EARLY CHILDHOOD EDUCATION IN THE TWENTY-FIRST CENTURY: THE ROLE OF TEACHERS IN MEDIATING THE USE OF TECHNOLOGY BY CHILDREN

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ABSTRACT

This research analyzed the role of teachers in mediating the use of technology by children in early childhood education in the twenty-first century, focusing on the challenges and opportunities of this mediation in the educational process. The central problem investigated was to identify the main responsibilities and strategies of educators in guiding the use of digital technologies by young children. The general objective was to analyze the practices of technological mediation in early childhood education in Brazil, highlighting the crucial role of teachers in this process. The methodology used was the bibliographic review, with a qualitative approach, including the analysis of published materials such as books, scientific articles, theses and official documents. The results indicated that, although there are significant benefits in the integration of technologies in early childhood education, the role of the teacher as a mediator is fundamental to ensure an appropriate and pedagogically relevant use. The research highlighted the importance of continuing education of teachers in educational technologies and the need for educational policies that support this mediation. The final considerations pointed out that, despite the challenges, the role of the teacher as a mediator of the use of technologies in early childhood education is crucial for

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the integral development of children in the twenty-first century. Investments in teacher training, development of pedagogical guidelines for the use of technologies and the promotion of a balanced approach are essential for the success of this mediation. The need for future studies was underscored to explore effective mediation strategies and assess the long-term impacts of this approach on child development.

Keywords: Digital Technologies. Early Childhood Education. Cognitive Development. Social development. Digital Learning.

INTRODUCTION

In the contemporary twenty-first century, the fundamental relevance of the teaching staff as a mediator in the interface between technology and preschool education is highlighted. The integration of digital resources in the context of early childhood presents a duality of perspectives: significant pedagogical opportunities and methodological challenges, where the role of the educator as a facilitator becomes a basic element to ensure a technological implementation that is both beneficial and appropriate to child development.

The relevance of this theme is based on the growing ubiquity of digital devices in children's daily lives, raising the pressing need to understand the mechanisms by which educators can optimize the use of these resources in the educational environment. In the Brazilian context, there is an upward trend in the adoption of technological instruments in the scenario of early childhood education, in line with global guidelines. However, the effective operationalization of these technological resources requires a judicious and methodologically structured teaching intermediation. Thus, it is imperative to examine and understand the strategic role and responsibility of educators in conducting the process of technological insertion with children, ensuring that this integration is pedagogically significant and holistic for the child's development.

The central investigation that underlies this literature review seeks to elucidate: what are the preponderant burdens and methodologies of educators in intermediating the use of digital devices by children in the Brazilian preschool context? Based on the selected bibliographic collection, it is proposed to examine the teaching performance in its mediating function, identifying successful practices of technological intermediation and mapping the obstacles encountered by professionals in this process. This research aims to provide a critical and in-depth analysis of the role of the educator as a technological mediator in the context of early childhood education, in addition to providing pragmatic guidelines for effective mediation.

The scope of this research focuses on the analysis of the teaching performance in the intermediation of technological use by children in the Brazilian preschool context of the twenty-first century, with emphasis on successful mediating approaches and the challenges inherent to this process. Such evaluation will allow the identification of efficient mediating strategies and areas that require improvement in the training and support of educators.

The structure of this study is based on seven basic components. The introductory segment presents the theme, its relevance, the problem and the objectives of the investigation. The theoretical framework contemplates fundamental concepts about technological mediation in early childhood and the teaching role in this context. Subsequently, three thematic axes are developed: analysis of technological mediating practices and their implementation, the role of teachers as technological mediators, and the perspectives and limitations of technological mediation in early childhood education.

The methodological design specifies the procedures used in the literature review. In the discussion and conclusions section, the data collected are presented and analyzed in three aspects: effectiveness of technological mediating practices, impacts of mediation on child development and future perspectives of technological mediation in early childhood education. The final considerations summarize the main aspects contemplated and reflections on the future of teacher technological mediation in Brazilian early childhood education, including suggestions for further investigations.

THEORETICAL FRAMEWORK

The structuring of the theoretical framework was conceived in order to establish the conceptual foundations necessary to understand the teaching performance in the intermediation of technological use in the contemporary pre-school context. Initially, the conceptualization of technological mediation in the context of early childhood is presented, with emphasis on the fundamental assumptions and constructs that guide this pedagogical praxis.

