role of student motivation in learning English online. *Int J Adolesc Youth.* 2025;30(1):2467109. doi:10.1080/02673843.2025.2467109.

[30] Jafarzadeh A, Taheri M, Abolghasemi M, Abbaspour A. Parents' participation model in the virtual education process of primary schools: a qualitative study during the COVID-19 pandemic. *Res Teach.* 2022;10(2):277–305. [In Persian] doi:10.34785/J012.2022.035.

[31] Istenič A, Rosanda V, Volk M, Gačnik M. Parental perceptions of children's play in the post-digital era: parents' dilemma with digital formats informing the kindergarten curriculum. *Children (Basel).* 2023;10(1):101. doi:10.3390/children10010101.

[32] Choi M, Glassman M, Cristol D. What it means to be a citizen in the internet age: development of a reliable and valid digital citizenship scale. *Comput Educ.* 2017;107:100–12. doi:10.1016/j.compedu.2017.01.002.

[33] Kraft MA, Dougherty SM. The effect of teacher-family communication on student engagement: evidence from a randomized field experiment. *J Res Educ Eff.* 2013;6(3):199–222. doi:10.1080/19345747.2012.743636.

[34] Hollandsworth R, Donovan J, Welch M. Digital citizenship: you can't go home again. *TechTrends.* 2017;61(6):524–30. doi:10.1007/s11528-017-0190-4.

[35] Magis-Weinberg L, Muñoz López DE, Gys CL, Berger EL, Dahl RE. Promoting digital citizenship through a school-based intervention in early adolescence in Perú: a pilot quasi-experimental study. *Child Adolesc Ment Health*. 2023;28(1):83–9. doi:10.1111/camh.12625.

[36] Capuno R, Suson R, Suladay D, Arnaiz V, Villarin I, Jungoy E. Digital citizenship in education and its implication. *World J Educ Technol Curr Issues*. 2022;14(2):426–37. doi:10.18844/wjet.v14i2.6952.

[37] Zafeer HM, Maqbool S, Rong Y, Maqbool S. Impact of digital learning tools on students' engagement and achievement in middle school science classes. *Int J Technol Educ Sci*. 2025;9(2):177–96. doi:10.46328/ijtes.622.

[38] Abdi L, Rezaei E, Chaharbashloo H. Investigating the effectiveness of parental involvement training on learning and motivation of primary school students in a blended learning environment. *Q J Fam Res*. 2025;21(4):159–74. [In Persian]

[39] Suprobo NR, Hasanah WK, Puriastuti AC, Novembriani RP, Widya Y, Alim MS, et al. Empowering parents through e-learning: assessing digital readiness for online parenting education. *BIO Web Conf*. 2025;193:00074. doi:10.1051/bioconf/202519300074.

[40] Esmaeelpanah Amlashi Z, Hosseinkhanzadeh AA, Akbari B, Moghtader L. Psychometric properties of the parenting self-efficacy questionnaire (TOPSE). *J Psychol Sci*. 2021;20(102):939–51. [In Persian]

[41] Barghi I, Garyi Garavand P. Investigating the effect of parent participation on quality of life and adjustment in students. *J Sch Psychol*. 2021;9(4):96–105. [In Persian] doi:10.32598/JSPI.9.4.8.

[42] Amelia R, Mustadi A, Ghufon A, Suriansyah A. Parental involvement in digital learning: mothers' experiences of elementary school students. *Int J Interact Mob Technol*. 2023;17(10):118–35. doi:10.3991/ijim.v17i10.38253.

[43] Yasa AD, Rahayu S, Handayanto SK, Ekawati R. Investigation effects digital literacy on primary student attitude in Indonesia. *Int J Elem Educ*. 2024;8(1):11–19. doi:10.23887/ijee.v8i1.70413.

[44] Onwuegbuzie AJ, Collins KMT, Frels RK. Foreword: using Bronfenbrenner's ecological systems theory to frame quantitative, qualitative, and mixed research. *Int J Mult Res Approaches*. 2013;7(1):2–8. doi:10.5172/mra.2013.7.1.2.

AUTHOR(S) BIOSKETCHES

Mahdi Namdari Pejman is an assistant professor at Farhangian University, Faculty of Educational Sciences, Department of Educational Management. His expertise includes educational administration, quality assurance in teacher education, lesson study, and quantitative/qualitative data analysis. He has published over 40 articles and 6 books.

Namdari-Pejman, M., Assistant Professor, Educational Administration, Farhangian University, Tehran, Iran

✉ m.namdari@cfu.ac.ir

Mohsen Zandian holds a master's degree in Educational Administration from the University of Tehran. His research interests encompass educational technology in school management, teacher empowerment, home-school communication, qualitative research methodologies in school leadership, and organizational culture.

Zandian, M., MA, Educational Administration, Department of Educational Management, Faculty of Psychology and Education, University of Tehran, Tehran, Iran

✉ zandian.mohsen@ut.ac.ir

Citation (Vancouver): Namdari-Pejman M, Zandian M. [Parental Involvement in Digital Learning Environments: Examining School-Parent Communication, Parental Self-Efficacy, and Students' Positive Digital Agency] *Tech. Edu. J*. 2026; 20(1): 179-197

 <https://doi.org/10.22061/tej.2026.12938.3360>

