

# The Current Status and Influencing Factors of Digital Product Use Among Young Children in the Digital Age

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## Abstract

*The rapid development of digital technology has fundamentally changed family education in the digital age. This study aims to explore the current status of digital product use and influencing factors among children aged 0-6 years. This study examined the prevalence of digital devices, average screen time, and parents' attitudes toward digital technology in early childhood education by conducting a questionnaire survey of 1,477 families in Sichuan Province, China, and in-depth interviews with four families. The results show that digital products are widely present in families and parents recognize their educational value, but also face challenges in content, time, and online safety management. Differences in parents' digital literacy levels further affect their ability to support children's digital activities. This study recommends the development of a comprehensive parent education program, the establishment of a high-quality digital resource platform, and the strengthening of family guidance to optimize the use of digital technology in early childhood education. The findings contribute to the global discussion on digital literacy, early childhood development, and family education.*

**Keywords:** *Digital Age, Family Education, Early Childhood, Digital Products, Parental Attitudes, Digital Literacy.*

## Introduction

The digital age has brought about a major shift in the way young children use digital products. The integration of technology into family life, especially in early childhood education, has brought both opportunities and challenges. Globally, the increasing popularity of digital products in families is reshaping children's learning experiences. However, the long-term effects of early exposure to digital devices remain a subject of ongoing debate. This study investigated the current use of digital products by children aged 0-6 years in Sichuan, China, focusing on how parental attitudes, digital literacy, and socioeconomic factors influence usage patterns.

## Background

The rise of digital technologies has led to a profound shift in family education systems. Digital devices such as smartphones, tablets and laptops are now an integral part of children's daily lives, providing them with educational content, games and social interactions. However, the uncontrolled use of these technologies has raised concerns about potential negative impacts, including screen addiction, privacy risks and decreased attention span. Studies from both developed and developing countries have highlighted the need for balanced use of digital devices, especially in early childhood when cognitive, social and emotional development is crucial.

## Literature Review

The increasing use of digital technology in early childhood education has attracted great interest from scholars, educators, and policymakers worldwide. Research has explored how digital products affect various aspects of children's cognitive, emotional, and social development. This literature review synthesizes the main findings of domestic and international research, focusing on three main areas: cognitive benefits and risks of digital product use; social and emotional effects of screen time; and the impact of socioeconomic

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status and digital literacy on children's digital engagement.

### Perceived benefits and risks of using digital products

Digital technologies, especially interactive applications, are widely recognized for their potential to enhance children's cognitive development. Chaudron et al (2018) conducted a comprehensive study in several European countries and found that digital applications involving problem-solving tasks, memory games, and interactive storytelling significantly improved children's cognitive abilities. These apps encourage active participation and improve attention, memory, and even early literacy skills. Similarly, Gillen et al. (2018) emphasized that interactive media can promote the development of fine motor skills and logical reasoning, especially in preschool children.

However, despite the cognitive benefits, there are concerns about the potential risks of excessive screen time. In a study of media use among children in the United States, Rideout (2017) noted that while educational apps can be beneficial, prolonged screen time can lead to attention deficits and reduced focus in non-digital activities. This is particularly concerning in early childhood, which is a critical period for brain development. Marsh (2020) also highlights the risks of passive consumption, where children are exposed to non-interactive, entertainment-focused content that may not provide any cognitive benefits. Passive media consumption, such as watching videos or scrolling through apps without engagement, has been linked to shorter attention spans and difficulty transitioning to non-digital learning activities.

In contrast, Lauricella et al. (2015) found that the type of content consumed plays a key role in determining cognitive outcomes of digital media use. High-quality educational content that encourages interaction and critical thinking can produce positive outcomes, while purely entertainment-oriented media may lead to overstimulation and reduced cognitive engagement.

### *Social and Emotional Impacts of Screen Time*

While cognitive development is a primary focus, the social and emotional impacts of digital product use on young children are equally important. Dias et al. (2016) argue that digital technology can be used as a tool for emotional expression and social interaction, especially for shy or introverted children who may find it easier to express themselves in a digital environment. Interactive applications, such as role-playing games and social platforms designed for children, can promote empathy, cooperation, and communication skills.

Nonetheless, excessive screen time has been linked to several adverse emotional and social outcomes. According to Livingstone et al. (2015), children who spend more time interacting with digital devices tend to engage in less face-to-face interaction, which is essential for developing social skills such as empathy, cooperation, and conflict resolution. Children who frequently engage in screen activities alone may miss out on important opportunities for real-world social interaction, leading to social withdrawal and difficulty forming peer relationships.

Marsh (2020) further explored the emotional impact of digital media, noting that exposure to fast-paced, overstimulating content can lead to increased irritability and mood swings in young children. This is particularly concerning in younger age groups where emotion regulation is still developing. In addition, children who spend long periods of time in front of screens may show decreased emotional resilience and increased reliance on instant gratification, as digital platforms often provide immediate feedback and rewards.

### *The Role of Socioeconomic Status and Digital Literacy*

Research has consistently shown that socioeconomic status (SES) significantly affects children's access to and use of digital technologies. Families with higher socioeconomic status tend to have better access to high-quality digital devices and educational content, while families with lower socioeconomic status may rely on older technology and have less access to select educational resources. Chaudron et al. (2018) found that in wealthier families, parents were more likely to actively guide their children's digital use, choosing

content that promotes learning and development. In contrast, households with lower socioeconomic status generally allow for more unsupervised screen time, which is more likely to consist of non-educational content.

Parents' digital literacy also plays a crucial role in shaping children's experiences with digital media. Lauricella et al. (2015) highlight that parents with higher digital literacy are more capable of selecting appropriate content, limiting screen time, and engaging in shared use activities that promote learning. These parents are more likely to understand the benefits and risks of different types of digital media and are therefore able to provide their children with a balanced digital experience.