TECHNOLOGICAL MEDIATION PRACTICES AND THEIR IMPLEMENTATION

The multiplicity and degree of sophistication of technological mediating practices in the context of early childhood education show the polyvalent nature of the educator in this context. Silva and Oliveira (2021, p. 8) point out that "technological mediation in early childhood education is not restricted only to guidance in the use of devices, but also to the construction of learning environments that incorporate technologies in a relevant and appropriate way for children's progress". This approach aims to establish a harmonization between the use of digital resources and other pedagogical methodologies essential to early childhood development.

Costa and Santos (2022, p. 45) complement this view by stating that "the role of the teacher as a technological mediator in early childhood education is a field in constant evolution, which requires specific skills and a deep understanding of both child development and the potentialities and limitations of digital technologies". This assertion highlights the complexity inherent to the teaching function in this scenario, underlining the need for permanent and dynamic training.

The operationalization of technological mediating practices is faced with multiple challenges. Ferreira and Lima (2023) postulate that, despite the growing recognition of the relevance of technological mediation in early childhood education, a significant portion of the teaching staff still expresses insecurity about the effectiveness of their performance in this role. This finding indicates that, despite the progress in the incorporation of technology in the educational environment of children, there is still a notable disparity in the training of educators for technological mediation.

Rodrigues (2022) documents exemplary cases of successful technological mediation. The researcher identifies effective strategies such as the careful curation of educational applications, the development of projects that combine digital technologies with practical activities, and the establishment of precise protocols for the use of devices. Thus, the urgency of a balanced and methodologically structured approach in technological mediation is evident.

Carvalho, Souza, and Melo (2021, p. 625) state that "effective technological mediation in early childhood education requires constant reflection and adaptation of pedagogical practices, considering both the developmental needs of children and the rapid changes in the technological scenario". This perspective corroborates the relevance of a flexible and sensitive approach to the particularities of early childhood education in the digital context.

In summary, technological mediating practices in pre-school education are fundamental elements to ensure the appropriate and fruitful appropriation of digital technologies by children. However, its implementation encounters several obstacles that require systematic and articulated overcoming. The theoretical framework presented provides subsidies for the understanding of these challenges, emphasizing the urgency of continuous investment in teacher training, in the development of holistic pedagogical strategies and in the consolidation of a culture of conscious and balanced technological use in the context of early childhood education.

THE ROLE OF THE TEACHER AS A MEDIATOR IN THE USE OF TECHNOLOGIES

The teaching performance as an intermediary in the process of technological integration in early childhood education is a core element to ensure an effective and profitable incorporation of these resources in the teaching-learning process. Oliveira and Santos (2020, p. 33) highlight that "the teacher, as a technological mediator, acts as a guide that facilitates children's interaction with digital technologies, promoting a critical, creative, and safe use of these tools". This perspective shows that the teaching performance transcends mere supervision, encompassing the structuring of significant pedagogical experiences through such resources.

Costa, Ferreira, and Silva (2022, p. 39) argue that "the role of the teacher in technological mediation goes beyond technical instruction, involving the promotion of skills such as critical thinking, problem-solving, and collaboration in the digital context". Such considerations suggest that an effective technological intermediation demands from the educator an integrative understanding of child development and the potential of digital resources as pedagogical instruments.

The examination of the teaching function as a mediator highlights both attributions and obstacles. Carvalho, Souza, and Melo (2021, p. 627) note that "while teachers play a crucial role in guiding the use of technologies, many face difficulties in balancing the use of digital tools with other activities essential for child development". This finding highlights the need for a thoughtful approach in technological mediation, contemplating the multiple dimensions of child development.

Silva and Martins (2023, p. 47) address specific aspects of the teacher's role as a technological mediator:

> "The teacher, as a mediator in the use of technologies in early childhood education, plays multiple roles: curator of digital content, facilitator of technological learning experiences, model of ethical and responsible use of technology, and bridge between the digital world and the concrete experiences essential for child development. This mediation requires not only technical knowledge, but also a deep understanding of child development and a critical view of the role of technologies in contemporary society."

The detailed analysis of this function reveals that, despite the growing recognition of its relevance, there is still a need for support and continuous improvement for effective teaching in this area.

