



From Playgrounds to Pixels: Navigating Data Privacy and Ethical App Selection in Early Childhood Education

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Abstract

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Abstract

This thesis, "From Playgrounds to Pixels: Navigating Data Privacy and Ethical App Selection in Early Childhood Education," explores the integration of digital tools in Early Childhood Education and Care (ECEC), emphasizing the importance of data privacy and ethical practices. The study was conducted against the backdrop of increasing digital tool use in educational settings and notable security breaches, highlighting the critical need for robust digital safety protocols.

Central to the thesis is the development of an educational guidebook aimed at equipping educators with the necessary knowledge and strategies to improve digital literacy and secure data handling in ECEC settings. The guidebook was developed through comprehensive literature reviews, stakeholder interviews, and feedback. The findings advocate for ongoing professional development and the regular updating of educational resources to keep pace with technological advancements. These contributions are pivotal in enhancing digital education practices, ultimately enriching the learning environment and safeguarding young learners.

Keywords: Digital Tools, Data Privacy, Early Childhood Education, Ethical Guidelines, Digital Literacy.

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1 Introduction

In the rapidly evolving landscape of Early Childhood Education and Care (ECEC), the integration of Information and Communication Technology (ICT) has emerged as a significant trend, reshaping the way educators engage with young learners. Digital tools such as computers, tablets, and smartphones enhance cognitive, socio-emotional, and physical development in young learners. They provide access to a wide range of educational resources, including interactive apps and digital books, fostering creativity and problem-solving skills. Additionally, these technologies improve communication between educators and parents, strengthen home-kindergarten partnerships, and enhance parental engagement (Harris et al. 2018, 2; Kontkanen et al. 2023, 4, 8; Güneş 2020, 10; Alanko, Kankaanranta & Kenttälä 2019, 2). As digital technologies become increasingly ubiquitous in ECEC curricula, educators face the daunting task of ensuring that these tools enhance learning outcomes while safeguarding children's rights and privacy (Kontkanen et al. 2023, 8; Harris et al. 2018, 2).

A recent and impactful illustration of the dire consequences of inadequate digital security in educational settings is the May 2024 data breach in the City of Helsinki's education and training sector. This breach, facilitated through a vulnerability in a remote access server, led to unauthorized access to sensitive data, including personal identification numbers and address information of children, guardians, and staff (City of Helsinki 2024). This incident underscores the critical need for rigorous security protocols and regular system updates to defend against such vulnerabilities. The breach not only exposed personal data but also highlighted the potential for deep and lasting impacts on the trust and safety of the educational community. It reflects the immense responsibility educators and educational institutions hold in safeguarding the data of their learners and staff.

The significance and topicality of our thesis, therefore, stem from the growing reliance on digital tools in educational settings and the inherent complexities associated with their use. The lack of comprehensive ethical frameworks and guidelines exacerbates this challenge, highlighting the urgency of raising awareness and developing resources to support educators in navigating the ethical complexities of digitalization (Livingstone, Stoilova & Nandagiri 2019, 4). Against this backdrop, this thesis seeks to critically evaluate the integration and ethical digitalization practices in ECEC, addressing the pressing need for clear ethical guidelines and best practices in the digital age (UNICEF Office of Research - Innocenti 2022, 5).

The authors' interest in this chosen topic arises from a deep-seated commitment to promoting ethical practices and ensuring optimal developmental outcomes for young learners.

Drawing on their background in education, technology, and ethics, the authors recognize the pivotal role that educators play in shaping children's digital experience. The development process of our thesis involved a combination of literature review and discussions with key stakeholders, including our work representative, manager of an international private kindergarten in Finland.

During this process, we delved deeply into the current practices around digital tool usage and the regulatory frameworks governing digital privacy. Through this rigorous examination, we pinpointed specific deficiencies in knowledge and practices related to the selection and employment of digital tools in ECEC environments. One particular area of concern identified was the absence of a structured evaluation process for app usage within private daycare settings—a stark contrast to the more regulated practices observed in municipal daycares.

These findings guided our focus towards developing a comprehensive understanding of data privacy and the General Data Protection Regulation (GDPR) specifically tailored for ECEC settings. Our goal was to create actionable strategies that significantly enhance educators' abilities to select and use digital tools responsibly. This initiative aims to empower educators, equipping them to handle the complexities of digital tools while safeguarding the privacy and safety of their educational environments.

A key output of our study is the creation of an educational guidebook, designed to serve as a crucial resource for educators. This guidebook is intended to enhance understanding and awareness of ethical digitalization principles, focusing specifically on issues related to privacy and data protection in educational settings. Through collaboration with our manager and utilizing insights gained directly from our workplace, this resource will guide educators in assessing and selecting digital tools that align with both ethical standards and pedagogical objectives. Moreover, we have scheduled to host the first pedagogical workshop, 'Navigate and Educate: Safeguarding Our Digital Playgrounds,' at our daycare at the start of the academic year 2024-2025. In the workshop, we will highlight the practical application of our research and introduce educators to the guidebook, facilitating informed discussions on privacy and data protection in ECEC settings.

Despite the specific focus and inherent limitations of this study, confined to our immediate educational environment and stakeholder—our manager—this thesis strives to make a meaningful contribution to the discourse on ethical digitalization in ECEC. By addressing the complexities of the Finnish system and the dynamic nature of digital technologies, our work supports educators in fostering safer and more effective digital learning experiences for young children.

2 Theoretical Framework

2.1 ICT in Early Childhood Education and Care (ECEC)

The Finnish National Core Curriculum for ECEC emphasizes digital competence as a crucial aspect of educational equality. It advocates for the integration of digital tools into a variety of ECEC activities, including documentation, play, interaction, and exploration. This approach not only fosters creative thinking, teamwork, and multiliteracy in children but also ensures that they are educated about the responsible and safe use of digital environments by ECEC personnel (Finnish National Agency for Education 2022, 23-24).

Hu and Yelland (2019, 491-492) discuss the evolution of technology in early childhood education, highlighting the shift from traditional computers to a broader array of digital tools such as tablets, cameras, and interactive toys. Hammed (2014, 53-56) elaborates on the potential roles of these technologies in early childhood education, including activities like game-playing, storytelling, and collaborative content creation, as well as their use in lesson planning and developmental monitoring. However, challenges such as effective implementation, integration, and teacher confidence in teaching technology skills are also noted.