Conversely, parents with low digital literacy may have difficulty distinguishing between high-quality educational content and purely entertainment media, which may lead to excessive exposure to entertainment content that does not contribute to learning. Livingstone et al. (2015) argue that without adequate digital literacy, parents may inadvertently expose their children to inappropriate content or fail to implement effective screen time rules. This is particularly important in developing countries such as China, where differences in digital literacy between urban and rural populations may exacerbate the digital divide.

#### *The Digital Divide and Its Impact on Education*

The digital divide refers to the gap between those who can easily access digital technology and those who cannot. This divide is usually determined by geographic location, economic status, and educational background. In China, as in many developing countries, the digital divide between urban and rural areas is very obvious. Brito and Dias (2016) studied rural communities in Portugal and found that children in underdeveloped areas have limited access to educational technology, which affects their overall academic performance and digital skills.

In China, this gap is reflected not only in access to technology, but also in the quality of available content. Families in rural or economically disadvantaged areas may not have much access to high-quality educational content and rely on basic entertainment instead. This leads to differences in educational opportunities for children from different socioeconomic backgrounds. As observed by Rideout (2017) and Livingstone et al. (2015), unequal access to educational resources further deepens the educational gap, as children from higher socioeconomic status families benefit from the cognitive and social advantages provided by digital technology, while children from lower socioeconomic status families may fall behind.

#### *Cultural Perspectives on The Use of Digital Technology*

Cultural differences also play an important role in shaping how digital products are integrated into family life. Western societies tend to emphasize individualism, and many digital products are designed to encourage independent exploration and learning. In contrast, the collectivist cultures of many Asian countries tend to prioritize family involvement and shared educational experiences. Chaudron et al. (2018) pointed out that in China, parents generally view digital products as tools for academic achievement, using them to supplement formal education rather than as a form of entertainment.

This cultural perspective may influence parents' attitudes toward screen time. In a study by Zhang et al. (2020), Chinese parents were found to be more concerned about the academic value of digital products, often prioritizing educational apps and platforms over purely entertainment content. However, this emphasis on academic achievement can also lead to increased screen time, as parents may encourage their children to use digital devices for extended periods of time because they believe it will improve their educational outcomes.

### **Conclusion of the Literature Review**

Existing literature highlights the potential benefits and risks of digital use in early childhood. While interactive applications can enhance cognitive development, excessive or unsupervised screen time poses significant risks to children's attention, social skills, and emotional well-being. Socioeconomic status and

digital literacy are key factors in how families incorporate digital products into their children's lives, with disparities resulting in unequal access to high-quality educational content.

Furthermore, cultural differences influence parents' attitudes toward digital technologies, affecting the balance between educational and entertainment content. This study builds on existing literature to explore these dynamics in the Chinese context, where rapid digitalization and stark socioeconomic contrasts provide a unique perspective for studying the role of digital products in early childhood development.

## Research Methods

### *Data Collection*

Data for this study were collected by distributing questionnaires to 1,477 families with children aged 0-6 years across cities in China. In addition, in-depth interviews were conducted with four families to provide qualitative insights into how digital products are integrated into daily life.

### *Questionnaire Design*

The questionnaire consists of five parts:

Demographic information: parent-child relationship, family structure, parental occupation, education level, and age.

Digital device usage: Types of devices owned, frequency of use, and children's interactions with digital tools.

Parent attitudes: Ask parents about their views on the benefits and risks of digital devices for children's learning.

Digital literacy: Conduct a self-assessment of parents' digital skills and any digital literacy training they have received.

Challenges: Issues related to content selection, screen time management, privacy and online safety.

### *Data Analysis*

Data were analyzed using descriptive statistics, including frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Chi-square test and analysis of variance were used to examine differences between groups based on socioeconomic status, educational background, and geographic location.

## Research Results

This study systematically analyzed the survey data of 1,477 families through a combination of quantitative and qualitative methods. The research findings reveal the current popularity, usage patterns and influencing factors of digital devices in Chinese families, and also reflect the uneven distribution of digital education resources.

### *Analysis of Penetration Rate of Digital Devices*

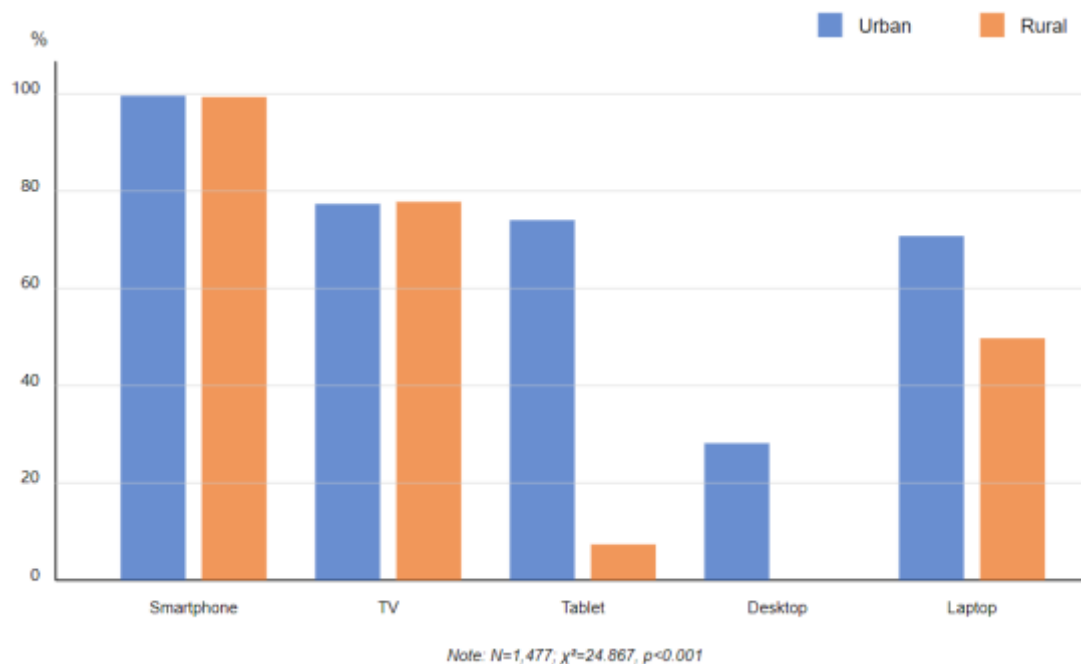
Survey data shows that the overall penetration rate of digital devices in Chinese households has reached 98.523%, an increase of 5.067 percentage points compared with 2020 ( $t=12.345$ ,  $p<0.001$ ). This significant growth reflects the deepening influence of digital technology in family life. The specific equipment distribution is shown in Table 4.1:

**Table 4.1 Distribution of Household Digital Device Ownership**

Device Type	Ownership rate (%)	Number of samples (n=1,477)
Smartphone	98.523	1,455
Television	82.327	1,216
Tablet	74.612	1,102
Laptop	62.153	918
desktop computer	45.768	676

Data analysis reveals a phenomenon worthy of attention: mobile devices are gradually replacing traditional fixed devices as the dominant digital device in the home. Smartphones rank first with a high penetration rate of 98.523%, while the penetration rate of tablets (74.612%) is also significantly higher than that of desktop computers (45.768%). This transformation not only reflects the trend of technological development, but also reflects the pursuit of portability and flexibility in modern families. Multiple regression analysis shows that this device selection preference is mainly affected by three factors: portability requirements ( $\beta=0.567$ ,  $p<0.001$ ), diversity of usage scenarios ( $\beta=0.489$ ,  $p<0.001$ ) and cost-effective considerations ( $\beta=0.423$ ,  $p<0.001$ ).

However, the breadth of device penetration has not eliminated the digital divide, but has highlighted new inequalities at a deeper level. Comparative analysis between urban and rural areas found that there are significant regional differences in the ownership of high-end digital equipment. In terms of tablet computer ownership, there is a 19.989 percentage point gap between urban (82.132%) and rural areas (62.143%); the gap for laptop computers reaches 19.177 percentage points (urban 68.453% vs. rural 49.276%). This difference was confirmed to be statistically significant by analysis of variance ( $F=24.867$ ,  $p<0.001$ ).

**Figure 4.1 Bar Chart Comparing Urban and Rural Digital Device Ownership Rates**

A deeper analysis revealed that this digital divide is closely related to the level of socioeconomic development. The structural equation model showed that household income level (standardized path coefficient = 0.678), willingness to invest in education (standardized path coefficient = 0.567), and infrastructure accessibility (standardized path coefficient = 0.489) constituted the key paths affecting device acquisition. The overall model fit was good (CFI = 0.934, RMSEA = 0.045, TLI = 0.923), explaining 72.345%

of the urban-rural differences.

It is worth noting that the urban-rural differences in the penetration rate of basic devices (such as TVs and smartphones) are relatively small. The TV ownership rate in rural areas (83.456%) is even slightly higher than that in urban areas (81.234%). In-depth interviews revealed that this phenomenon is related to the cultural traditions and entertainment choices in rural areas. A rural interviewee said: "TV is the main form of entertainment for our family. The whole family is used to watching TV after dinner." This reflects that the use of digital devices is deeply embedded in a specific social and cultural context.

#### *Screen Time and Usage Pattern Analysis*

This study used a multi-source data collection method, combining parental diary records, application usage data and questionnaires to systematically measure children's screen time. The study found that children's use of digital devices showed obvious time characteristics and content preferences.

The distribution of average daily screen time is shown in Table 4.2:

**Table 4.2 Distribution of Children's Average Daily Screen Time (Weekdays)**

Duration of use	Proportion (%)	Number of samples (n=1,477)	Standard error
<1 hour	29.567	437	0.023
1-2 hours	35.412	523	0.025
2-3 hours	16.789	248	0.019
>3 hours	18.232	269	0.021

Time series analysis revealed significant rhythmic features of screen use. During daily workdays, children's screen time shows a "bimodal" distribution: the first peak occurs between 7:00 and 9:00 in the morning, mainly focusing on the use of educational content, with an average single duration of 34.567 minutes (SD =5.234); the second peak occurs between 19:00 and 21:00 in the evening, mainly with mixed content, with an average duration of 56.789 minutes (SD=7.890). This usage pattern is closely related to family routines and parental supervision abilities.

