

Rethinking Early Childhood Education Management in the Digital Age: Cultural and Historical Perspectives

Zhaoqian Wang*

e-mail: edusunshine123@163.com

School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520 Thailand.

Abstract: This research addresses the transformation of Early Childhood Education (ECE) management in the digital era, considering the cultural and historical context. With the increasing impact of digital technologies on the education system, ECE management has become digitalized into technology-mediated data-driven decision-making, digital communication, and administration. However, these changes are influenced by culture, historical progress, and leadership practises, that is why the digital transformation is highly situational. The study adheres to a qualitative, case-study analysis. Institutional reports and academic sources were used as secondary sources. Specifically, two contrasting cases including Finland and China are selected to provide a comparison of a range of digital integration models in ECE management. The thematic analysis of data is conducted by considering the Cultural-Historical Activity Theory (CHAT) and Transformational Leadership Theory. According to the results, Finland integrates pedagogically supportive digital tools and child-centred instruments with trust-prioritised and professionally autonomous emphasis. On the other hand, China is more centralised and information-intensive, with a greater focus on efficiency, accountability and colossal governance. The analysis finds the relevance of culturally responsive leadership, ethics, and continuity as crucial factors in building digital practises. It concludes that effective digital transformation in ECE management needs to balance between technological change and pedagogical validity and context sensitivity.

Keywords: Early Childhood Education (ECE) Management, Digital Transformation, Cultural Context, Qualitative Case Study, Educational Leadership.

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1. Introduction

1.1. Background of the Study

The booming development of digital technologies has had a profound impact on the educational systems across the globe, including early childhood education (ECE). Use of digital tools in management of education has in the recent years transformed the way institutions are structured, governed and assessed (OECD, 2017). Such a

change demands a critical re-reading of the management practise in ECE, especially along a cultural and historical axis. Researchers have pointed at the fact that the digitalization is not a simple technical shift but instead a socio-cultural shift that impacts the institutional framework and leadership models (Selwyn, 2021). In the ECE setting, technological innovation has to balance management practise with developmental appropriateness and cultural values. Indicatively, Fleer and Veresov (2018) explained that early childhood systems are profoundly historicized within cultural-historical contexts, which determine pedagogy and administration. Consequently, any change instigated by digital technologies should be interpreted in such larger contexts. Historically, ECE management has developed informal caregiving systems to formal frameworks with policies and standards (Van Laere, 2017). Administrative practises have over time become more complicated which has involved incorporation of measures of accountability, curriculum standards, and professional development requirements. Digital technologies have introduced novel types of governance, including digital monitoring systems, digital reporting, and data analytics (Williamson, 2017). The transformations presented opportunities and challenges to ECE managers.

Cultural values are important determinants in the adoption and use of digital tools in early childhood education. Varied communities have different ideologies about childhood, learning, and technology use. As an illustration, Edwards (2013) has reported that digital technologies in the ECE field have varying interpretations across different cultures affecting their application in the management and pedagogy processes. Likewise, Wang (2024) proposed that early childhood leadership practises are culturalized and that management reforms are universal and cannot be done without considering the local values and traditions. Moreover, the digital age has increased the necessity of adaptive leadership in ECE. Today leaders do not only operate on physical levels but on virtual platforms and electronic mediums of communication (Heikka, 2014). This transition demands new competencies such as digital literacy, data management, and decision-making ethics. There is a concern, though, that excessive dependence on the digital platforms may erode the relational nature of early childhood education that is at the core of child development (Kucirkova et al., 2019). Digital disparities in resource dissemination have also been followed in the present study that can affect the efficiency of digital management practises (UNESCO, 2020). The means of digital tools and training are insufficient in certain settings, and in other places the rate at which technological use is taking place may outrun the educator. These differences highlight the need to study ECE management, culturally and historically, to have equal and situational practises.

The COVID-19 crisis further accelerated the digitization of education, even in early childhood settings. Most of the institutions had to depend on online management systems and remote connections (Dong et al., 2020). This rapid change revealed the vulnerabilities of preparedness and called the sustainability of the digital management practises in ECE into question. It also marked the necessity of research, and one of the most important elements of research raises at the crossroad between digitalization and cultural norms and historic developments. To sum up, the digitalization of early childhood education management is made more complex by the influence of technological, cultural, and historical factors. Although digital tools have offered efficiency and opportunities to be innovative, they bring challenges, such as equity, cultural relevancy, and pedagogical integrity. By so doing, the examination of how to

reconsider ECE management by bringing these views together would give a more accurate picture of modern changes.

1.2. Problem Statement

Although there has been increased integration of digital technologies within the education system, little is known on how these changes have impacted on the management of early childhood education in various cultural and historical background. Current literature is oriented more on technological installation and does not pay due attention to the reality that management process could be subjected to impact of culture and historical layers (Selwyn, 2021). This creates a knowledge gap in terms of the suitability of digital transformation; or violates longstanding values and practises in ECE. Furthermore, the existing management trends embraced in the sphere of early childhood education might not be efficient enough to mitigate the problem of digitalization. Williamson (2017) continues by observing that the application of data-based governance may result in the creation of universal practises that would fail to include the specifics of local cultures. Similarly, Edwards (2013) suggested the concept that the wholesale implementation of digital tools can upset what he called contextually specific pedagogical practises. Additionally, no comparative analysis was made of how various societies responded to the digital transformation of the ECE management. In the absence of these insights, policymakers and practitioners might apply inefficient and culturally insensitive approaches. Thus, this research will fill these gaps by concentrating on the governance of early childhood education in the age of digitality in the perspective of culture and history.

1.3. Objectives of the Study

- To examine how digital technologies are influencing early childhood education management practices.
- To analyze the role of cultural contexts in shaping the adoption of digital management in ECE.
- To explore the historical evolution of early childhood education management in relation to current digital transformations.

1.4. Research Questions

- How are digital technologies influencing early childhood education management practices?
- How do cultural contexts shape the adoption and implementation of digital management in ECE?
- How has early childhood education management evolved historically in relation to current digital transformations?

1.5. Significance of the Study

The research is significant because it offers an in-depth understanding of the ways through which early childhood education is organised in the digital era that integrates cultural and historical insights. It enhances the knowledge base of the academic sources by filling knowledge gaps about the contextual and evolutionary character of the digital transformation in ECE. The results of the researched culturally responsive and historically informed practises in management will be useful to policy makers,

educational leaders and practitioners. Additionally, the research also assists in creating more efficient and fair digital interventions within early childhood classrooms. It can also be applied to inform future research and policy making in enhancing the quality and sustainability of early childhood education systems by reinforcing the complexities of digital integration.