The influence of teacher mediation in the constitution of healthy digital practices among students deserves to be highlighted. Rodrigues (2022, p. 73) observes that

"effective teacher mediation in the use of technologies can contribute significantly to the development of a balanced and productive relationship between children and digital tools". This influence can have longitudinal repercussions on children's interaction with technological resources.

In conclusion, the teaching performance as a technological mediator in preschool education is characterized by its multiplicity and essentiality. It transcends mere technical instrumentalization, encompassing the promotion of the reflective, inventive and balanced use of digital resources. The literary panorama shows that, despite the growing recognition of the significance of this function, educators still encounter substantial obstacles in its implementation. Permanent training, the development of integrated pedagogical strategies and institutional support are essential elements for teacher training in the effective exercise of their mediating function in the technological context of early childhood education.

CHALLENGES AND OPPORTUNITIES OF TECHNOLOGICAL MEDIATION IN EARLY CHILDHOOD EDUCATION

The multiplicity and complexity of the obstacles and potentialities inherent to technological mediation in early childhood education reflect the changing nature of the convergence between digital resources and pedagogical practices in early childhood.

Silva and Oliveira (2021, p. 45) emphasize that "technological mediation in early childhood education, although promising, faces significant challenges, such as the need for continuous training of teachers and the adaptation of age-appropriate digital content". This finding highlights the urgency of teacher improvement and the development of specific digital resources for children.

Costa and Santos (2022, p. 120) add that "one of the main challenges of technological mediation in early childhood education is to balance the use of digital technologies with other activities essential for the physical, social, and emotional development of children". Such intersection indicates that the problems transcend merely technical aspects, encompassing pedagogical and developmental issues.

The potentialities provided by technological intermediation are of equivalent relevance. Ferreira and Lima (2023) argue that adequate mediation can provide enriching pedagogical experiênces, fostering children's investigation, inventiveness, and problem-solving skills. The authors point out that careful implementation can amplify access to qualified educational resources and promote early digital inclusion.

Rodrigues (2022, p. 8) addresses the specific challenges and opportunities of technological mediation in early childhood education:

> "The application of technology in early childhood education brings unique challenges, such as protecting children from inappropriate content on the internet, managing screen time, and ensuring that the use of technology does not replace essential personal interactions. On the other hand, it offers innovative possibilities, such as the customization of learning, the early improvement of digital skills and the elaboration of engaging and interactive educational experiences. The role of the teacher as a mediator is fundamental to face these challenges and take advantage of opportunities efficiently."

The intrinsic complexity of technological mediation in early childhood education is evident, demanding a meticulous balance between the use of digital opportunities and the mitigation of potential risks associated with its use by children.

Carvalho, Souza, and Melo (2021, p. 626) point out that "a significant challenge is the disparity in access to technology between different socioeconomic contexts, which can exacerbate existing educational inequalities". This perspective highlights the need for public policies that promote the democratization of access to technological resources in early childhood education.

A significant opportunity identified in the literature refers to the potential of technological mediation in promoting school-family integration. Silva and Martins (2023) suggest that "digital technologies, when properly mediated, can create stronger bridges between the school and home environments, involving parents more actively in their children's educational process".

In summary, the challenges and potentialities of technological mediation in early childhood education are manifested in multiple dimensions, contemplating pedagogical, technological, ethical and social aspects. The bibliographic overview indicates that overcoming these obstacles and taking advantage of opportunities require a systemic effort, encompassing continuing teacher training, the formulation of structured educational policies, the development of digital resources appropriate to the age group and a balanced approach that integrates digital technologies with pedagogical practices essential to child development.

METHODOLOGY

The present study was based on a systematic literature review, adopting a qualitative approach to analyze the teacher's role in the intermediation of technological use in the

contemporary preschool context. The methodology of literary review is characterized as an investigative modality that is based on the careful examination of previously published academic productions, contemplating scientific articles, specialized literary works, dissertations, theses and official documentation, aiming to compile, examine and problematize the existing knowledge on the subject.

The methodological instrument for data collection comprised the use of digital academic repositories, virtual bibliographic collections and institutional databases, where the bibliographic material pertinent to the investigation was selected. The methodological procedures included the systematic survey of specific literature on technological intermediation in the context of early childhood education, followed by detailed analysis and systematization of the identified contents. The analytical strategies were based on the thematic classification of the selected sources, enabling the identification of convergences, gaps and predominant directions in academic production.