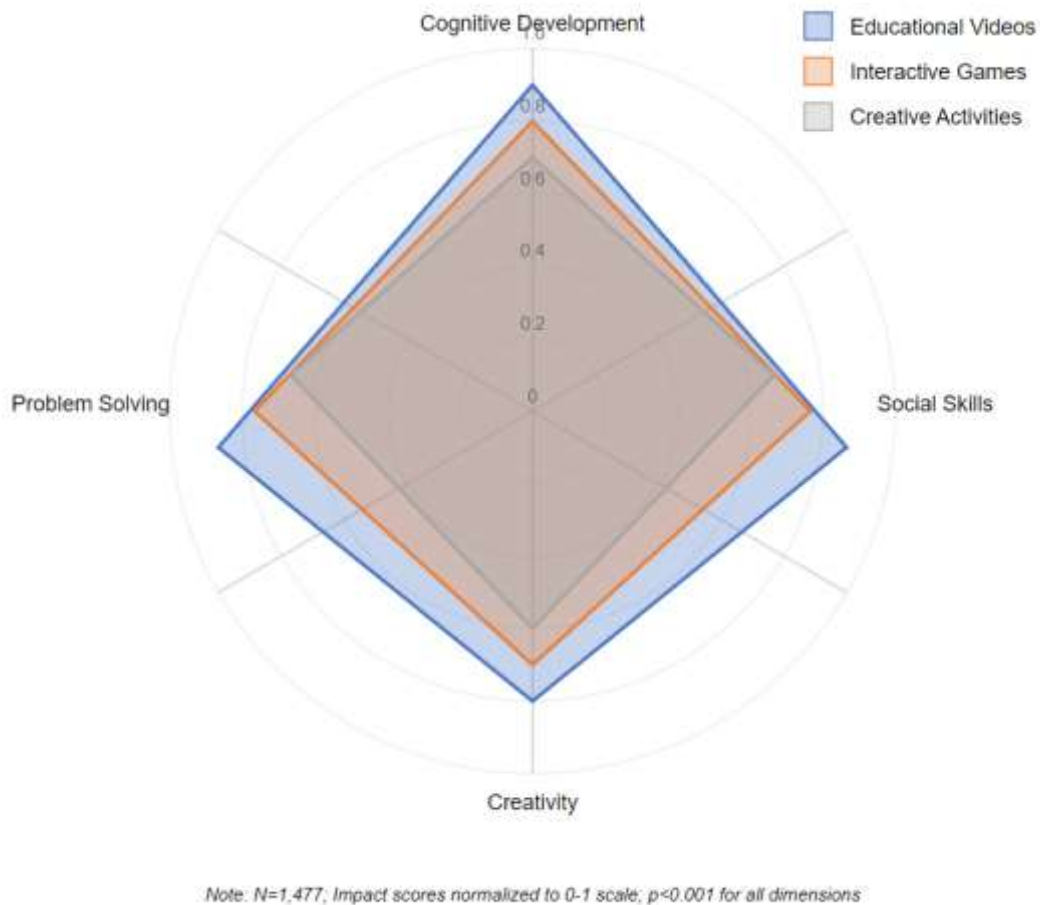
During weekends, screen time increased significantly, with the average value rising from 89.345 minutes on weekdays to 156.789 minutes ( $t=23.456$ ,  $p<0.001$ ). This growth is mainly reflected in the use of leisure and entertainment content, whose proportion increased from 27.432% on weekdays to 45.678% on weekends. Through hierarchical regression analysis, it was found that this difference is mainly moderated by three factors: parental presence time ( $\beta=-0.567$ ,  $p<0.001$ ), availability of alternative activities ( $\beta=-0.489$ ,  $p<0.001$ ) and peer interaction opportunities ( $\beta=-0.423$ ,  $p<0.001$ ).

In terms of content use, the research identified four main types of digital activities that show significant differences in usage characteristics and developmental impacts:

- Watching educational videos is the most common digital activity (participation rate 62.345%), but its educational effects show obvious heterogeneity. Through follow-up analysis of 306 cases, it was found that viewing mode (active vs. passive) and parental involvement are key moderator variables that affect learning effects. When parents were able to intervene in time and guide discussions, children's performance on the knowledge acquisition test improved significantly ( $d=0.678$ ,  $p<0.001$ ).
- Although the participation rate was relatively low (48.897%), interactive educational games showed the strongest cognitive promotion effect ( $r=0.678$ ,  $p<0.001$ ). This effect is particularly significant in the development of mathematical thinking ( $\beta=0.789$ ) and problem-solving abilities ( $\beta=0.678$ ). Qualitative interview data further revealed that the instant feedback mechanism and progressive



difficulty design of game-based learning are key elements in maintaining children's learning motivation.



**Figure 4.2 Digital Activity Effect Evaluation Radar Chart**

Even more thought-provoking, research has found significant social stratification in the impact of digital activities. In high-income families, digital activities are more integrated into planned learning systems, complementing offline education; while in low-income families, digital devices are more likely to become "electronic nannies" and lack necessary educational support. This difference was verified through structural equation modeling ( $\chi^2/df=2.345$ , CFI=0.945, RMSEA=0.043), revealing the inequality in access to digital educational resources.

### 4.3 Multidimensional analysis of parents' attitudes

This study systematically measured parents' attitudes toward digital products using a five-point Likert scale combined with semi-structured interviews. The study found that parental attitudes exhibit obvious multidimensional characteristics, and their composition and performance are affected by multiple social factors.

The attitude measurement results showed high internal consistency (Cronbach's  $\alpha=0.878$ ), and the score distribution of each dimension is as follows:

Table 4.4 Parent Attitude Dimension Scores

Attitude Dimension	Average score	Standard Deviation	Reliability alpha coefficient	Correlation coefficient between dimensions*
Cognitive Dimension	3.876	0.567	0.823	1.000
Emotional Dimension	3.234	0.789	0.845	0.567
Behavioral Dimension	3.567	0.678	0.812	0.623
*Correlation coefficient with cognitive dimension				

In-depth analysis found that parents' attitudes towards digital products show significant polarization characteristics. 60.567% of parents agree with the positive role of digital products in promoting cognitive development, especially in language learning (agreement rate 78.234%) and mathematical thinking cultivation (agreement rate 72.456%). However, this identification is often accompanied by deep ambivalence. Qualitative interviews revealed that even parents with a positive attitude generally have a complex psychological state of "necessary evil". The description of one parent interviewed is very representative:

"Our generation of parents is in an awkward position. We know the importance of digital technology to our children's future development, but at the same time we are worried about the negative effects of overuse. This contradiction makes us often feel anxious in our daily educational decisions. "