2. Literature Review

2.1. Overview

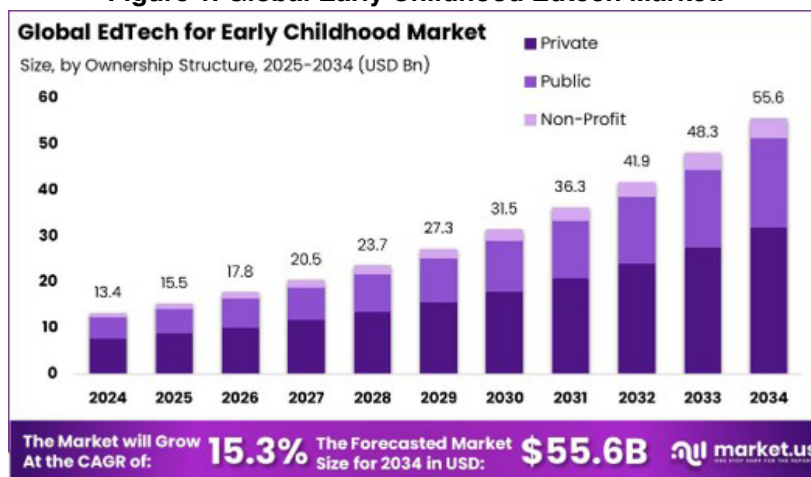
This section is based on a literature overview of early childhood education management in digital age in which the role of technology, cultural backgrounds, and historical events will be considered. It also describes the theoretical framework on which the study is based, and also outlines critical gaps in the current research on which the aims and analysis of the study is based.

2.2. Digital Influence on ECE Management

2.2.1. Digital Tools and Administrative Transformation

The introduction of digital technology in establishing early childhood education (ECE) has radically changed the administration structures and processes. Some of the digital platforms that have simplified the administrative processes are learning management systems, child assessment programmes and communication applications and an effective process of data collection, maintenance, and reporting is undertaken. The global early childhood EdTech market is projected to grow steadily, reaching approximately \$55.6 billion by 2034, as shown in figure 1;

Figure 1: Global Early Childhood Edtech Market.



Source: (Market.U.s, 2025)

The use of digital tools enables managers to make effective decision-making, as the information flow in the shape of documentation of children learning could be traced in real time. This shift in thinking of data-driven management has assisted

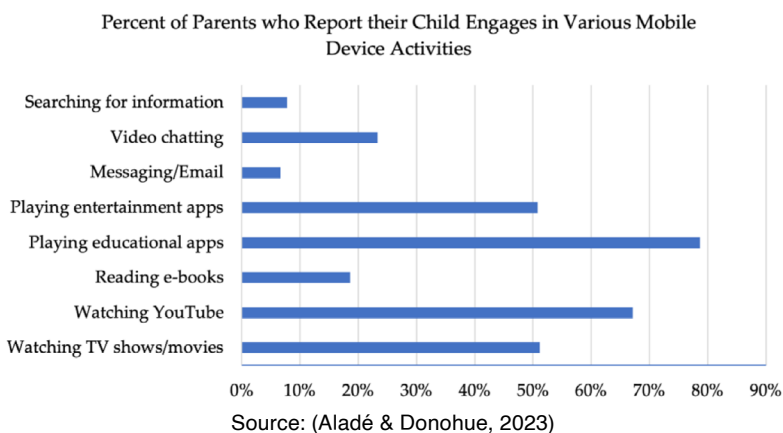
ECE institutions to become more transparent and responsible. Moreover, digitalization has made possible centralised management systems where administrators can monitor several centres or classes at a time. According to Arnott (2016), the digital documentation practise is based on fulfilling administrative functions, yet contributes to pedagogical planning, filling the gap between administration and teaching.

Another vital point is that electronic communication in ECE is digitalised. Web portals and mobile applications allow real-time communication between teachers, parents, and administrators. This increases parental involvement and collaborative decision making. But it also raises some questions regarding privacy of data and ethical use of information that needs to be answered by managers who should provide proper policies and protection. Alongside these benefits, new problems of normalisation and over-monitoring emerge as new concerns in the utilisation of the digital resources. Mascheroni and Holloway (2019) suggested that, in education, the rise of datafication might result in the prioritisation of quantifiable effects, which can fail to capture the qualitative content of early childhood development.

2.2.2. Leadership and Digital Competencies

The EC management has been digitised hence changing the positions and leadership abilities needed. Not only can they now be knowledgeable about pedagogy, but also digitally and technologically-literate and technologically-leadership capable. It encompasses the ability to choose the most efficient digital tools, educate members of the staff, and make sure that it becomes part of the daily routine. Blackwell et al. (2016) emphasise that the attitudes of teachers and administrators towards technology can be considered one of the most significant predictors of technology adoption and use in an early childhood setting. However, according to Aladé and Donohue (2023), Most children primarily use mobile devices for educational apps (around 80%) and YouTube (about 70%), with lower engagement in activities like messaging and information searching, as depicted in Figure 2;

Figure 2: Parents Perception Regarding Child's Use of Mobile Devices.



In addition to this, digital leadership entails the creation of an innovation culture and a culture of lifelong learning in ECE institutions. Managers are encouraged

to help teachers embrace new technologies and deal with resistance and anxiety toward digital change. The key factor in enhancing educators in the domain of digital usage confidence and competence development is the consideration of professional development, which is emphasised by Parette et al. (2010). Resilient leaders thus extend training on a regular basis and provide training through partnership.

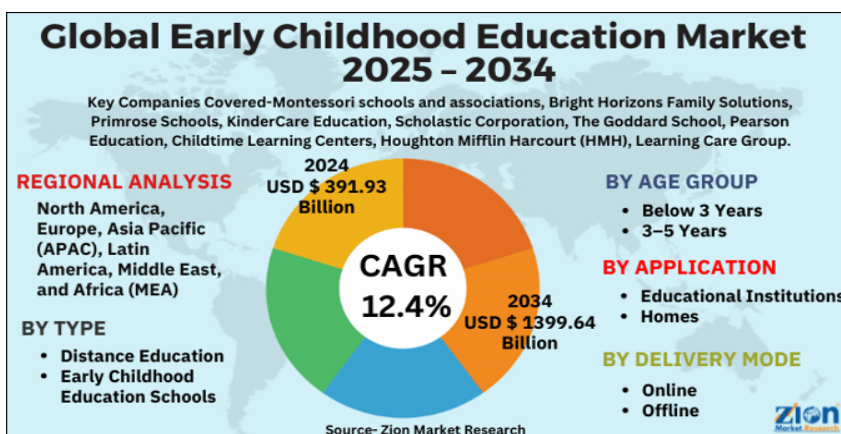
Ethical responsibility is another important factor of digital leadership. As the use of digital platforms grows, questions like the safety of data, privacy of children, and managing screen time became the main focus. Livingstone et al. (2018) highlighted the necessity of policies and informed decision-making by educational leaders in order to protect children in digital environments. Therefore, ECE managers have to strike a balance between technological innovation and ethical concern to guarantee the well-being of children. Moreover, digital leadership demands flexibility and a strategic mindset. The rapid pace of technological change implies that managers need to constantly review and revise their practises.

2.3. Cultural Context in Digital ECE Management

2.3.1. Cultural Values and Technology Adoption

The role of cultural context in influencing the adoption and integration of the digital technologies in the management of early childhood education (ECE) cannot be overstated. The perception of childhood, learning and technology across different societies is highly diverse and in different ways affects policy choices and institutional practises. Some cultures may perceive technology as an aid to cognitive development and integrating children into future digital economies, but in others, it can be seen that traditional, play-based methods are more valued (Stephen & Edwards, 2017). Conversely, individuals in more traditional settings can assume a more conservative stance in that they would engage technology more sparingly in order to avoid violating the growth stages and cultural norms. Prior literature describes the nature of early childhood practises as entrenched in cultural norms, and they state that the implementation of digital tools should not target universality but be context-sensitive.