Bernárdez López (2023, 9) emphasizes the importance of aligning ICT use with curricular standards. The thesis focuses on developing digital skills in toddlers to meet both curricular requirements and the demands of the working world. A guidebook, developed as part of this thesis, serves as a practical tool for teachers to implement activities that enhance digital competence. Feedback from colleagues highlights its effectiveness and success. The appointment of a digital tutor at the workplace demonstrates how institutions are proactively enhancing digital skills among both educators and children.

Research by Fox-Turnbull and others (2019, 78) indicates a growing emphasis on integrating technology into early childhood settings, particularly in areas like mathematics, science, and technology. This integration aims at helping children understand how simple technologies work and develop skills in building and creating. However, there's a noted need for more research on effective use of ICT in ECEC, as well as a call for responsible and mindful use of technology to promote children's well-being and development.

Digital technology, like smartphones and tablets, is changing how we learn, making it more accessible and engaging. Social media is also playing a big role in education, allowing children and teachers to connect and share information easily. Traditional classrooms are evolving to include digital tools like online calendars and student response systems, which help with scheduling and feedback. By using digital tools, children can have more dynamic learning experiences and save time and resources. Overall, technology is reshaping education for the better, making it more affordable and accessible to all (Haleem et al. 2022, 276).

Finnish digital education rules set until 2027 emphasize clear objectives, teamwork, and enhanced learning through technology, as outlined by the Ministry of Education and Culture (2023, 17). Despite these guidelines, the overall status of digital education across the country remains ambiguous, posing specific challenges for smaller educational institutions. Effective collaboration and sharing of resources are essential for future digital education, which should be well-structured and environmentally conscious.

In Finland, digital skills are integrated across all subjects, yet the quality and extent of teaching vary. Looking ahead, there is a need for consistent digital education from early childhood through to graduation. Comprehensive plans for standardized learning experiences and teacher training are vital. In sum, the main tasks moving forward will involve supporting digital skill development, monitoring educational progress, and continually updating teaching methods, as per the Ministry of Education and Culture (2023, 17).

2.2 Impact of Digitalization on ECEC

Digitalization has transformed ECEC, introducing a new era of learning with technologies like computers, tablets, and smartphones. These tools enrich learning experiences and support development across cognitive, socio-emotional, and physical domains (Harris et al. 2018, 2; Kontkanen et al. 2023, 8).

A key benefit of digitalization in ECEC is the access it provides to a variety of educational resources. Children can engage with interactive apps, digital books, and educational videos that enhance their learning experiences (Kontkanen et al. 2023, 4). Tools such as iPads and educational games not only foster creativity and problem-solving skills but also offer personalized learning experiences tailored to the needs and interests of individual children (Güneş 2020, 10; Alanko, Kankaanranta & Kenttälä 2019, 2).

Digitalization also improves communication and collaboration between educators and parents, facilitating real-time updates on children's activities, progress, and development. This strengthens the partnership between home and kindergarten and fosters greater parental engagement (Harris et al. 2018, 3; Kontkanen et al. 2023, 1). Early exposure to digital technologies aids in developing essential digital literacy skills, preparing children for the demands of the digital age (Güneş 2020, 2).

However, there are concerns associated with digitalization in ECEC. Excessive screen time and passive consumption of digital media may negatively impact children's physical health, social development, and attention spans (Dardanou et al. 2023, 19). It is crucial to balance digital experiences with hands-on activities to promote holistic development. Ensuring equitable access to digital resources is essential to prevent disparities and narrow

the digital divide among children from different socioeconomic backgrounds (Judge, Puckett & Cabuk 2004, 383).

Educators are pivotal in effectively leveraging digital technologies while addressing concerns about privacy, safety, and equity. Ongoing professional development and research are vital for optimizing the benefits of digitalization and addressing its challenges (Stratigos and Fenech 2020, 24).

As we consider the dual-edged nature of digital technologies in ECEC, the importance of ethical considerations becomes clear. The next sections will explore ethical frameworks and guidelines in education, emphasizing the need for educators to align technology use with strong ethical standards, thereby ensuring that digital tools enhance learning environments while protecting the rights and well-being of all learners. This ethical scrutiny ensures that the integration of digital resources in educational settings is conducted thoughtfully and responsibly.

2.3 Delineating Ethical Digitalization in ECEC

2.3.1 Dimensions of Current Ethical Frameworks

Ethics in the context of digital education can be defined as the set of moral principles that govern the conduct of educators and institutions in the use of technology (Council of Europe n.d.). These principles ensure that technological practices support the developmental, educational, and well-being needs of young learners, while prioritizing their rights to privacy and confidentiality (UNICEF Office of Research - Innocenti 2022, 5). This definition guides our exploration of various ethical frameworks that address these multifaceted considerations, detailing the essential dimensions that such frameworks should encompass to empower educators in selecting and utilizing digital materials responsibly.

Several organizations and scholars have contributed to the development of ethical guidelines and frameworks for digital tool use in educational settings. The International Society for Technology in Education (ISTE) offers standards that include ethical considerations for educators and children in navigating digital landscapes (Crompton 2017, 10-50). Similarly, the UNESCO ICT Competency Framework for Teachers (UNESCO 2018, 18) underscores the importance of ethical use of ICT to enhance teaching and learning while ensuring the safety and privacy of learners.

Despite our comprehensive literature review, no existing ethical frameworks specifically tailored to the unique context of ECEC were identified. Existing frameworks often concentrate on older children, overlooking the distinct developmental needs and

vulnerabilities of early learners (Livingstone, Stoilova & Nandagiri 2019, 9). This gap underscores the critical need for the development of a dedicated ethical framework that addresses dimensions uniquely pertinent to ECEC settings.