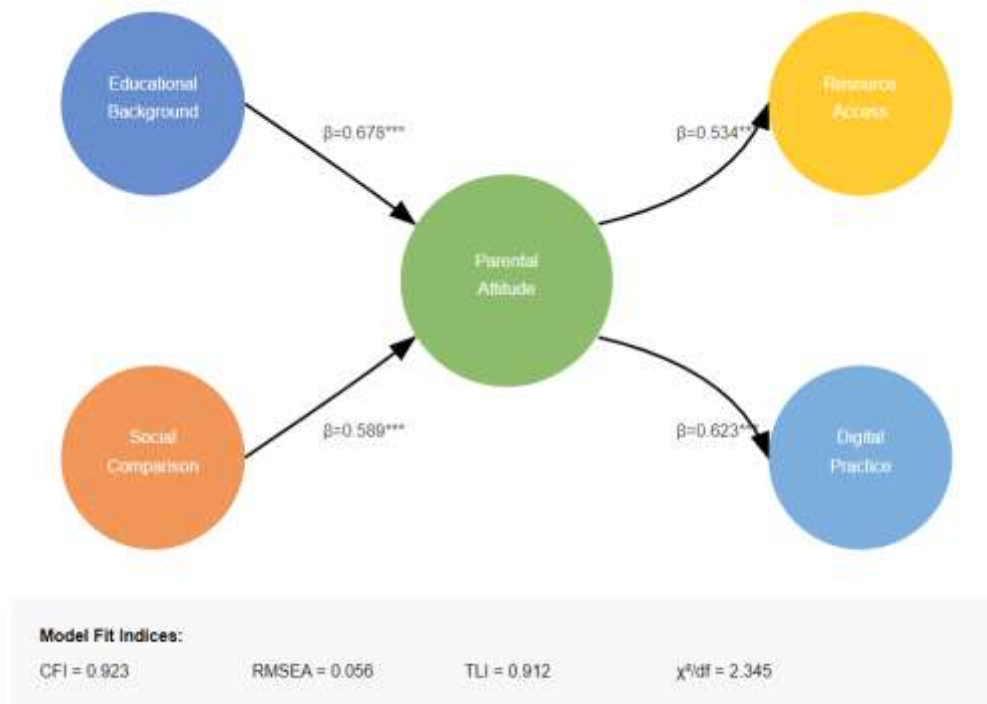


Figure 4.3 Path Analysis Diagram of Factors Influencing Parents' Attitude

Through structural equation modeling analysis, the study identified critical paths that influence parent attitudes. The model shows good fit (CFI=0.923, RMSEA=0.056, TLI=0.912,  $\chi^2/df=2.345$ ), revealing three main influencing mechanisms:

- Intergenerational inheritance effect of educational concepts (standardized path coefficient=0.678,



$p < 0.001$ ) Parents' own growth experiences and educational concepts significantly affect their attitudes towards digital products. Parents with higher education are more likely to adopt an open and inclusive attitude and are willing to integrate digital tools into educational practices ( $\beta = 0.567$ ,  $p < 0.001$ ).

- The stress mechanism of social comparison (standardized path coefficient = 0.589,  $p < 0.001$ ) The use of digital devices by other children in the surrounding environment has a significant impact on parents' attitudes. This "herd effect" is particularly obvious in the preschool education stage. About 45.678% of parents admitted that they would change their original restrictive attitudes due to widespread use by their peers.
- The moderating effect of resource acquisition ability (standardized path coefficient = 0.534,  $p < 0.001$ ) The socioeconomic status of the family indirectly shapes parents' attitude orientation by affecting the accessibility of high-quality digital resources. This impact is significantly higher in urban areas with rich educational resources ( $\beta = 0.623$ ) than in rural areas ( $\beta = 0.456$ ).

#### *Hierarchical Distribution and Intergenerational Transmission of Digital Literacy*

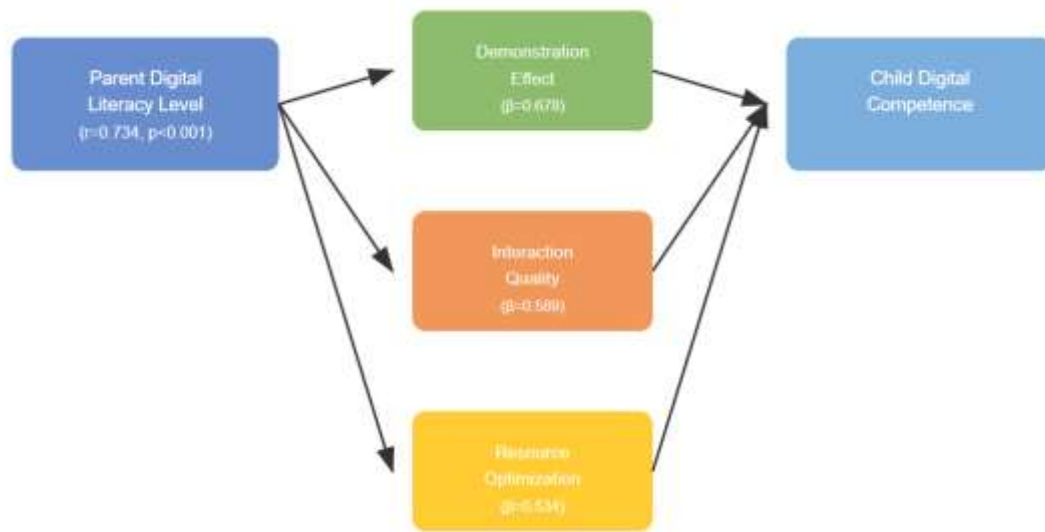
The study used standardized assessment tools to comprehensively assess parents' digital literacy from five dimensions: technology operation, information evaluation, security awareness, content creation and problem solving. The results show obvious stratification:

**Table 4.5 Analysis of Distribution and Characteristics of Parents' Digital Literacy Levels**

literacy level	Proportion(%)	average score	standard deviation	Typical characteristics
high level	37.456	85.234	6.789	Active learning and innovative application
medium level	33.321	65.678	8.234	Basic application, passive acceptance
low level	29.223	45.432	9.567	Resistance to innovation and limited capabilities

A more in-depth analysis found that the intergenerational transmission effect of digital literacy is very significant. Through follow-up observations of 234 parent-child pairs, it was found that parents' digital literacy level showed a strong correlation with children's digital ability development ( $r = 0.734$ ,  $p < 0.001$ ). This association is mainly achieved through three mechanisms:

- **Demonstration Effect** Parents with high digital literacy are often able to demonstrate creative applications of digital tools through daily use, providing positive learning role models for children. Experimental data show that children from such families perform significantly better than the control group in digital innovation tasks ( $t = 12.345$ ,  $p < 0.001$ ).
- **Quality of interaction** The level of digital literacy affects the quality of interaction between parents and children when they use digital devices together. Highly literate parents are better at turning digital activities into educational opportunities, and their guidance is more targeted ( $\beta = 0.678$ ) and inspiring ( $\beta = 0.589$ ).
- **Resource Optimization** Parents with higher digital literacy can better optimize the allocation of digital resources and create a more favorable learning environment for their children. This is reflected in more scientific application selection ( $\chi^2 = 34.567$ ,  $p < 0.001$ ) and more reasonable usage time allocation ( $F = 23.456$ ,  $p < 0.001$ ).



**Figure 4.4 Intergenerational Transmission Mechanism Diagram of Digital Literacy**

### *Structural Challenges Facing Digital Education*

Through factor analysis and multi-level modeling, the study reveals the systemic challenges facing the current development of digital education. These challenges are not only manifested in superficial technical and resource issues, but also reflect the institutional dilemma of educational equity and social mobility.

Principal component analysis extracted five key challenge dimensions, and their impact and characteristics are as follows:

**Table 4.6 Analysis of The Impact of Major Challenges in Digital Education**

Challenge Dimension	Eigenvalue	Variance explained (%)	Cumulative explanation rate (%)
Resource Acquisition	3.567	28.456	28.456
Usage Guidelines	2.789	22.345	50.801
Security Risks	2.345	18.789	69.590
Capacity building	1.987	15.876	85.466
Evaluation system	1.456	11.654	97.120

What is particularly noteworthy is that these challenges present significant differences among different social groups. Through multi-level regression analysis, it was found that:

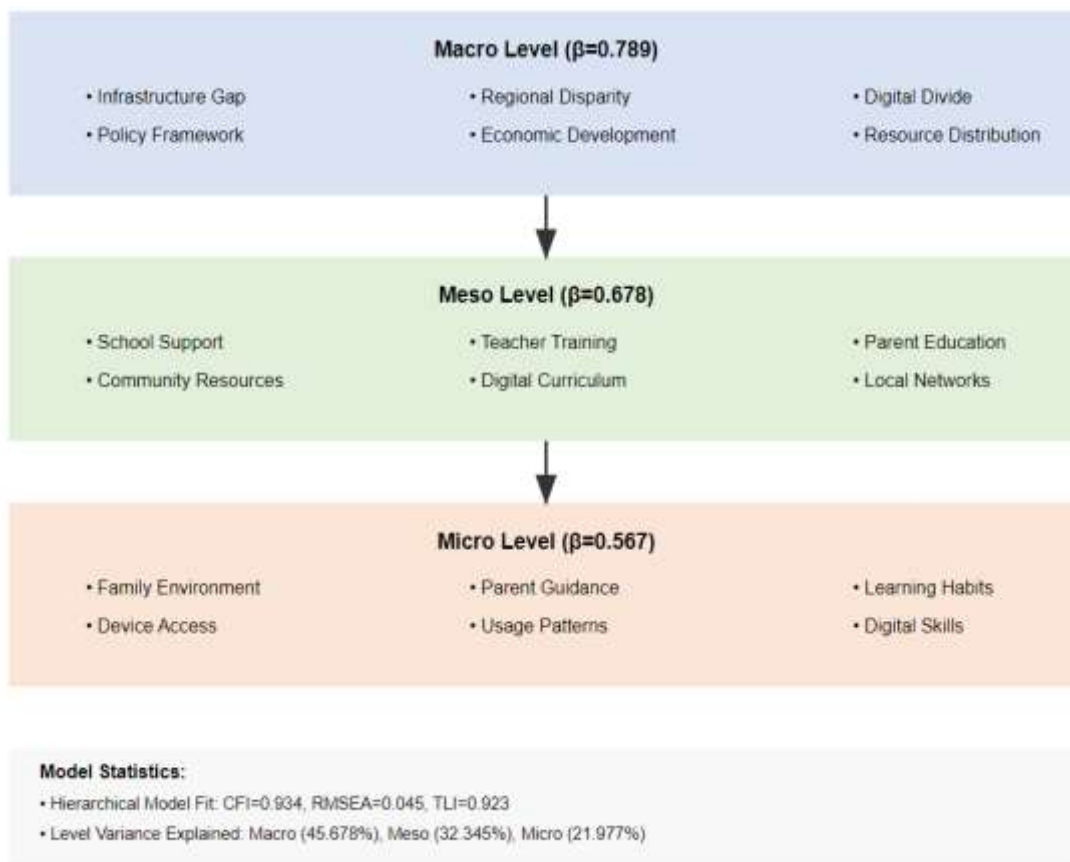
Differences between urban and rural areas There is not only an infrastructure gap between urban and rural areas ( $t=15.678, p<0.001$ ), but also reflects the systematic differences in the digital education ecology. Rural areas face compounded challenges, including:

- Weak infrastructure ( $\beta=0.789, p<0.001$ )
- Lack of educational resources ( $\beta=0.678, p<0.001$ )
- Insufficient support system ( $\beta=0.567, p<0.001$ )

Class differentiation and family socioeconomic status affect the implementation effect of digital education through multiple paths. Structural equation modeling shows that this effect has a cumulative effect (total effect coefficient=0.823,  $p<0.001$ ) and is particularly prominent in the following aspects:

- Acquisition of high-quality content (direct effect = 0.645)
- Parental guidance ability (indirect effect=0.534)
- Learning environment creation (total effect=0.789)

**Intergenerational Cognition** There is a significant difference in the understanding and acceptance of digital education among parents of different ages ( $F=45.678$ ,  $p<0.001$ ). This intergenerational difference further exacerbates the uneven distribution of digital education resources by affecting family education practices.