Figure 3: Global Early Childhood Education Market.



Source: (Zion Market Research, 2024)

In addition, language, social values, and family expectations influence the perception and use of digital management systems. Managers in multicultural environments usually encounter the challenge of balancing various expectations to technology usage. This needs culturally responsive leadership that recognises and honours various views. Figure 3 highlights the projected growth of the global early childhood education market from 2025 to 2034, with key details on regional analysis, market segmentation by age, application, and delivery mode;

According to prior studies, culturally informed decision-making supports the usefulness and receptor of educational innovations, such as digital systems. The other significant factor is that of policy frameworks, which are frequently shaped by the national cultural priorities. Depending on the values and developmental philosophies within society, governments can either encourage or discourage the adoption of digital in ECE.

2.3.2. Cross-Cultural Differences in Management Practices

The impact of cross-cultural differences on the management of digital transformation in early childhood education is substantial. Comparative analysis indicates that this is despite varying management practises, based on the differences in governance structure, education priorities, and resources availability. As an example, Nordic nations usually adopt child-centred methodologies and comprehensive growth in ECE management, wherein digital technologies assist, but do not control the learning process (Melis et al., 2024). Contrastingly, other Asian settings can be more systematic and academic and incorporate digital technologies to improve performance and responsibility. Such differences underscore the role of cultural diversity in the analysis of digital management practises. As per prior literature it is clear that the cross-cultural analysis offers insights into the approaches through which the educational systems can teach each other, without prescribing the same solution to each.

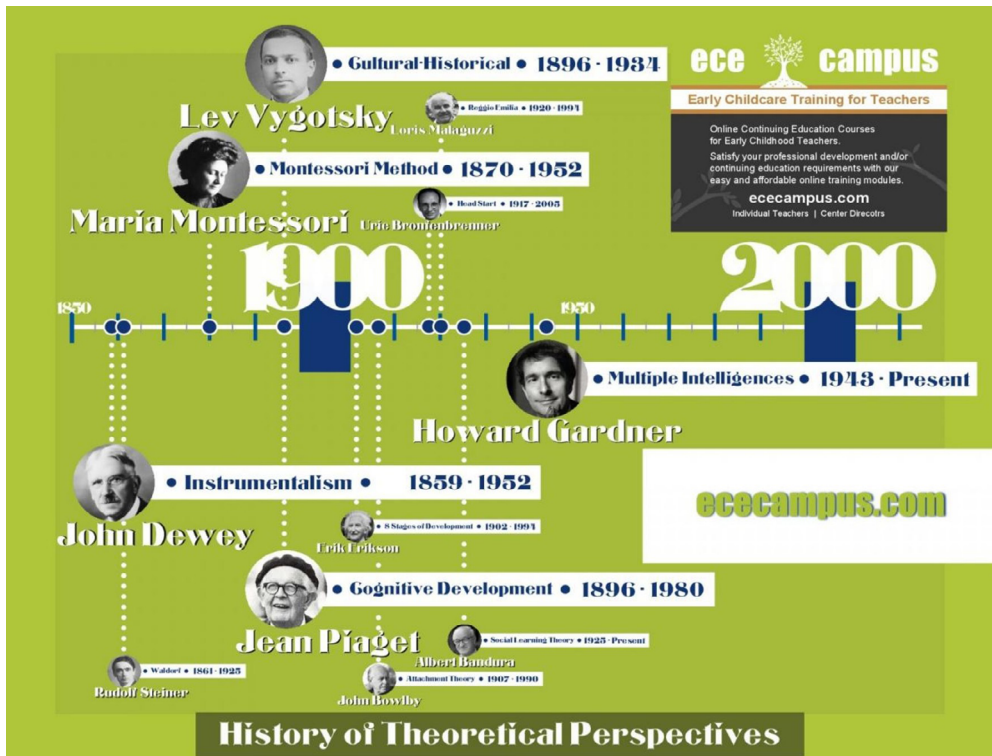
Another aspect that influences cross-cultural differences is the availability of resources. High-income countries may tend to have higher-level digital infrastructure and training opportunities in their ECE institutions so that management systems become more sophisticated. In contrast, in the low and middle-income situations, lack of resources can inhibit the implementation of digital tools, resulting in the use of hybrid or low-technology management styles (Neuman et al., 2015). Such discrepancies highlight the significance of context-sensitive and just solutions. Moreover, the process of implementing digital management systems is affected by cultural attitudes toward leadership and authority. Hierarchical structures in certain cultures might support the top-down implementation of digital policies, whereas in others, collaborative and participatory styles are used.

2.4. Historical Evolution of ECE Management

2.4.1. Traditional Foundations of ECE Management

Early childhood education (ECE) has over time undergone development in management influenced by philosophical, social, and institutional changes. Figure 3 outlines key theoretical perspectives in early childhood education from 1850 to the present;

Figure 4: Key Theoretical Perspectives in Early Childhood Education.



Source: (Early Childhood Education Portfolio, 2015)

Moreover, Haslip and Gullo (2018), examined that traditionally, ECE existed based on informal practises of caregiving within families and communities, and there were few formal management structures. As time passed, both Froebel and Montessori were pioneers in the field of early education, their ideas and methods beginning to impact the formulation of systematic methods in early education, which slowly had to spill over to administrative and managerial practises. Such primitive models focused on child-centred learning, autonomy, and holistic growth, which appear in modern management systems. With the institutionalisation of ECE, management practises started to formalise. The administrative lines were broadened to input curriculum planning and staff supervision and compliance. Havnes (2018) notes that the professionalisation of early childhood education gave rise to the creation of standards, training and governance systems that delineated the responsibilities of management.

In most nations, ECE administration also changed as the establishments of the publicly funded education systems at the end of the 20th century. Governments established policies to regulate quality, access, and accountability leading to control and standardisation. According to Whitebread et al. (2017), these developments have helped to make ECE a significant point of entry into the lifelong learning experience, so, the relevance of effective management can be explained. Nevertheless, the traditional methods of dealing with ECE had a bias towards them aligning with the already established cultural and socio-political concepts.

2.4.2. Transition to Digital-Era Management

The shift between the traditional management trend into the digital-era management is a considerable change in the development of early childhood education. The introduction of new tools and systems with the onset of digital technologies in the late 20th and early 21st centuries led to the ECE management changing the administrative processes. In the contemporary management contexts, digital record-keeping, online communicating system, and data analytics have become a part and parcel in the management system. This shift has presented new types of governance that are marked by more use of data and performance monitoring. Bradbury and Roberts-Holmes (2017) affirm that the emergence of data-driven accountability in the education sector has transformed the nature of the institution administration, whereby accountability on measurable outcomes and accountability reporting on an equal footing are laid more emphasis. In ECE, this has contributed to usage of digital assessment tools to monitor the development of children and guide decision-making.