Based on a synthesis of literature and existing ethical guidelines, the following dimensions are crucial for an ethical framework aimed at empowering ECEC educators:

1. **Developmental Appropriateness:** Content within digital tools should be tailored to the developmental stages of early learners, promoting cognitive, social, and emotional growth (Cooper 2005, 286-302).
2. **Safety and Privacy:** The framework must prioritize children's safety online and protect their personal data, aligning with legal standards such as GDPR (UNICEF 2021, 27-28).
3. **Well-being and Emotional Health:** Digital tools should support the mental and emotional well-being of early learners, offering environments that are not only safe but also promote positive emotional development. Tools should be designed to minimize stress and anxiety, encourage positive social interactions, and provide content that fosters resilience and emotional intelligence. Activities and content should also allow for relaxation and mindfulness, helping children to develop healthy relationships with technology (UNICEF Office of Research - Innocenti 2022, 5-6).
4. **Content Quality and Educational Value:** Digital materials should offer high-quality, engaging content with clear educational objectives that support the ECEC curriculum (OECD 2023, 23-34).
5. **Equity and Accessibility:** Ensuring all children have equal access to digital tools, including those from diverse socioeconomic backgrounds and those with special educational needs (Resta et al. 2018, 989; Gottschalk and Weise 2023, 16; UNESCO 2018, 14-15).
6. **Inclusivity and Diversity:** Apps and websites should represent a wide range of cultures, languages, and family structures, promoting inclusivity and respect for diversity (Gottschalk & Weise 2023, Resta et al. 2018, 989; Gottschalk and Weise 2023, 16; UNESCO 2018, 14-15)
7. **Teacher Empowerment and Support:** The framework should provide educators with guidelines and resources to enhance their confidence and competence in selecting and using digital tools (UNESCO 2018, 49-58; OECD 2023, 133-165).
8. **Parental Engagement:** Encouraging active collaboration and communication with parents about the use and benefits of digital tools in education (Tremblay et al. 2023, 37-41).
9. **Continuous Monitoring and Evaluation:** Establishing mechanisms for ongoing assessment of digital tools' impact on children's learning and well-being (OECD 2023, 96-117).

2.3.2 Focusing on the Safety and Privacy Dimension in Finnish ECEC

In Finnish ECEC, the integration of digital technologies has been marked by a strong emphasis on safety and privacy, driven by a proactive approach to digitalization. The "Empowering Young Children in the Digital Age" report by the OECD underscores this initiative, highlighting Finland's commitment to integrating digital tools while addressing the inherent risks associated with digitalization (OECD 2023, 1-15).

The Finnish approach to digital education in ECEC emphasizes the need to safeguard the most vulnerable participants in digital learning environments against the commercialization of their data. ECEC settings, under this framework, are vigilant against becoming targets for marketing strategies and algorithmic profiling, which often occur without adequate transparency or consent (OECD 2023, 11).

To support ECEC providers in fulfilling their data protection obligations, the Finnish National Agency for Education (FNAE) has developed specific guidelines. These include conducting data protection impact assessments for any digital activity involving minors' data, ensuring that all digital interactions are secure and privacy-compliant (Opetushallitus 2023, 131, as cited in OECD 2023, 3).

This focus on data protection is part of a broader strategy to equip educators with the necessary skills to use digital technologies safely and effectively. Extensive guidance on managing privacy and protecting the personal data of young children is provided, which is crucial for fostering a secure digital learning environment (OECD 2023, 1). This preparation aligns with Finland's emphasis on digital literacy within the National Core Curriculum for Early Childhood Education and Care, which promotes an understanding of digital risks and cultivates healthy digital habits from an early age (FNAE 2022, 46). The curriculum underscores the importance of educating young learners about the responsible use of digital devices, ensuring they not only use technology effectively but also comprehend its implications on privacy and data security (FNAE 2022, 31).

The OECD (2023, 14) report on Finland provides several policy pointers essential for enhancing digital safety and privacy. Despite advances in digital education, challenges remain, particularly in balancing the opportunities presented by digital tools with the risks they pose, especially concerning privacy and data protection. Continuous refinement of policies is necessary to ensure that digital service providers and ECEC settings adhere strictly to safety and privacy regulations, thus protecting children from potential harms associated with digital engagement. Moreover, it is crucial to clarify the responsibilities of the ECEC workforce for children's safety in digital environments, depending on their role, the children's

age, and the type of ECEC setting. This clarification will help ensure that all staff members are equipped with the appropriate knowledge and skills to manage digital risks effectively. Additionally, aligning guidelines for the ECEC sector and parents on managing risks and realizing the benefits of digital environments for children is essential. Such alignment will support a unified approach to digital education that safeguards children's welfare while maximizing their learning opportunities.

The UNESCO document "Minding the Data: Protecting learners' privacy and security" sheds light on similar challenges on a global level, emphasizing the "privacy paradox"—the disparity between the intended educational use of digital technologies and the potential infringement on privacy that can occur (UNESCO 2022, 17). This paradox illustrates the complexity of digitalization in education, where the benefits of technological tools must be balanced against the potential for misuse and the threats to student privacy.

The European Declaration on Digital Rights and Principles for the Digital Decade further supports this focus, advocating for the development of digital environments where children can safely and creatively engage, with guarantees for their security and appropriate access to digital content (European Commission 2023; UNESCO 2024, 20).

Given these concerns, this review section focuses on the safety and privacy dimensions within the ethical frameworks in Finnish ECEC. This focus is justified because these aspects are critical in ensuring that digital education remains a tool for empowerment rather than a source of vulnerability. Educators' roles are crucial in this regard; they must be equipped with the right tools and knowledge to navigate these challenges effectively.

2.3.3 Insights from Localized Digital Pedagogy Programs

Municipal digital pedagogy programs in Vantaa and Espoo offer insights into the effective integration of digital tools in ECEC settings. These programs demonstrate how localized educational initiatives can implement national policies on digital education, focusing on ethical considerations such as data protection and responsible digital tool usage (Manner 2022 & Vantaa.fi n.d.).

By examining the measures in place at the municipality level to ensure ethical digitalization, as outlined in the Digital Pedagogy Programs of Vantaa and Espoo, our thesis establishes a connection between theoretical frameworks and practical application. The emphasis on data protection and privacy in both programs resonates with our thesis's focus on ensuring the safety and security of digital environments used in early childhood education. Similarly, the requirement for educational apps to undergo evaluation aligns with our emphasis on rigorous assessment processes to safeguard children's privacy and protect their personal data.

Furthermore, the focus on ongoing professional development in digital pedagogy, highlighted by peer learning networks and specialized training resources in both Vantaa and Espoo programs, underscores the importance of equipping educators with the necessary tools and knowledge for responsible technology use. Our thesis contributes to this educational endeavor by providing educators with targeted guidelines for selecting and effectively using educational tools in early childhood settings.

2.3.4 Digital Device Use in Our Workplace

In the context of our international kindergarten, tablets are the primary digital device for educational activities, making it crucial to ensure that the apps we use align with educational objectives and adhere to strict data protection and privacy standards. Unlike other institutions that may use a variety of digital devices, our reliance on tablets intensifies the need for rigorous evaluation of apps integrated into our ECEC settings.