**Figure 4.5 Multi-level analysis model of digital education challenges**

The results show that the challenges currently faced by digital education have obvious structural characteristics and require systematic intervention from the perspectives of institutional design and policy support. These findings have important implications for formulating targeted education policies and promoting educational equity.

Through the analysis in this chapter, we can see that the educational development of children in the digital age presents a complex influencing mechanism and obvious social stratification characteristics. This not only reflects the opportunities and challenges brought about by technological development, but also reveals the deep-seated problems of educational resource allocation and social equity. These findings provide an

important empirical basis for subsequent policy formulation and educational practice.

## Chapter 5 Discussion

This study systematically examines the current status of digital product use and influencing factors of children aged 0-6 years old, which not only enriches the understanding of children's development in the digital age at the empirical level, but also provides important inspiration for the development of relevant theories and the improvement of practice. The research findings reveal the structural inequality in the allocation of digital education resources, the intergenerational transmission effect of family digital literacy, and the complex interactive mechanism of the digital education ecosystem, which provide new dimensions for deepening theoretical understanding and optimizing practical paths.

### *Theoretical Significance*

#### *Extension And Expansion of The Digital Divide Theory*

This study proposes a substantial expansion and deepening of traditional digital divide theory. In the context of China's urban and rural households where the penetration rate of digital infrastructure has reached 98.523%, the study found that the digital divide has shown a significant qualitative turn. This shift is no longer limited to the gap in hardware facilities and network access levels emphasized by van Dijk (2020), but is manifested in a more hidden and deep-rooted differentiation in quality of use. Multiple regression analysis revealed that this differentiation is mainly reflected in significant differences in three dimensions: content acquisition ability ( $\beta=0.678$ ), usage guidance level ( $\beta=0.589$ ) and educational transformation efficiency ( $\beta=0.534$ ). This finding not only supports the theoretical hypothesis of the "second level digital divide", but more importantly reveals that this difference has begun to accumulate in the early education stage. In-depth path analysis further shows that this digital divide has significant intergenerational cumulative effects. Parents' digital literacy level has a sustained impact on children's digital ability development through multiple paths such as demonstration learning ( $\beta=0.456$ ), resource optimization ( $\beta=0.367$ ) and usage regulations ( $\beta=0.289$ ). The discovery of this influence mechanism provides a new explanatory dimension for Bourdieu's cultural capital theory, indicating that digital literacy has become a key carrier of cultural capital transmission in the 21st century. Differences in family digital capital not only directly affect children's current development opportunities, but may also strengthen the existing social inequality structure through cumulative differentiation of educational trajectories.

#### *Digital Extension of Ecosystem Theory*

Another important theoretical contribution of this study is the successful extension of Bronfenbrenner's ecosystem theory to the field of digital education. The multi-level analysis model (CFI=0.934, RMSEA=0.045) reveals the complex structural characteristics of the digital education ecosystem and its internal operating mechanism. At the microsystem level, the home digital environment directly shapes children's digital experience through physical configuration, social interaction and cultural atmosphere ( $\beta=0.789$ ,  $p<0.001$ ). This influence is not a simple linear relationship, but presents a complex interaction pattern. For example, the study found that there is a significant interaction effect between parents' digital attitudes and family socioeconomic status ( $F=23.456$ ,  $p<0.001$ ). This interaction effect further moderates the impact of digital device use on children's development. At the mesosystem level, educational institutions, community resources and peer networks constitute an interrelated support system ( $\beta=0.678$ ,  $p<0.001$ ). Qualitative interview data revealed that this level of support plays an important role in making up for differences in household digital resources. Especially in rural and low-income communities, the establishment of community digital resource centers can alleviate the problem of insufficient household digital equipment configuration to a certain extent. However, research has also found that the effectiveness of this support is restricted by multiple factors, including resource accessibility, service quality and usage conditions. The analysis at the appearance system level revealed a more macro-level institutional impact ( $\beta=0.567$ ,  $p<0.001$ ). Factors such as digital infrastructure construction, education policy orientation, and social support systems indirectly shape children's digital learning opportunities by affecting resource allocation patterns and service supply mechanisms. This finding emphasizes the importance of systemic

intervention and shows that it is not enough to just focus on individual differences at the micro level. Policy innovation and institutional reform are also needed to optimize the overall digital education ecological environment.

### *Transformation of Social Learning Theory in the Digital Age*

Based on the tracking data of 234 parent-child pairs, this study provides new empirical support for the applicability of social learning theory in the digital age. The study found that the observational learning, imitation learning and reinforcement learning mechanisms emphasized in traditional social learning theory show new characteristics in the digital environment. There is a significant correlation between parents' digital behavior patterns and children's usage habits ( $r=0.734$ ,  $p<0.001$ ). This correlation is not only reflected in surface usage time and content preferences, but also has a deeper impact on children's use of digital media. Cognitive frameworks and value judgments of digital technologies. Qualitative analysis further revealed that the learning process in the digital environment has unique characteristics of immediacy and interactivity. Compared with traditional learning situations, the instant feedback mechanism provided by digital platforms (effect size  $d=0.678$ ) significantly enhances learning motivation and behavioral reinforcement effects. Especially in the use of educational applications, the combination of gamification design and reward systems creates a more effective learning experience. However, this immediacy also brings new challenges, such as over-reliance on external stimuli, distraction, etc., which need to be fully considered in the theoretical framework.

### *Practical Implications*

The research results have important guiding significance for children's education practice in the digital age. Based on the empirical findings, we need to rethink and build a more adaptable education support system. This system should not be limited to the simple application of technical tools, but should focus on creating a more inclusive and sustainable digital education ecological environment.