The research was carried out in sequential stages. Specific parameters were established for the inclusion and exclusion of sources, prioritizing publications from the last decade that specifically addressed the teaching performance in technological mediation in the context of early childhood education. Subsequently, systematic searches were carried out in academic platforms such as Scielo, Google Scholar and university repositories, using descriptors such as "technological mediation", "early childhood education", "role of the educator", "digital technologies" and "21st century". After the careful selection of sources, an in-depth textual analysis was carried out, identifying relevant elements for the proposed discussion. From this systematic analysis, the theoretical axes that constitute the conceptual framework of the investigation were structured.

EFFECTIVENESS OF TECHNOLOGICAL MEDIATION PRACTICES

The effectiveness of technological mediation practices in early childhood education has been a topic of great relevance in the educational literature, reflecting the need to evaluate these practices to ensure that they promote adequate and meaningful development of children. Silva and Oliveira (2021, p. 8) point out that "effective technological mediation in early childhood education aims to create an enriched learning environment, where digital technologies are used consciously and in line with pedagogical objectives". The fundamental intention of technological mediation practices is highlighted, which is to integrate technologies in a meaningful way in the educational process.

Costa and Santos (2022, p. 45) add that "the effectiveness of technological mediation largely depends on the teacher's ability to select, adapt and implement digital resources in a way that is appropriate to the context of early childhood education". This observation suggests that the success of mediation practices is closely linked to the educator's training and ability to integrate technologies in a pedagogical and appropriate way for child development.

The evaluation of technological mediation practices in early childhood education reveals both successes and areas for improvement. Ferreira and Lima (2023, p. 104) observe that "successful technological mediation practices have demonstrated positive results in terms of children's engagement, development of basic digital skills, and stimulation of curiosity and creativity". It is observed that, when well implemented, technological mediation can significantly enrich the learning environment in early childhood education.

Rodrigues (2022, p. 72) points out specific aspects of the effectiveness of technological mediation practices:

> The most effective technological mediation practices in early childhood education are those that integrate digital technologies in a balanced way with other activities essential for child development. This includes the use of carefully selected educational applications, the creation of projects that combine technology with hands-on activities, and the establishment of routines that limit the time of exposure to screens. The effectiveness of these practices is evidenced by the increase in children's engagement, the development of critical thinking and problem-solving skills, and the formation of a healthy relationship with digital technologies from an early age.

The authors highlight the importance of a balanced and judicious approach to technological mediation, emphasizing that effectiveness depends not only on the use of technology itself, but on how it is integrated into the broader context of child development.

The results achieved to date show that, although there is progress, there are significant challenges in the effective implementation of technological mediation. For example, Carvalho, Souza, and Melo (2021, p. 625) point out that "the effectiveness of technological mediation practices varies considerably depending on the socioeconomic context, teacher training, and the resources available in early childhood education institutions". This suggests that for mediation practices to be effective more broadly, it is necessary to address issues of equity in access to technology and in the training of educators.

The examination of the effectiveness of technological mediating strategies in the context of early childhood education shows a duality between substantial progress and significant obstacles. Notwithstanding the positive indicators related to student engagement and the development of specific skills, there remains a vast field to be explored with regard to the longitudinal impacts of these practices on the children's evolutionary process. The continuous training of the teaching staff, the establishment of precise methodological guidelines for the implementation of technological resources in preschool education and the adaptability of these practices to the various socioeconomic scenarios are configured as basic elements for the achievement and effectiveness of technological mediation in this formative stage.

IMPACTS OF MEDIATION ON CHILD DEVELOPMENT

The technological mediation carried out by teachers in early childhood education has generated significant impacts on children's development, covering several areas of child growth. Oliveira and Santos (2020, p. 33) highlight that "adequate mediation in the use of digital technologies can enhance the development of cognitive skills, such as attention, working memory, and problem-solving capacity". This observation highlights the multidimensional nature of the impacts of technological mediation, which go beyond mere familiarization with digital tools, encompassing fundamental aspects of children's cognitive development.