Our study has revealed that the responsibility for evaluating apps and ensuring they meet safety standards is a shared responsibility among various stakeholders within our organization, including the Data Protection Officer (DPO), educators, and IT professionals. This collaborative approach underpins the need for clear role definition and effective communication to enhance digital safety and compliance.

Currently, our organization has protocols for requesting app evaluations through the IT department; however, these processes have not kept pace with the rapid advancements in digital technology. To our knowledge, approximately 75 apps currently in use have not undergone formal evaluation, often selected based on informal recommendations and subjective judgments that might not sufficiently address critical safety and privacy concerns.

This gap in our evaluation process creates uncertainties among educators about our adherence to data security and privacy standards. Recognizing this, our study aims to clarify the roles and responsibilities of all stakeholders involved in app selection and to equip educators with the essential knowledge and practical strategies needed to navigate these processes effectively.

2.4 Identifying Core Areas of Knowledge for Ethical Digital Tool Usage

Based on a thorough analysis of the challenges and needs articulated during discussions with our work representative and peers in Early Childhood Education and Care (ECEC) settings, as well as an extensive review of the relevant literature, three pivotal areas

of knowledge were identified—Legal Framework and GDPR, Data Protection, and Privacy Policy Evaluation. These areas are critical for educators to effectively navigate the complexities of digital tools, particularly concerning safety, privacy, and adherence to data protection laws.

- **Legal Framework and GDPR:** Educators need a solid understanding of the General Data Protection Regulation (GDPR), which serves as a critical legal framework in Europe and any region handling EU citizens' data. According to Huang et al. (2020, 1-28), GDPR sets strict requirements for handling personal data, especially sensitive data concerning children. Educators in ECEC must be aware of GDPR's influence on selecting and using digital tools to ensure compliance and uphold the stringent standards of data protection and child safety mandated by law.
- **Data Protection:** As highlighted in the same work by Huang et al. (2020, 7), comprehensive knowledge of data protection principles is vital. Educators should understand how children's data is collected, stored, processed, and shared by digital tools. They must develop the skills to assess and confirm the security measures implemented by digital tools, ensuring these measures prevent unauthorized access and data breaches. This expertise is pivotal in maintaining a secure and trusted digital learning environment where the privacy and integrity of learner information are safeguarded.
- **Privacy Policy Evaluation:** Berisha et al. (2023, 9-12) emphasize the importance of critically assessing and interpreting the privacy policies of digital tools. Privacy policies offer deep insights into the management of user data. It is imperative for educators to thoroughly understand these documents to ensure the selected tools not only meet ethical standards but also offer transparent, understandable, and accessible explanations of their data handling practices. Educators need to identify policies that clearly articulate data usage, storage, and protection measures, aligning with both ethical and legal standards.

By equipping educators with these specific areas of knowledge, we prepare them to more effectively select and utilize digital tools that are safe, ethical, and conducive to early learning. This proactive approach in professional development not only aligns with the safety and privacy concerns emphasized in Finnish ECEC but also demonstrates a broader commitment to maintaining high ethical standards in the application of digital technologies in education.

2.4.1 Legal Frameworks Governing Digital Privacy

The General Data Protection Regulation (GDPR), enacted by the European Union in 2018, represents a pivotal advancement in data protection and privacy laws globally. Its comprehensive approach emphasizes several critical principles including consent, data minimization, and the rights of data subjects, with special attention to the processing of children's data. This regulation necessitates explicit consent from guardians for children's data and prioritizes their best interests, setting a high standard for transparency, accountability, and the protection of minors (European Parliament and Council of the European Union 2016).

In addition to understanding GDPR, it is crucial for educators to be familiar with national legal frameworks that complement these broader regulations. For instance, the Act on Early Childhood Education and Care (540/2018) in Finland provides specific provisions for data management and privacy in ECEC settings. This Act emphasizes the scope and purpose of data repositories, outlining responsibilities for data controllers and detailing requirements for data storage, retention, and disclosure (Act on Early Childhood Education and Care 2018). Such national legislation not only supports GDPR principles but also contextualizes them within the specific legal and operational framework of a country, enhancing the educators' understanding and compliance with these regulations.

Our review gains substantial depth from integrating international literature on personal data and privacy in educational settings. Two pivotal studies have significantly shaped our understanding and approach to addressing these issues within our thesis:

- Huang et al. (2020, 1-28) provided comprehensive guidance for children, teachers, and parents regarding personal data and privacy protection in online learning environments. The study conducted a thorough review of various legislations, regulations, and policies related to personal data protection for children. For instance, the study presented 13 items on legislation and regulation of countries and organizations, and 4 items specifically addressing legislation and regulation on personal data protection for children. They outlined the significance of legal frameworks such as GDPR in ensuring the protection of personal data, particularly in educational contexts. The insights from this study underscored the importance of transparency, consent mechanisms, and security measures in digital education practices.
- Archambault (2021, 10-19) delved into the complexities of student privacy in the digital age, shedding light on the implications of legal frameworks on privacy rights and data protection in educational settings. The study offered a historical overview of key federal regulations impacting student privacy from 1974 to 2018, highlighting the

evolving nature of privacy legislation over time. Moreover, Archambault (2021, 20-51) outlined California regulations related to student privacy spanning from 2015 to 2020, underscoring the state-specific measures implemented to address privacy concerns in educational contexts. Furthermore, the study examined 11 key Supreme Court cases related to student privacy, providing context on legal precedents shaping privacy rights in education. The study emphasized the need for educators to navigate the legal landscape effectively, ensuring compliance with regulations like GDPR and the Children's Online Privacy Protection Act (COPPA) to safeguard children's privacy rights. It provided valuable insights into the practical implications of these frameworks for educators and educational institutions.

By synthesizing insights from these studies and other relevant literature, our review offers a comprehensive understanding of the legal frameworks addressing privacy and data protection in ECEC settings. It underscores the importance of adhering to regulatory requirements and implementing robust privacy practices to promote safe and ethical use of digital tools in early childhood education.

To ensure compliance and protect the privacy and data of children in ECEC settings, teachers should adhere to key non-negotiable guidelines when evaluating the legal framework concerning privacy and data protection. These guidelines encompass various aspects, including compliance, transparency, consent mechanisms, security measures, and data retention policies.