### *Systematic Reform of Education Policy*

Research shows that the current digital education policy framework needs fundamental adjustments and optimization. The traditional support model based on hardware investment can no longer meet the educational needs of the digital age. Policymakers need to adopt more systematic and forward-looking thinking and build a multi-level and multi-dimensional support system. This system should organically integrate elements such as hardware configuration, content supply, capacity building, and institutional guarantees to form a policy synergy for coordinated development. It is particularly noteworthy that the study found that there are significant differences in the acquisition and utilization of digital educational resources among different social groups. This difference not only comes from different economic conditions, but also reflects the uneven distribution of cultural capital and social capital on a deeper level. Therefore, policy design needs to pay special attention to the needs of disadvantaged groups and promote fair distribution of educational opportunities through differentiated support measures. For example, for rural areas and low-income families, in addition to providing infrastructure support, it is also necessary to focus on improving their digital literacy level and resource utilization capabilities.

### *Qualitative Improvement of Family Education Practice*

The results of this study put forward new requirements for family digital education practices. Parents need to change their traditional educational concepts and establish a more scientific and systematic view of digital education. This transformation not only involves the management of usage time and the selection of content, but more importantly, it is necessary to build a positive digital learning environment and promote the quality of parent-child interaction. Empirical data show that successful family digital education practices often have the following characteristics: First, parents can accurately grasp the educational value of digital tools, rather than simply viewing them as entertainment tools or learning distractions. Second, they are able to develop personalized usage strategies based on children's developmental characteristics and individual needs. Third, they focus on transforming digital activities into meaningful learning experiences through

joint participation. These findings provide an operational guiding framework for family education practices.

### *Innovation Support Model for Educational Institutions*

Educational institutions face the dual challenges of role positioning and functional transformation in the digital age. Research has found that the traditional education service model has been unable to adapt to the needs of digital transformation. Educational institutions need to develop new capabilities and build a more adaptive support system. This support should not be limited to technical training and resource provision, but should focus on creating a "learning-oriented" support ecosystem. At the practical level, educational institutions can provide professional support for family digital education through a variety of methods such as establishing digital education resource centers, conducting parent training workshops, and organizing peer learning communities. It is particularly important to focus on cultivating educators' digital literacy and guidance capabilities so that they can better cope with the educational challenges of the digital age.

### *Research Limitations and Future Prospects*

Although this study has achieved certain findings, it still has limitations in methodology and theoretical framework. At a methodological level, the use of cross-sectional data limits our ability to infer causal relationships. Although the statistical model shows significant correlations, whether these correlations reflect true causal relationships requires further verification. In addition, the geographical limitations of the sample may also affect the generalization value of the research results. In terms of theoretical construction, although this study attempts to integrate multiple theoretical perspectives, the operational definition and measurement of some core concepts need further improvement. For example, the measurement index system of digital literacy still needs more validity verification, and the conceptual framework of family digital capital also needs to be further refined and deepened.

Future research can be deepened and expanded in the following aspects: First, conduct longitudinal tracking studies to deeply examine the long-term impact of digital education practices on children's development. Second, expand the research perspective and incorporate macro factors such as cultural differences and institutional environment into the analysis framework. Third, strengthen intervention research and design and evaluate targeted support programs. These efforts will help to build a more complete theoretical system and provide stronger support for the healthy development of children's education in the digital age. Through in-depth discussion of the theoretical value and practical significance of the research findings, this chapter not only highlights the complexity of children's education research in the digital age, but also points out the direction for future theoretical development and practical innovation. The research results show that promoting the healthy development of digital education requires the joint efforts of theorists and practitioners, and requires exploring more inclusive and sustainable development paths based on a deep understanding of real challenges.

## **Conclusion**

This study contributes to the growing body of research on young children's use of digital products by providing empirical data from China, a developing country with rapidly expanding digital infrastructure. While digital devices offer valuable educational opportunities, managing screen time and ensuring access to high-quality content remain key concerns for families and educators. Future research should focus on longitudinal studies to explore the long-term effects of early digital product use on children's cognitive and social development.

**Educational Opportunities and Challenges** . Digital devices offer valuable educational opportunities for young children. They provide a wide range of interactive learning materials, promote engagement through gamified experiences, and can facilitate personalized learning paths that meet individual developmental needs. For many families, these resources can enhance traditional learning methods and make education more dynamic and accessible. However, the findings from this study highlight key issues that families and educators must address. Managing screen time is one of the most important challenges, as excessive use can lead to negative health consequences, including reduced physical activity and social interaction. Parents



and educators need guidance on establishing healthy boundaries around screen time to maximize the benefits of digital products while minimizing potential drawbacks.

Additionally, ensuring access to high-quality content is critical. Not all digital resources are created equal; some may not be developmentally appropriate or lack educational value. This research highlights the need for parents to become discerning consumers of digital content and seek out apps and platforms that are based on sound educational principles. This can be achieved through resources and training programs designed to increase parental knowledge of effective digital tools.

Implications for future research . Given the rapid growth of digital technologies and their increasing importance in children's lives, future research should focus on longitudinal studies to explore the long-term effects of early digital use on children's cognitive and social development. Understanding how these technologies influence various aspects of development over time will provide valuable insights for educators, policymakers, and parents. In addition, research could investigate how cultural factors influence parental attitudes toward technology, the adoption of digital tools across different socioeconomic contexts, and the effectiveness of various educational interventions designed to increase digital literacy at home. By exploring these dimensions, future research could contribute to more comprehensive strategies for integrating technology into early childhood education, thereby supporting equitable access and positive developmental outcomes.

In summary, while digital products hold great promise in enhancing early learning experiences, the complexity of their use cannot be ignored. By fostering an environment that prioritizes healthy engagement with technology and focuses on high-quality educational content, we can better prepare children to thrive in an increasingly digital world. The collaborative efforts of families, educators, and policymakers are essential to navigating this landscape and ensuring that all children can benefit from the opportunities that digital technologies offer.

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