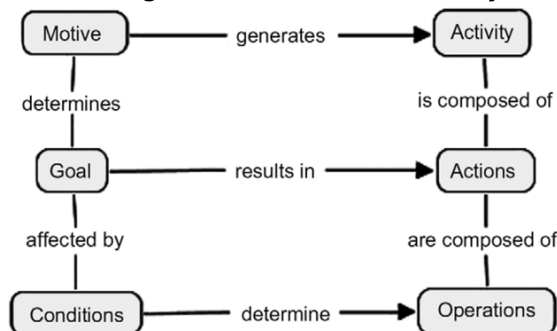
Meanwhile, the digitalization of managing ECE has brought forth new challenges. Chairudin and Hakim (2025) argue that managers have to strike a balance between technological infrastructure, employee training, and ethical issues. The current speed of technical change presupposes constant adjustment, which is why flexibility becomes the main feature of contemporary leadership. Moreover, the introduction of digital technologies should remain compatible with the developmental requirements of young children, which determines that technology should enrich, not substitute the valuable interactions with them. As a historical context shows, digital technologies form a decisive new step in discontinua with traditional practises, but they occupy the position in a continuum of change in ECE management. The informal, institutional, and digital levels of development represent the changes in societal needs and values. (Dadang, 2023). This development brings out dynamism of managing ECE and the relevance of considering historical thoughts in analysing the modern challenges of the digital age.

2.5. Theoretical Framework

Cultural-Historical Activity Theory (CHAT) and Transformational Leadership Theory are two theoretical frameworks that lay the foundations of the current study, giving us the full picture of the management of the early childhood education (ECE) system in the digital era. The choice of these theories is justified by the fact that all of them reflect the interplay of the socio-cultural context and the dynamics of historical development and leadership in the transformation of the educational environment on the technologic level.

2.5.1. Cultural-Historical Activity Theory (CHAT)

Cultural-Historical Activity Theory (CHAT) is an expansion based on the work of Vygotsky and subsequent development by Engestrom that offers a methodology to examine human practises as socially and culturally situated activities. CHAT highlights that learning and development are realised as a result of interactions between people, tools, and their socio-cultural context, which illustrates a process where a motive determines a goal, which results in an activity. The activity is composed of actions, which, in turn, are composed of operations. Conditions affect the goal and determine the operations;

Figure 5: Using Cultural Historical Activity Theory.

Source: (Batiibwe, 2019)

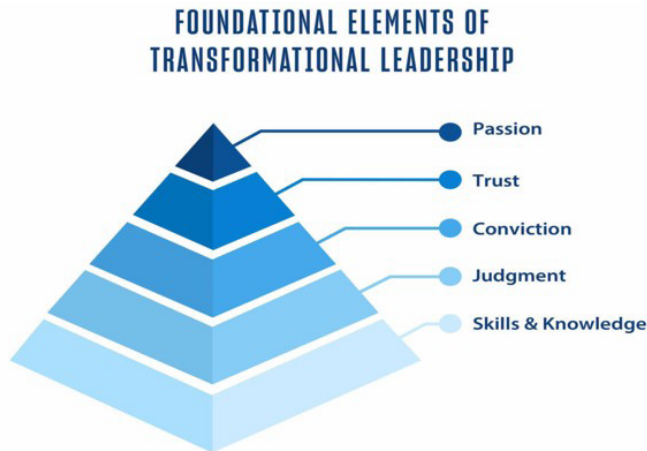
The theory applies especially well to early childhood education in the context of digital technologies that serve a mediating role in educational systems. Engeström (2016) characterises activity systems as systems composed of interrelated elements, among which are subjects (educators and managers) and tools (digital technologies), rules (policies and norms), community (stakeholders), and division of labour (roles and responsibilities). By implementing the framework to ECE management, it is possible to explore the impacts of digital transformation on not only the administrative processes but also the relationships and practises delivered within institutions in a holistic manner. The inclusion of the historical dimensions into the analysis is one of the primary strengths of CHAT. It acknowledges that modern action is influenced by the historical progress and changes of the cultural scenes. Investigating the evolution of the activity systems through time, CHAT helps to understand better the tensions and contradictions occurring at the time of the pressure.

To illustrate, the implementation of digital instruments in ECE administration can produce inconsistencies between the conventional child-centred pedagogies and the data-based management demands. CHAT offers a model by which these tensions can be recognised and analysed and provides an understanding of how they can be resolved or managed. Scholars observed that the conceptualisation of digital technologies may be grounded on the notion that they have rewritten interactions and practises, but not only offered technical ability. Moreover, CHAT emphasises collaboration and teamwork. Management in ECE is never an individual undertaking but a collective undertaking among educators, families, policymakers, and communities. These interactions may be assisted or inhibited depending on the way they are coupled with the help of digital platforms. In this way, CHAT helps make the analysis using the opportunities and challenges of digitalization of complex social systems. Overall, Cultural-Historical Activity Theory can be a potent tool in the discussion of digital tools, culture, and historical events in ECE management.

2.5.2. Transformational Leadership Theory

The Transformational Leadership Theory is a complementary theory which illuminates the role of leadership in generating change and innovation in organisations. Figure 6 illustrates the foundational elements of transformational leadership, with Skills & Knowledge at the base, followed by Judgment, Conviction, Trust, and culminating in Passion at the top;

Figure 6: Foundational Elements of Transformational Leadership.



Source: (University of San Diego, n.d.)

It is a theory which was formulated by Burns and later explained by Bass based on the concept of inspiring, motivating and enabling others to reach the common goals. When it comes to ECE management, transformational leadership is especially applicable in handling the challenges of digital transformation. According to Leithwood and Sun (2018), collective vision, collaborative culture, and professional development are three aspects through which transformational leaders contribute to change in organisations. In the early childhood context, this means influencing teachers to use digital technology without compromising on child-focused practises. Effective leaders should make sure that technological and not technology mediated innovations in the learning process increase pedagogical integrity, and they should do so in creative ways. In technological competence and confidence, an educator can be technologically confident and competent to varying degrees during the digital age. It concurs with the discovery of Wannapairo et al. (2026), who established that leadership plays a vital role in promoting digital capability in schools.

Intellectual stimulation is another important factor that can spur creativity and critical thinking. Transformational leaders disrupt normal practise and encourage innovation that is ideal in the case of digital change leadership in ECE. Leaders can facilitate the beneficial application of digital technologies to management and pedagogy by fostering the organisational culture of experimentation and learning. Moreover, inspirational motivation is essential in harmonising the stakeholders with the objectives of digital transformation. The leaders must share a distinctive vision which correlates technological innovations and the values of early childhood education. This is especially applicable in multicultural situations, where there might exist different perceptions of technology. Another area of concern in this theory, which is particularly relevant to digital management, is ethical leadership (Heikka et al., 2025). Data privacy, unfairness, and proper use of technology are problems that should be considered with a serious mind and conscientious decision. These transformational leaders are expected to be role models and to science policies that safeguard the interests of the children and the stakeholders.