- **Compliance with Regulations:** Teachers must ensure that educational apps strictly adhere to relevant national and regional regulations, such as COPPA in the United States or the General Data Protection Regulation (GDPR) in the European Union. Educators must verify that apps comply with GDPR Articles 8 (Conditions applicable to child's consent) and 17 (Right to erasure or 'right to be forgotten') to protect the rights of children (Huang et al. 2020, 7; Archambault 2021, 12; UNESCO 2022, 27).
- **Transparency in Privacy Policies:** It is crucial for educational apps to maintain clear privacy policies that articulate the data collected, the processing purposes, and consent procedures, as required by GDPR Articles 12 to 14 (Transparent information, communication, and modalities for the exercise of the rights of the data subject). These policies must be communicated in language that educators and parents can understand (Huang et al. 2020, 24; Archambault 2021, 44; UNESCO 2022, 4).
- **Informed Consent Mechanisms:** Teachers should ensure that educational apps have robust consent mechanisms in place as mandated by GDPR Article 7 (Conditions for consent) and Article 8. These should clearly explain data collection practices, purposes, and risks, providing ways for parents to review and revoke consent (Huang et al. 2020, 6; Archambault 2021, 7; UNESCO 2022, 16).

- **Security Protocols:** To comply with GDPR Article 32 (Security of processing), teachers must evaluate the security measures of educational apps. These measures should include the use of robust encryption, secure storage practices, and regular audits to protect data against unauthorized access and breaches (Huang et al. 2020, 16; Archambault 2021, 3).
- **Data Minimization and Retention Policies:** Teachers should verify that apps adhere to GDPR Article 5(1)(c) (Data minimization), ensuring that data collection is limited to what is necessary for specific educational purposes and that there are clear data retention policies specifying the duration of data storage and deletion protocols (Huang et al. 2020, 24; Archambault 2021, 43).

2.4.1.1 Legal Compliance Case Studies in Education Settings

To understand how GDPR's theoretical principles translate into practical actions within ECEC settings, it is beneficial to examine relevant legal cases that highlight both the challenges and compliance strategies involved. To illustrate how the theoretical principles of GDPR are applied in real-world scenarios within ECEC settings, the following table summarizes key legal cases that highlight both the challenges and compliance strategies involved:

Table 1: Summary of GDPR Compliance Case Studies in ECEC Settings

Section	Content
Case Study	Finnish DPA Case - Municipality Education Board (Finnish DPA 2020)
Overview	Addressed violations involving improper visibility of children's personal data across schools through an email system.
GDPR Connection	Violations of the principles of data minimization and integrity (Articles 5 and 25 GDPR), illustrating the essential balance between operational functionality and stringent data protection standards.

Consequences	Required implementation of measures to ensure data minimization and enhance system privacy settings.
Case Study	Finnish DPA Case - Pre-school COVID-19 Survey (Finnish DPA 2020)
Overview	A pre-school failed to communicate the voluntary nature of a survey collecting children's sensitive data.
GDPR Connection	Highlights the importance of transparency (Articles 5, 12, and 13 GDPR) in data collection processes, particularly the need to inform data subjects clearly about the legal basis for data processing and the voluntary nature of their participation.
Consequences	Mandated clearer communication on consent mechanisms and improvements in how consent is obtained and recorded.
Case Study	Norwegian DPA Case - Rælingen Municipality (Norwegian DPA 2019)
Overview	The municipality was fined for inadequate security measures in the use of the "Showbie" app, which compromised special categories of data concerning children with special needs.
GDPR Connection	Stresses the implementation of GDPR's data protection by design principle (Article 25 GDPR), emphasizing the need for robust security protocols to safeguard sensitive information, particularly for vulnerable groups such as children.
Consequences	Fined 500,000 NOK and ordered to implement stringent security measures including two-factor authentication.

This table not only highlights specific incidents where GDPR compliance was challenged but also the outcomes that led to enhanced data protection practices. By examining these cases, educators can better understand the complexities of GDPR compliance and the practical measures required to safeguard children's data in educational settings.

GDPR introduces stringent requirements that impact various sectors, including education. Its principles of data protection by design and by default require that data protection measures be integrated at the onset of designing systems, rather than as an addition. This approach ensures that privacy settings are set at a high standard from the start and that personal data are processed with the utmost care throughout the lifecycle of the system or service.

In the context of ECEC, understanding and implementing GDPR is crucial due to the sensitive nature of handling young children's data. Educators and administrators must navigate these regulations not only to comply with the law but to foster a trustful environment for parents and guardians.

2.4.1.2 Implementing GDPR in Practice: A Detailed Look at Daycare XYZ

In this section, an illustrative scenario is used to connect the theoretical aspects of GDPR with their practical implications in an ECEC setting. This hypothetical scenario demonstrates how abstract principles, such as data protection by design, are applied in everyday contexts, thus providing educators with actionable insights into their roles and responsibilities. Additionally, this approach underscores the value of using illustrative examples in educational literature, as they provide concrete demonstrations that help educators better understand and implement complex regulations such as GDPR.

Implementing GDPR in practice at Daycare XYZ involves several key aspects, beginning with data collection and consent management. According to GDPR regulations, personal data must be processed with clear and affirmative consent (European Parliament and Council of the European Union, 2016). Daycare XYZ addresses this requirement by developing an interactive digital consent form accessible via a secure parent portal. This form uses plain language to elucidate the purpose, usage, and rights of parents regarding data collection, thereby highlighting GDPR's emphasis on dynamic consent.

Furthermore, GDPR classifies certain data, such as health information or data concerning children, as "special category data," mandating higher protection levels (GDPR Article 9). Daycare XYZ adheres to this principle by implementing data protection measures

that restrict access to sensitive data through encrypted digital records accessible only via secure login credentials. Educators undergo rigorous training on accessing and using such data, ensuring compliance with GDPR's stringent standards.

In conducting GDPR compliance audits for EdTech tools, the Data Protection Officer (DPO) typically oversees the process, yet educators also play a significant role. Educators are often the first to identify the need for new EdTech tools, report potential data protection concerns, and provide essential insights during preliminary assessments. They also offer crucial feedback on tool functionality and data protection issues post-integration. In the audit process for EdTech tools, another crucial aspect is ensuring that educators and staff thoroughly understand the privacy policies and terms of service associated with the tools they use. This comprehension is essential for upholding GDPR compliance and protecting personal data. Responsibility for reviewing privacy policies and terms of service typically falls on both educators and the DPO. Educators play a vital role in this process as they are the end-users of these tools and are often the first point of contact for identifying potential data protection concerns.