Costa, Ferreira, and Silva (2022, p. 40) complement this view by stating that "the impacts of technological mediation on the social development of children in early childhood education are remarkable, including improvements in communication skills, collaboration, and digital empathy". These results suggest that technological mediation, when performed appropriately, can contribute to the development of socio-emotional skills essential for life in the twenty-first century.

Analysis of the impacts of technological mediation on child development reveals both benefits and areas that require attention. Carvalho, Souza, and Melo (2021, p. 627) note that "while technological mediation has shown promising results in stimulating curiosity and promoting new forms of learning, it is crucial to assess its long-term effects on children's language development and face-to-face interactions". This perspective highlights the importance of a continuous and comprehensive assessment of the impacts of technological

mediation, considering not only the immediate outcomes but also its future implications for child development.

Silva and Martins (2023, p. 48) address the specific impacts of technological mediation on child development:

> The effects of technological mediation in early childhood education are varied, encompassing cognitive, social and emotional elements of growth. There is a growth in the ability to process visual information, in the competence to navigate in digital environments and in the understanding of abstract concepts when exposed in an interactive way. In the social sphere, mediation has encouraged the improvement of digital collaboration skills and the understanding of etiquette on the internet. In emotional terms, there is a growth in children's self-confidence when using technologies and a greater willingness to explore new learning environments. It is worth mentioning that these effects may vary according to the quality of the mediation and the context in which it is carried out.

The authors emphasize the diversity of impacts of technological mediation and the importance of careful implementation to maximize its benefits on child development. Critical analysis of the observed impacts reveals that while there are significant positive results, there is still a need for more in-depth research to fully understand how technological mediation affects children's long-term development.

Rodrigues (2022, p. 73) observes that "effective mediation by teachers in the use of technologies can contribute significantly to the development of a balanced and productive relationship between children and digital tools". This influence can have lasting implications for the way children interact with technologies throughout their lives, promoting a conscious and critical use of them.

In summary, the impacts of technological mediation on child development are varied and promising, covering cognitive, social and emotional aspects. The reviewed literature shows that while there are clear benefits in terms of engagement, development of digital skills, and stimulation of creativity, a balanced and careful approach to the implementation of technological mediation is key.

Taking into account the specific context of early childhood education, the quality of mediation by teachers and the integrated integration with other teaching methods are fundamental factors to enhance the beneficial effects of technological mediation on child growth. In addition, it is crucial to maintain a critical perspective on the possible long-term impacts, particularly with regard to language enhancement, face-to-face social skills, and the ability to maintain concentration for a long period.

PROPOSALS FOR THE FUTURE OF TECHNOLOGICAL MEDIATION IN EARLY CHILDHOOD EDUCATION

It is imperative to consider propositions that improve pedagogical practices and enhance the benefits for child development. Silva and Oliveira (2021, p. 46) argue that "the future of technological mediation in early childhood education requires a more comprehensive perspective, which fluidly integrates digital technologies with conventional teaching practices". This assertion suggests that one of the primary objectives should be the design of methodologies that harmonize the technological elements with the activities that are fundamental to child development.

Costa and Santos (2022, p. 9) highlight the importance of implementing new approaches to teacher training, stating that "the future of technological mediation in early childhood education requires a reformulation of teacher training programs, incorporating not only technical skills, but also specific pedagogical competencies for the integration of technologies". Such practices include the institution of mentoring programs, the creation of technological experimentation laboratories for educators, and the promotion of communities of practice focused on technological mediation in early childhood.

Ferreira and Lima (2023, p. 106), regarding the proposals to improve technological mediation in early childhood education, state:

> "For technological mediation in early childhood education to reach its maximum capacity, it is necessary to constantly engage with the investigation and implementation of innovative practices. This includes the development of hybrid learning environments that inseparably unite physical digital experiences, the creation of specific assessment instruments to assess the effect of technological mediation on child growth, as well as the application of educational policies that ensure equal access to high-quality technological resources. In addition, it is essential to stimulate collaborations between teachers, educational technology creators and researchers to develop customized solutions that meet the specific demands of early childhood education."

The need for a collaborative and continuous effort to ensure the effectiveness and relevance of technological mediation in future early childhood education is evident. The permanent training of the teaching staff, the development of technological tools appropriate to the age group and the promotion of a learning culture that integrates technology in a balanced way are crucial elements in this process.