2.6. Literature Gap

Although the implications of digital transformation in education are increasingly being explored, the impact of the transformation on the management of early childhood education (ECE) is subject to considerable gaps in research. Current research is inclined towards moving mostly towards digital technology use as a part of teaching and learning processes, with comparatively less emphasis on administrative and managerial aspects. This leaves a biased view of the way digitalization transforms leadership, decision-making, and organisational structures in ECE settings. In addition, a great deal of the existing literature is generalised and tends to ignore the impact of culture and context on digital management practises. According to Stephen and Edwards (2017), the application of technology in early childhood education is highly situational, though comparative cultural analysis is limited. Consequently, we have limited knowledge of how various societies are changing management behaviours in relation to digital change. Yet another prominent disconnect is the lack of integration of historical perspectives. Bradbury and Roberts-Holmes (2017) pointed out the growing importance of data-driven systems in education, yet limited research exists to explore the connexion between these factors and the historical development of ECE management. The absence of longitudinal analysis obstructs the complete understanding of transformations now. Thus, the research fills these gaps with a culturally and historically aware analysis of digital ECE management, which contributes to an overall understanding of the field as context-sensitive.

3. Methodology

3.1. Research Design

In this study, a qualitative case study research design is used to investigate early childhood education (ECE) management in the digital era through cultural and historical perspectives. The case study approach is suitable since it enables thorough and contextual study of a complex phenomenon under natural environments. According to Yin (2018), case study research is especially appropriate when the task is to learn a modern problem or issue in its natural environment. The case study approach in this research provides an opportunity to conduct a thorough analysis of the impact of digital technologies on ECE management practises, as well as to take into account the cultural and historical factors that predetermine the processes. The research design allows the researcher to investigate relationships among digital transformation, institutional practises, and contextual factors holistically.

3.2. Research Approach

The study is based on a qualitative interpretative methodology, and it is not about quantifying variables, but rather about providing sense to meanings, patterns, and contextual dynamics. This approach justifies the research objectives, which seek to analyse the linkage between digitalization and cultural values and historical patterns in the management of ECE. Creswell and Poth (2018) suggest that qualitative research is strong at researching more complex social phenomena where context comes to the fore. Interpretive approach of this research allows further elucidation of the impact of digital tools on management practises within specific socio-cultural and historical settings.

3.3. Case Selection

This study selects purposive comparative cases with clear selective participation of Finland and China as two opposite national contexts of digital age early childhood education (ECE) administration. Finland is selected due to its established, child-centred, ECE system, with a decentralised governance system, high professional autonomy, and pedagogically-driven digital integration. China, conversely, is an extremely centralised and rapidly modernising system in which data-driven administration, surveillance, and accountability are broadly practised through the adoption of digital technologies. The two cases are specifically chosen to exemplify various cultural values, modes of governance and historical developments. Their counter lets us delve deeper into the ways in which difference in socio-cultural and institutional conditions affects the digital transformation of the management of ECE.

3.4. Data Sources and Collection

This research will use secondary data sources, since there is no primary data collection in terms of interviews or surveys. Data is gathered through:

- Policy documents (e.g., national ECE frameworks, digital education strategies)
- Institutional reports and records
- Academic literature and case reports
- Official publications from organizations such as OECD and UNESCO

The main data collection process is case study analysis. Bowen (2017) described case study analysis as a methodical process in the review and evaluation of printed and electronic documents. It is especially applicable in case study research, which gives detailed and contextual information on the case. These sources will enable the researcher to analyse the manner in which digital technologies are adopted in ECE management, the ways in which policies mirror cultural values, and the evolution of practises over the years.

3.5. Data Analysis

In this research, thematic analysis is used to analyse the data, meaning the identification and interpretation of patterns in the documents gathered. According to Braun and Clarke (2019), thematic analysis is a highly popular and versatile approach to qualitative data analysis. The analysis process involves:

- Familiarisation with data by reading documents attentively.
- Entering corresponding data on digital management, culture, and history.
- Recurrent pattern-based thematization.
- Thematic interpretation in terms of study goals and theoretical foundation.

This approach helps the researcher to manage and analyse vast amounts of textual information efficiently without losing track of the primary themes of the study.

3.6. Trustworthiness of the Study

Various strategies are used to guarantee rigour and credibility of the research conducted. The reliability of information is achieved by using multiple data sources therefore information can be triangulated and the reliability of the findings reinforced. To sustain dependability, the research process is transparent and well documented,

such as having clear procedures of collecting and analysing data. Confirmability is accomplished by basing interpretations on evidence based on the data instead of researcher bias. According to Lincoln and Guba (1985), these criteria are fundamental in achieving trustworthiness in qualitative research.

3.7. Ethical Considerations

As this research is a secondary data study, ethical issues are not of great concern but nonetheless of significance. Every source has been referenced correctly to prevent plagiarism and maintain academic integrity. Also, publicly available publications are considered, which means that no confidential or sensitive information is lost.

3.8. Summary

The present study uses a theoretical approach of qualitative case study utilising case study analysis as an approach to the study of early childhood education management in the digital era. Through secondary data analysis in cultural and historical contexts, the study offers a holistic and context specific interpretation of digital transformation in ECE management.

4. Data Analysis

4.1. Introduction

The section includes the analysis of data obtained after reviewing the documents, emphasising the way digital technologies redefine the management of the field of early childhood education (ECE) in certain cultural and historical backgrounds. The part investigates the patterns and interpretations using a thematic analysis approach based on two opposite case studies of Finland and China. These cases have been chosen deliberately because of their different educational philosophies, governance policies, and ways of integrating into the digital realm, which way to get a deeper comparative insight into the phenomenon under investigation. The Cultural-Historical Activity Theory (CHAT) and Transformational Leadership Theory inform the analysis and offer a platform that the researcher uses to analyse the functioning of digital tools in socially situated systems and the role of leadership in facilitating change in complex environments. Key themes used to structure the results include the digital technology transformation of management practises, the role of cultural values in determining adoption, the impact of the past, and the changing nature of leadership in the digital era.

4.2. Case Study One: Finland's Early Childhood Education System

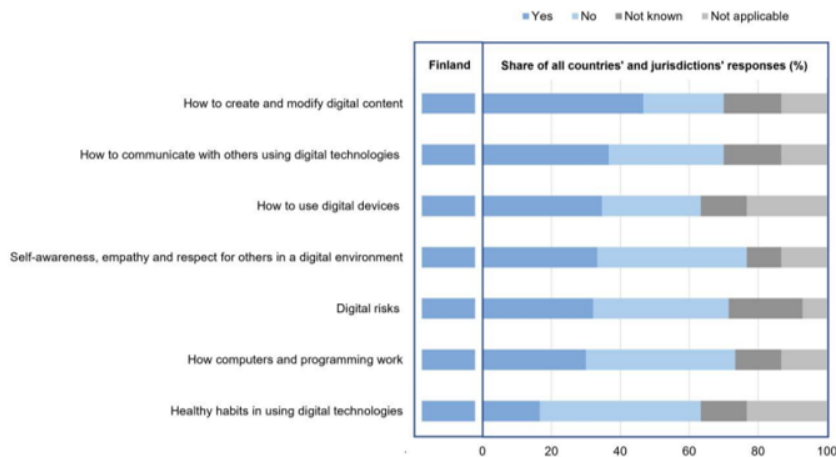
4.2.1. Digital Transformation of Management Practices

Digitalization in young child education in Finland is a reserved and pedagogical adoption of technology in the management processes. Lähdesmäki et al. (2024) assert that instead of absolute revolution, digital capabilities are being integrated to improve the functionality of the administrative systems. The use of digital documentation platforms including Pedanet and Wilma is one of the examples where educators and administrators can capture the progress of children in terms of development, communicate, and exchange observations with families. These platforms are not meant to instil hard-

faced assessment frameworks but facilitate narrative-based documentation in line with play-based curriculum in Finland. These systems provide understanding of the classroom practises to managers without compromising professional autonomy of the educators. This is part of a wider opposition to over-standardisation and data-driven control. Figure 7 shows the percentage of countries, including Finland, incorporating aspects of early digital literacy in curricula for children aged 0-5 in 2022;

Figure 7: Aspects of Early Digital Literacy Specified in Curriculum Frameworks.