An illustrative example of this collaborative effort is the introduction of a new Daycare Management System at Daycare XYZ. Recognizing the necessity to streamline administrative processes while ensuring data protection compliance, the daycare decides to implement a new system capable of handling sensitive data securely. During the compliance audit process, the DPO collaborates with the system vendor to scrutinize data protection measures, while educators provide input on their specific needs for data access and control. Consequently, the audit leads to the adoption of role-based data access and robust data encryption practices, ensuring compliance with GDPR.

Moreover, GDPR underscores the importance of training and raising awareness among all staff members handling personal data (GDPR Article 39) (European Union, 2016). At Daycare XYZ, bi-annual GDPR training sessions facilitated by the DPO are conducted, encompassing role-playing, case discussions, legislative updates, and secure data handling practices. This comprehensive approach ensures that educators are proficient in GDPR regulations and actively contribute to data protection practices.

Overall, the case study of Daycare XYZ exemplifies the practical application of GDPR in an ECEC setting. It demonstrates how ECEC centers can effectively integrate GDPR requirements into their operations, ensuring compliance while safeguarding children's data. By documenting these applications and providing actionable insights for educators, this literature review contributes to a deeper understanding of GDPR's impact on ECEC and advocates for a proactive approach to data protection in educational environments.

2.4.2 Data Protection: Selecting Safe Apps

The legislative environment guiding digitalization in education has undergone significant changes in recent years, marked by several key legislative reforms. These reforms include the data protection reform, the Act on Information Management in Public Administration, and the Act on the Provision of Digital Services. These legislative changes reflect a broader commitment to enhancing the governance and integration of digital technologies within educational settings (Ministry of Education and Culture 2023, 9).

In response to these reforms, the Ministry of Education and Culture along with the FNAE have taken proactive steps to implement information-based steering. They have developed support materials aimed at facilitating compliance and enhancing the effectiveness of digital technologies in education. Notable among these are the Data Protection Guide, the Learning Analytics Framework, and the Publicity and Information Management in Education Services. These resources are designed to help educators and administrators navigate the complexities of digital technology use while ensuring compliance with new regulations (Ministry of Education and Culture 2023, 9).

In the context of our review, particularly in the area of data protection, we will be utilizing the Data Protection Guide developed by the FNAE. This guide is part of a suite of materials produced in response to recent legislative reforms, including the data protection reform, and is designed to assist educators in navigating the complexities associated with digital technologies in teaching. The guide provides practical insights and strategies to ensure that digital tools used within ECEC settings meet stringent safety and privacy requirements.

Data protection is of paramount importance in educational settings, serving as a crucial safeguard against unauthorized access to personal data, thereby ensuring the privacy and security of both children and staff. Inadequate data protection can lead to severe consequences including legal ramifications, such as fines and sanctions mentioned in section 2.4.1 under stringent regulations like the GDPR. Furthermore, a breach in data security can significantly erode trust among parents and the broader educational community, potentially damaging the institution's reputation (Reindenberg and Schaub 2018, 10). Most critically, the mishandling or exposure of sensitive data can cause substantial harm to children, affecting their emotional well-being and privacy (Banko-Bal and Guler-Yildiz 2021, 1). Therefore, robust data protection measures are essential to prevent these adverse outcomes and maintain a secure educational environment (Huang et al. 2020, 7).

The recent data breach in Helsinki, mentioned in the introduction, exemplifies the severe impact such incidents can have on trust and security within educational environments. This breach exposed the sensitive data of thousands, underscoring the critical need for stringent data protection measures and continuous vigilance in safeguarding educational data.

2.4.2.1 Roles and Responsibilities of Educators in Safeguarding Data

Educators in Early Childhood Education and Care (ECEC) settings are integral to both fostering digital literacy and safeguarding data (Huang et al. 2020, 4). Their responsibilities extend beyond educational objectives to include the critical task of ensuring that digital tools used within the classroom adhere strictly to data protection standards. As outlined by the FNAE, educators are required to carefully select digital applications that not only enhance learning but also comply with legal requirements such as the GDPR. Additionally, they must educate children on safe digital behaviors, which include understanding how to navigate digital platforms securely and the implications of sharing personal data (FNAE n.d.).

Furthermore, educators are charged with maintaining the privacy of young learners. This involves implementing and enforcing policies that prevent unauthorized access to data and being vigilant in reporting any security vulnerabilities or breaches (Reidenberg and Schaub 2018, 5). According to regulatory guidelines, educators should promptly report any deficiencies or concerns related to digital tools to early childhood education organizers, facilitating a proactive approach in addressing these issues swiftly. This not only enhances the security of the learning environment but also promotes a culture of continuous improvement (FNAE n.d.).

Collaboration with other stakeholders is crucial for effective data protection within educational settings. Educators work alongside Data Protection Officers (DPOs), who provide expertise on data protection laws and compliance assessments. IT specialists are also key partners, helping to evaluate the technical safeguards and encryption measures of educational apps. Moreover, educators engage with parents and guardians to obtain necessary consents and ensure transparency about how children's data is utilized. Regular interactions with regulatory bodies ensure that educational practices remain in alignment with evolving data protection regulations, thereby upholding a standard of excellence and compliance (FNAE n.d.).

Through these multifaceted roles, educators not only act as facilitators of technology-enhanced learning but also as guardians of child data privacy (Milkaite n.d., 179). This dual responsibility emphasizes the need for a balanced approach where both educational and security needs are met, ensuring an environment where safety and learning coexist effectively (Milkaite n.d., 182-183). By fostering a culture of security awareness and committing to stringent adherence to data protection laws, educators help create a protective yet enriching educational experience for all children.

modification, or destruction. The goal is to ensure the confidentiality, integrity, and availability of information. This typically involves physical and electronic protection measures to ensure that only those with authorized access can retrieve or use the information.