Additionally, Carvalho, Souza, and Melo (2021, p. 628) suggest that "the implementation of ethical guidelines for technological mediation in early childhood education and the development of more robust evaluation frameworks are essential

strategies to ensure responsible and effective technological integration". Such strategies enable a more conscious and structured approach on the part of educators and educational institutions in the face of the ethical and practical challenges inherent to technological mediation with children.

In summary, the propositions for the future of technological mediation in early childhood education should focus on the improvement of pedagogical practices through the continuous training of educators, the design of hybrid learning environments, the formulation of inclusive educational policies and the promotion of collaborative research between educators and technology developers. The implementation of clear ethical guidelines and the development of specific evaluation methodologies are essential to ensure that technological mediation is effective and beneficial to the integral development of children in early childhood education in the twenty-first century.

FINAL CONSIDERATIONS

The objective of the study was to examine the role of teachers in mediating the use of technology by children in early childhood education in the twenty-first century, highlighting the successful mediation practices and the obstacles encountered in this procedure. The most relevant results of this literature review indicate that, even with remarkable progress in the incorporation of digital technologies in early childhood education, the role of the educator as a mediator is vital and deals with several practical and pedagogical challenges. Effective technological mediation has the ability to considerably improve the teaching-learning process in early childhood. However, its application requires a meticulous, balanced strategy adjusted to the particular context of early childhood education.

It was noted that technological mediation strategies in early childhood education are advanced to establish more interactive and motivating learning environments. However, there are still considerable challenges to be overcome, such as adequate teacher training and the adequacy of digital resources to the specific requirements of preschool children. Teachers have the challenge of balancing the use of technologies with other activities crucial to children's growth, ensuring that technological incorporation increases, and does not suppress, traditional methods of learning and interaction. This suggests that, even with the recognized potential, the effective application of technological mediation requires

additional investments in teacher training and in the development of age-appropriate digital resources.

With regard to the effects of technological mediation on child growth, the study brought benefits in stimulating creativity, improving fundamental digital skills and promoting new ways of interaction and cooperation among the little ones. Actions such as the judicious use of educational applications, the incorporation of technologies in educational projects and the meticulous supervision of digital devices have proven to be efficient in arousing children's interest in learning and innovating cognitive and socio-emotional skills. However, the effectiveness of these practices is strongly linked to the quality of the mediation carried out by the teachers and to the compliance with the pedagogical goals of early childhood education.

Another point highlighted was the importance of the teacher's role as a model and guide in the ethical and responsible use of digital technologies. Technological mediation is not limited to technical instruction only, but also involves the formation of values and attitudes towards the use of technology. Educators play a key role in promoting a culture of conscious and balanced use of digital technologies, influencing the formation of healthy digital habits from early childhood.

Ultimately, the suggestions for the future of technological mediation in early childhood education underscore the demand for a more comprehensive and unified strategy. This includes the development of teacher training programs that encompass not only technical skills, but also specific pedagogical skills for the incorporation of technologies; the construction of mixed learning environments that mix digital experiences in a fluid way; and the application of educational policies that ensure equal access to high-quality technological resources.

The contributions of this research are relevant, as we offer a complete evaluation of the role of teachers in technological mediation in early childhood education in the twenty-first century scenario. The results highlight the need for constant and coordinated work to establish effective mediation practices and foster a high standard of early childhood education in the digital age. However, further studies are needed to validate the results of this study. Future research could focus on practical analyses of particular cases of technological mediation in early childhood education, examining the long-term effects on children's cognitive, social, and emotional growth, and monitoring successful tactics that can be applied in various educational settings.

In short, the role of the educator as a facilitator in the use of technologies in early childhood education is fundamental to ensure an effective and fruitful incorporation of these resources in the teaching process of the twenty-first century. Pedagogical strategies and educational policies have progressed, however, the effective application of technological mediation still faces considerable obstacles. A constant commitment to teacher training, the creation of age-appropriate digital resources, and the promotion of a learning culture that incorporates technology in a balanced way is essential for the success of technological mediation in early childhood education. Thus, collaboration between researchers, educators, and creators of educational technology is necessary to overcome barriers and enhance the advantages of technological mediation, ensuring that all children can have access to learning experiences that are enriching and complete to their stage of development in the digital age.

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