Percentage of countries and jurisdictions reporting the following, 2022



Source: (Eurostat, 2026)

Regarding CHAT, the digital tools in Finland act as mediating artefacts that enable interaction without reorganising the activity system entirely. The educator or manager, the child development, and the community (families and stakeholders) are the core of the relationships and technology improves, not overtakes them. Meanwhile, digitalization has enhanced efficiency in administration. All activities are simplified, including scheduling, reporting, and communication, permitting managers to devote additional time to pedagogical leadership (Ikeda & Binarkaheni, 2024). Nevertheless, the system does not overrely encompass performance metrics and therefore balances accountability and cross-functional development.

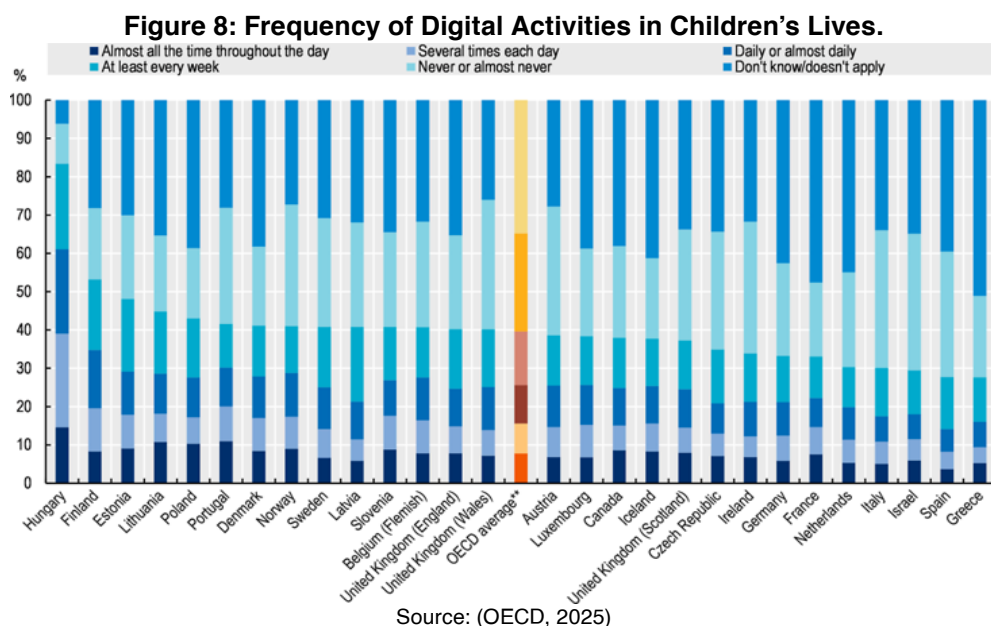
4.2.2. Cultural Influences on Digital Adoption

As the Finnish case demonstrates, the influence of cultural values on the adoption and implementation of digital technologies is profound. In this context, Fonsén et al. (2022) highlighted that the Finnish society is highly trust-focused, equal, or child-focused, and these values are embodied in the ECE management practises. These principles create a digital space, which focuses on openness and cooperation rather than surveillance. An example is that digital platforms can make information accessible in real time, but they are not applied to monitor teachers or children all the time. They advocate reflexivity and dialogue between teachers and parents instead. Moreover, Sahlberg (2021), evaluated that such a strategy is consistent with the larger Nordic

educational philosophy, which perceives children as active contributors to their own learning. The practical example is ECE centres in municipalities in Helsinki, where digital communication tools are employed to share daily updates with parents, with photos and storeys about what children do. Finland has adopted technology to adapt within the preexisting values instead of transforming them.

4.2.3. Historical Continuity and Evolution

Finland ECE system has historically developed as a welfare-focused model with an emphasis on social equality and child development. Moreover, Kotkas (2019) concluded that such historical underpinning still bears its impact on modern management, including the adoption of digital technologies. Figure 8 shows the frequency of digital activities in children's lives across various countries, including Finland;



Finland is characterised by digitalization as an expansion of established principles, not an avalanche. This change has been progressive and has enabled institutions to change without eroding the essence of pedagogy. Such as Ylinen (2021), examined how the implementation of digital portfolios extends previous observations-oriented assessment practises by ensuring continuity and improving efficiency. CHAT emphasises the relevance of historical development to present activity systems. In Finnish context, both the past and the present habits are harmonised and produce a soft tension or contradiction. Digital technologies are not introduced to make a splash but integrate with the system, strengthening, instead of undermining, established norms.

4.2.4. Leadership and Digital Competencies

The Finnish ECE leadership is defined as distributed and collaborative. Managers are not dictators but facilitators who assist educators in the integration of digital tools in

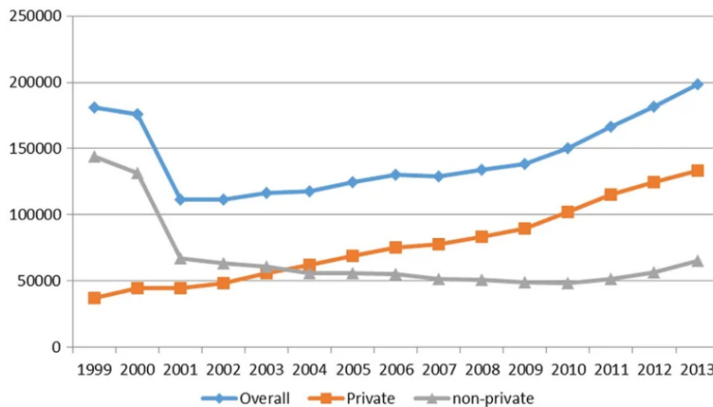
their practise. This corresponds to the theory of Transformational Leadership, especially its aspect of developing a shared vision and promoting professional development. Leaders focus on ongoing professional growth, making sure that personnel possess the required digital skills. Training programmes usually concentrate on the pedagogical use of technology as opposed to technical expertise in isolation. This indicates a perception that efficient digital incorporation assumes both skillfulness and question (Heikka et al., 2025). But also, leaders should address the issue of digital ethics, such as data privacy and screen time. Finnish approach focuses on responsible use where technology does not compromise the relational nature of early childhood education.