- **Categorization of Data:** Understanding different types of data is crucial:
 - **Personal Data:** Any information that can identify an individual, either directly or indirectly. In education settings, this can include names, addresses, and photos.
 - **Sensitive Personal Data:** This includes data on racial or ethnic origin, political opinions, religious beliefs, health data, and more, requiring higher levels of protection due to its sensitivity.
 - **Pseudonymized and Anonymized Data:** Pseudonymization is a process where identifying fields within a data record are replaced by one or more artificial identifiers, or pseudonyms. Anonymization removes all personally identifiable information where identification is not possible. These methods help minimize risks by reducing the linkability of datasets to individuals.
- **Roles and Responsibilities:**
 - **Data Protection Officer (DPO):** This role involves overseeing data protection strategies and implementation to ensure compliance with GDPR requirements.
 - **Data Controllers and Processors:** These are entities that determine the purposes, conditions and means of the processing of personal data. In education settings, the administration may act as the data controller, while external IT services might be the processors.
 - **Principles of Data Processing:** These principles include legality, fairness, and transparency; purpose limitation; data minimization; accuracy; storage limitation; integrity and confidentiality. These principles ensure that personal data is processed lawfully and fairly, without adversely affecting the individual's rights.
 - **Rights of Data Subjects:** GDPR enhances the rights of data subjects, giving them more control over their personal data. This includes rights to access, correct, delete, or restrict processing of their data, providing a basis for individuals to understand and control how their information is used.
 - **Data Breaches and Incident Response:** Educators must be equipped to identify and respond to data breaches. This includes understanding the legal requirement to notify the relevant supervisory authority and affected individuals where a breach poses a risk to rights and freedoms.
 - **Communication and Transparency:** It is imperative that data subjects are informed about how their data is being processed. In an educational setting, this means that educational institutions must communicate with parents and

guardians about how their children's data is being used, the measures in place to protect it, and their rights under data protection law.

These concepts form the bedrock of data protection practices in educational settings. By integrating these principles into their daily routines and digital tool selections, educators not only comply with legal requirements but also advance a culture of data privacy and security. This approach ensures that the digital tools employed in classrooms are not only educational but also secure and respectful of the privacy rights of young learners.

2.4.3 Evaluating Privacy Policies

A privacy policy is a statement or a legal document that details how an organization gathers, uses, discloses, and manages a customer's data. In ECEC, understanding and implementing effective privacy policies are crucial because they outline how children's personal information is protected within educational tools, ensuring adherence to data protection regulations such as the GDPR (Berisha et al. 2023, 9-12).

The importance of understanding privacy policies in ECEC settings cannot be overstated. These policies are vital for ensuring compliance with data protection laws, safeguarding the privacy and security of student information, and guiding educators in their selection of safe digital tools. When educators understand the terms outlined in privacy policies, they can make informed decisions about the digital tools they incorporate into the classroom, ensuring these tools meet the educational institutions' privacy requirements and legal standards (Huang et al. 2020, 4).

Educators have several key responsibilities when it comes to privacy policies. They must meticulously review the privacy policies and terms of service of each EdTech tool, checking for alignment with data protection laws. This review process includes identifying any discrepancies or gaps in the policies and communicating these issues to the DPO for corrective measures (McDermott et al. 2021, 6; Leatham 2017, 11). Ensuring the clarity and accessibility of these documents is crucial so that all staff members can uniformly implement the data protection practices across the institution.

Data Protection Officers play a supportive role in this process by facilitating educational workshops that help educators effectively read and interpret privacy policies and terms of service. DPOs also address any questions educators may have, enhancing their confidence in using digital tools safely. Furthermore, they ensure that all tools used within the educational setting comply with GDPR and other relevant data protection laws, thus safeguarding both student and staff data (FNAE n.d.).

IT professionals also play a crucial role in the context of evaluating privacy policies in educational settings. They are instrumental in assessing the technical aspects of digital tools, including the security measures employed to protect data. IT professionals work closely with educators and DPOs to ensure that the infrastructure supporting digital education tools meets the required security standards and that any technical vulnerabilities are promptly addressed. Their expertise is essential in interpreting the technical language of privacy policies and ensuring that the digital tools' data handling practices are secure and compliant (PTAC 2025, 2-8).

An effective privacy policy should clearly articulate several key elements, including the specifics of data collection practices, the purposes of data usage, conditions under which data is shared, the measures in place to protect data, and the rights of users regarding their data. These elements ensure transparency and help build trust between the users and the service providers. Moreover, policies must include contact information for users to reach out with any privacy concerns or questions (PTAC 2025, 2-8).

It is essential for educators to be vigilant about potential issues in privacy policies, such as vague language that could obscure the actual data handling practices, overly broad permissions that extend beyond necessary data collection and usage, and a lack of explicit compliance statements with data protection laws like GDPR. Recognizing these issues is crucial for maintaining the integrity of data management and ensuring the safety of digital environments in educational settings (PTAC 2025, 2-8).

Through a thorough understanding and proactive management of privacy policies, educators can significantly enhance the safety and effectiveness of digital learning tools in ECEC settings, ensuring that these tools are not only educational but also secure and compliant with relevant data protection regulations.

2.4.3.1 Common Sense Media

Common Sense Media is an independent nonprofit organization dedicated to helping families and educators navigate the world of media and technology. It provides trustworthy information, education, and an independent voice to foster safe environments for children in a digital age. The organization's initiatives include providing evaluations of media content, such as movies, books, and games, as well as digital tools used in educational settings.

A key initiative of Common Sense Media is the Common Sense Privacy Program, which offers detailed evaluations of privacy policies for various educational technologies. These evaluations are designed to ensure that digital tools comply with stringent data protection laws, such as the GDPR. Engaging with over 400 educational institutions, Common Sense

Media enhances transparency around privacy policies, establishing itself as a pivotal resource in the digital education landscape (Common Sense Privacy Program 2023).

Privacy evaluations are essential in educational settings to safeguard children's privacy effectively. The Common Sense Privacy Program provides educators and parents with concise, understandable summaries of how educational products handle safety, security, privacy, and compliance. This resource is designed to aid in the quick assessment of digital tools, facilitating informed decision-making about their use in classrooms and homes (Common Sense Privacy Program 2023).

The program not only assists in evaluating privacy policies but also promotes educational engagement by providing resources for educators to understand and discuss privacy issues. This proactive approach to privacy education helps prepare both educators and children for a secure digital future, emphasizing the importance of data protection in daily digital interactions (Common Sense Privacy Program 2023).

Backed by privacy and education experts, the Common Sense Privacy Program also offers in-depth research on children's privacy. This ongoing research is a critical asset for educators, providing insights into privacy trends and the effectiveness of privacy protections in educational technology. Such resources are instrumental in keeping educators informed and proactive in managing digital tools within educational frameworks (Common Sense Privacy Program 2023).