4.3. Case Study Two: China's Early Childhood Education System

4.3.1. Digital Transformation of Management Practices

China appears to be a significantly different scenario regarding digital integration in ECE management, which has a significantly higher adoption rate and appears to be according to the national policy goals. Zhang (2025) believes that the majority of surveillance activity performed on children, institutional performance, and the communication between large-scale systems are executed on digital platforms. In illustration, majority of urban kindergartens in Shanghai and Beijing are managed by centralised leadership structure that governs attendance record, assessment scores and teacher effectiveness. Figure 9 shows the number of private and non-private kindergartens in China between 1999 and 2013, with a significant increase in private kindergartens;

Figure 9: Number of Private and Non-private Kindergartens in China.



Number of private and non-private kindergartens in China between 1999 and 2013. source: Based on China National statistics on Education (Early Childhood) between 2001 and 2013.

Source: (Qi & Melhuish, 2017)

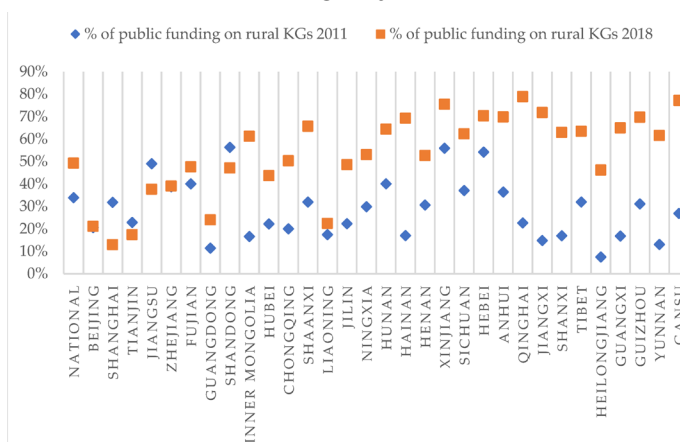
The systems are typically equipped with mobile applications which allow the parents to receive updates and the administrators to monitor the operations at real time. Chinese reaction is more disruptive than in Finland where digital tools are extensions of the old practises. In addition, Chang (2023) reported that information is the system upon which the management processes are built and the focus on the measurable

outcomes and responsibility is a priority. The following broad trends in educational governance can be associated with this change: data-driven decision-making is in the centre of the phenomenon. Under the framework of CHAT, digital technologies in China significantly alter the system of activities.

4.3.2. Cultural Influences on Digital Adoption

In China, the role of digital technologies in learning is deeply ingrained in the cultural values of that country. The focus on academic performance, productivity, and national growth fosters an ideal climate of data-driven management systems. It is here that digital tools are viewed as quality enhancers and consistency assurances across institutions. Figure 10 compares the percentage of public funding for rural kindergartens (KGs) in China in 2011 (blue) and 2018 (orange) across various regions;

Figure 10: Percentage of Public Funding for Rural Kindergartens (Kgs) In China.



Source: (Rao et al., 2023)

The hierarchical adoption of graded forms further enables the adoption of centralised digital systems (Liu, 2024). Managers should comply with policy directives, and online platforms offer a system through which compliance can be tracked. An example of practical use can be seen in the implementation of smart kindergarten systems where facial recognition technology is applied in attendance tracking and safety management. Although these practises can be ethically questionable in other settings, they are generally tolerated in the regulatory and cultural context of China (Luo et al., 2025). These results show that cultural values not just permit but also justify a particular way of digital management, which may imply a high amount of surveillance and standardisation.

4.3.3. Historical Continuity and Transformation

The ECE system in China has gone through a period of extensive overhaul in recent decades, shifting between the traditionally organised model into a more modern and technically-advanced model. Nevertheless, Niu et al. (2024) evaluated the aspects of continuity to be intact especially in the focus on the values of discipline and systematic

learning. The adoption of digital technologies is both a continuation of practises and also a reaction to modern requirements. To illustrate, the application of standardised assessment mechanisms has historically indicated persistent priorities associated with performance and accountability, and virtual environments increase the effectiveness and magnitude of these processes. CHAT offers a practical paradigm to explain the tensions which occur in the process of this transition. Digitization of operations will introduce disparities between old pedagogical methods and emerging managerial demands. Such contradictions lead to continual change of adaptation, generating an active and developing system.

4.3.4. Leadership and Digital Competencies

The leadership within the ECE system in China is more centralised and policy-oriented than Finland. Managers have the task of introducing digital initiatives aligned with national strategies, and this can often be implemented in well-regulated environments. Transformational leadership is reflected in the focus on innovation and professional growth, yet it works within a hierarchical system. Leaders should inspire staff, train, and make sure that digital tools are used effectively. In this context, however, challenges are more pronounced (Sungwa, 2025). Data reporting has the potential to increase workload for teachers, and concerns over privacy and ethical use of technology are emerging. The challenge faced by leaders is to strike a balance between efficiency and well-being of staff and children.

4.4. Comparative Analysis

A comparative analysis of the two cases reveals significant differences in how digital technologies are integrated into ECE management, as well as important similarities in the challenges faced, as presented in Table 1;

Table 1: Comparative Analysis of the Two Cases.

Dimension	Finland	China
Approach to Digitalization	Supportive and pedagogical	Transformative and data-driven
Cultural Orientation	Trust, autonomy, child-centered	Efficiency, accountability, hierarchy
Management Style	Decentralized and flexible	केन्द्रीकृत and standardized
Role of Data	Supplementary	Central to decision-making
Leadership Style	Distributed and collaborative	Structured and policy-driven

Source: Author

Comparing the two systems shows the significance of context in influencing digital transformation. Although both nations engage digital tools, their functions and connotations are quite different. Technology in Finland supplements old practises, not changing their nature. In China, digitalization is creating systemic change, transforming management fundamental processes and expectations. Nevertheless, irrespective of these contrasts, both examples illustrate the rising significance of digital abilities in leadership and the requirement to be ethical in technological application.

4.5. Discussion in Relation to Theoretical Framework

The results offer a compelling justification to the Cultural-Historical Activity Theory use. The digital technologies, in both instances, act as a mediating tool within and between complex systems of activity, yet their effects vary relative to cultural and

historical context. The system of Finland depicts stability and continuity whereas the system of China depicts change and adaptation under the influence of internal contradictions. The Transformational Leadership Theory also provides some valuable insights into the way leaders can navigate digital change. Leaders are important in both scenarios in influencing adoption and implementation of technology, but their methods vary. The Finnish and the Chinese model stress empowerment and collaboration, respectively, and alignment with policy and organisational aims, respectively. These results indicate that leadership in the digital era does not solely require technical skills but also cultural competence and moral duty.

4.6. Summary

The two contrasting case studies in this chapter have examined how digital technologies affect the management of early childhood education. The results reveal that digital transformation is a contextual, multifaceted process that depends on cultural values, historical processes, and leadership patterns. The Finnish model emphasises the significance of embedding digital innovation within pedagogical principles and cultural values, leading to a balanced and human-based model. Conversely, the Chinese model shows how digital technologies can implement widespread change, but also asks important questions regarding standardisation and ethics. Altogether, the discussion highlights that digital ECE management has no single model. Rather, effective integration involves the subtlety of context, which has to be facilitated by adaptive leadership and critical reflection.

5. Discussion

The results of Chapter 4 show that digital technologies are redefining early childhood education (ECE) management differently across settings, with Finland opting to follow a supportive and pedagogically compatible model, and China experiencing a more data-driven and centralised one. These variations indicate that cultural values, forms of governance, and the historical pathways mediate digital transformation where it does not follow a homogenous pattern. This coincides with the larger literature, which underlines that educational digitalization is not only technical but also socio-cultural (Selwyn, 2021). The incorporation of tools, including digital portfolios, in Finland can be seen as an extension of the tradition of play-based, child-centred practises, which can, in turn, be used to argue that ECE practises are rooted in cultural-historical contexts (Fleer & Veresov, 2018). On the contrary, the focus in China on data analytics and monitoring platforms evidences the rising role of data democracy in educational governance, according to Williamson (2017). The comparison of the two systems supports the argument, that although digital tools are effective in increasing the efficiency of administrators and communication, a large portion of their effects relies on how they are represented and enforced in particular socio-cultural contexts. Furthermore, digital technologies enable making decisions in real-time, yet they also evoke concerns regarding over-standardisation and the risk of disqualifying the qualitative aspects of the child development.

The analysis also indicates that cultural context is a primary factor in influencing the adoption and implementation of digital management practises in ECE. The principle of trust and decentralisation in Finland restricts technology use on surveillance, but in China, the hierarchical and efficiency-driven system encourages widespread

use of digital surveillance equipment. The observation resonates with the existing literature, which indicates that perceptions of childhood, learning, and authority play a crucial role in educational practises (Stephen & Edwards, 2017). Digital tools can be implemented in culturally diverse or policy-focused settings to achieve accountability and standardisation, whereas in child-centred settings, they can be modified to facilitate whole-person development. As Edwards (2013) has emphasised, digital technologies are perceived differently depending on the context, and that can be seen through the difference in their usage in Finland and China. Secondly, the results are correlated with the argument by Wang (2024), who says that leadership in ECE is culturally located, implying that management strategies cannot be universal. The example of the Chinese, in turn, explains that cultural acceptance of hierarchical forms enables the adoption of centralised digital systems, whereas the Finnish can be used to explain the significance of professional autonomy and collaborative decision-making. Such distinctions highlight why culturally responsive digital approaches are essential that correspond to the local values and expectations as opposed to the introduction of uniform modelling.

Lastly, the results illustrate the significance of the continuity of history and leadership to influence the digital transformation within ECE management. The fact that Finland is gradually adopting digital tools can be perceived as an evolutionary process that is consistent with the history of welfare-based education, whereas China's quick integration is more of a shift based on modernization agendas. This helps to argue that present repercussions are influenced by the historical process and changing institutional forms (Van Laere, 2017). Theoretically, CHAT can be used to describe the functioning of digital tools as mediating artefacts in activity systems through the reinforcement of current practise or contradictions leading to change (Engeström, 2016). Simultaneously, Transformational Leadership Theory offers an understanding of how leaders may overcome such changes by enhancing innovation, sustaining professional growth, and integrating technology engagement with the values of education (Leithwood & Sun, 2018). Both articles also reflect the growing use of digital competencies among ECE leaders as highlighted by Blackwell et al. (2016) and the issue of ethics related to data use and privacy (Livingstone et al., 2018). In general, the discussion highlights the idea that successful digital transformation in ECE management necessitates implementing an effective balance between innovation and pedagogical integrity, which is facilitated by culturally-cognizant leadership and sensitivity to the historical context.

6. Conclusion and Recommendations

6.1. Conclusion

This research aimed to analyse the shaping of digital technologies in early childhood education (ECE) management by use of cultural and historical lenses. The results indicate that digital transformation in ECE represents an intricate, situation-specific process as opposed to a technical or homogeneous one. Finland and China (noted in both case studies) presented a general trend toward digital technologies, which facilitated the transformation of administrative practises, communications, and leadership responsibilities. Nevertheless, the character and scope of this change differed significantly across the cultural ideals, the forms of governance, and the development of historical

courses. Digital tool integration did not disrupt the traditions of pedagogy, but it was designed to reinforce the nationwide practises of Finland, which are focused on the child, professional autonomy, and the capital of trust as the basis of managerial decisions. Digitalization in this regard acts as an addition and not a disruptor and it is consistent with the historical belief of the country in comprehensive child development and equal opportunity in society. Conversely, China exhibited a faster and more transformative mode in which digital technologies are integrated into centralised systems of governance and accountability. In this case, data-driven management becomes a fundamental component of decision-making, embodies more general cultural priorities in the domain of efficiency, performance, and national development.

The study also reflects on the vital importance of leadership in digital transformation. In both situations, the new competencies demanded of leader include digital literacy, ethical awareness and strategic adaptability. Nonetheless, leaders using different approaches; Finland reflects a distributed and collaborative way of leadership, whereas China demonstrates a more hierarchical and policy-driven framework. The present results support the significance of culturally sensitive leadership that attaches technological innovation to the set of educational values. Theoretically, the research shows the applicability of Cultural-Historical Activity Theory in comprehending how digital technologies operate within dynamic systems of activities and the implication of the Transformational Leadership Theory in leading change within organisations. In general, the study highlights that successful ECE management through digital incorporation must balance between innovative and pedagogical integrity based on the cultural context and historical occurrences. No general model exists, and high-quality practises should be context-dependent, grounded in ethics, and be sensitive to the needs of young children and teachers.

6.2. Recommendations

Considering the results of this research, several suggestions may be made to maximise digital transformation in the early childhood education administration.

- First, educators and policymakers need to embrace context-sensitive digital integration. Instead of using standardised models, digital strategies must be configured with the values and educational philosophies of the local cultures and institutional needs to be relevant and effective.
- Second, the professional development programmes centred on digital competencies should be reinforced. Training must extend past many technical-focused skills to pedagogical applications, critical thinking, and ethics, whereby teachers and managers learn to make good use of the digital tools they have and act in a responsible manner.
- Third, balanced application of digital technologies in ECE institutions should be prioritised. Although digital tools may be more efficient and effective, it does not mean that the relational and play-based nature of early childhood education has to disappear. Technology should not replace learning environments, but rather, the policies must serve them.
- Fourth, governments and institutions have to deal with issues of equity in digital access and infrastructure. Disparities need to be minimised through the provision of resources, training and support especially in poorly-resourced environments.
- Lastly, clear ethical principles and data governance policies must be developed.

Maintaining the privacy of children and their responsible use of data, as well as transparency, is paramount in the development of trust and the preservation of the welfare of all stakeholders.

6.3. Limitations of the Study

The research is also constrained by its secondary data sources, which might not be representative of the lived experiences of teachers and administrators. The application of two case studies alone also limits the foundational validity. Also, individual differences in each national setting were not studied in depth.

6.4. Future Research Directions

Primary data should also be used in the future by using interviews or observations to get more insight on practical experiences. It is also advisable to carry out comparative studies that feature a wider range of contexts. Future studies may investigate how digital management influences child development and educational achievement in the long run.

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