While the Common Sense Privacy Program is a robust tool for preliminary privacy assessments, it is crucial to note that it does not replace the formal evaluation procedures mandated by educational institutions or organizations. For example, in municipal daycares, educators are required to submit requests for app approval to their IT departments, adhering to specific organizational protocols. Therefore, this tool should be viewed as a supplementary resource that can aid educators in conducting initial evaluations, providing a foundation upon which formal assessments can be built (Common Sense Privacy Program 2023).

3 Output

3.1 Educational Guidebook

A key output of our study is the creation of an educational guidebook, designed as a crucial resource for educators. This guidebook is crafted to enhance understanding and awareness of ethical digitalization principles, focusing specifically on issues related to privacy and data protection in educational settings. By collaborating with our manager and utilizing

insights gained directly from our workplace, this resource aims to guide educators in assessing and selecting digital tools that align with both ethical standards and pedagogical objectives.

The content of the guidebook is deeply rooted in a comprehensive literature review that underscores the critical importance of robust legal frameworks, including the GDPR and the Finnish Act on Early Childhood Education and Care. These legal frameworks provide a foundational structure for the guidelines, ensuring they adhere to legal standards and address practical needs within educational settings. In addition to the legal frameworks, the literature review extensively covers the areas of privacy policy and data protection, which are pivotal for safeguarding the personal and sensitive information of children in Early Childhood Education and Care (ECEC) settings.

The guidebook is organized into five key sections, each designed to equip educators with necessary insights and tools to responsibly utilize digital tools:

- **Legal Framework:**
 - **Content Description:** Clarifies legal obligations and rights related to digital tools, presented in straightforward language.
 - **Application in Practice:** Uses case studies and real-world examples to demonstrate legal compliance and implications.
- **Data Protection:**
 - **Content Description:** Offers actionable advice on data protection practices.
 - **Application in Practice:** Discusses essential data protection strategies, such as managing third-party vendors and securing personal data, with practical scenarios.
- **Privacy Policy:**
 - **Content Description:** Guides educators on critical assessment of digital tools' privacy policies.
 - **Application in Practice:** Analyzes examples of good, average, and poor privacy policies to illustrate key elements that uphold or violate privacy standards.
- **Using Common Sense Media Ratings:**
 - **Content Description:** Introduces Common Sense Media privacy ratings and their significance in the evaluation of digital tools.
 - **Application in Practice:** Shows how to interpret these ratings through examples, assisting educators in making informed decisions based on the safety and suitability of apps.
- **Table of Apps, Ratings, and Alternatives:**
 - **Content Description:** This section presents a detailed table listing all the apps currently used within your daycare, accompanied by their Common Sense Media ratings.

- Application in Practice: Each app's rating is assessed, and where ratings indicate potential concerns ("warning" or "fail"), alternative apps with better privacy ratings are suggested. This direct application helps educators make swift changes to safer and more suitable digital tools.
- Visual Tools: The table will be clearly formatted and include color-coded ratings for easy reference. Symbols or icons may also be used to quickly signify whether an app passes, warns, or fails according to Common Sense Media's standards.
- Quick Reference Guide
 - Design and Purpose: A one-page quick reference guide, designed as a poster, summarizes the key points from all sections and includes a mini-version of the app ratings table for quick visual reference.
 - Usage: Ideal for quick consultation, this guide can be displayed in staff rooms or kept within easy reach for educators.

Pedagogical Approach Used in the Guidebook

- Storytelling and Scenario-Based Learning: The guidebook leverages a narrative approach, engagingly introducing educators to complex concepts through the adventures of the Guardians of the Digital Yard. This storytelling method is designed not only to captivate but also to make abstract principles more accessible and relatable. Each chapter is crafted around the Guardians' experiences, which mirror real-world challenges educators face in digital environments.
- Interactive Scenarios and Real-Life Case Studies: To deepen understanding and application of the principles discussed, each chapter includes interactive scenarios and real-life case studies that present educators with practical challenges. These components require educators to make informed decisions, reflecting their comprehension of topics such as GDPR compliance, data protection, and ethical digital tool usage. The inclusion of actual cases from various educational settings provides a solid grounding in reality, enhancing the relevance and applicability of the lessons learned.
- Reflection Questions: Complementing the interactive scenarios and case studies, reflection questions are strategically placed at the end of each chapter to prompt deeper thought and individual reflection. These questions encourage educators to consider how the concepts and strategies discussed could be implemented or observed in their own settings. This active engagement ensures that the information presented is not only absorbed but also applied, fostering a proactive approach to digital tool utilization in educational contexts.

Through these pedagogical techniques, the guidebook aims to empower educators with knowledge and skills, transforming them into adept navigators of the digital landscape, ready to guide their children safely and effectively.

Additionally, as part of our ongoing commitment to enhancing the understanding and responsible use of digital tools in educational settings, we have organized a training workshop titled 'Navigate and Educate: Safeguarding Our Digital Playgrounds'. This event is scheduled at the beginning of the new academic year 2024-2025. The workshop is designed not only to share our findings but also to equip educators with practical skills and knowledge to navigate digital tools safely and effectively.

The interactive format of the workshop will involve storytelling to engage the audience, portraying them as guardians facing digital challenges. We will use an interactive quiz to present these scenarios, encouraging participants to explore and discuss optimal solutions. This approach aims to foster a deep understanding and raise awareness about privacy and data protection in educational settings. The session will also offer an opportunity for live feedback on the guidebook's content and usability, which will be invaluable for future enhancements.

3.2 Selection, Design, and Implementation Process

Initial Idea Generation and Stakeholder Involvement:

Concept Origin: The project was initially conceived with the aim of developing guidelines for evaluating educational apps, inspired by the identified needs within our daycare setting and broader educational challenges noted during our literature review.

Manager Involvement: Our daycare manager played a crucial role in shaping the project's direction by highlighting the practical challenges faced by educators in using digital tools, thus steering the focus towards broader ethical issues rather than solely technical evaluations.

Supervisor Guidance: Regular interactions with our thesis supervisor aided in refining the project's scope. The supervisor's insights into broadening the project's impact led us to address ethical considerations more comprehensively.

Preliminary Research and Feedback: Feedback from informal discussions with other educators indicated a significant need for resources that addressed the ethical

aspects of digital tool use. This underscored the necessity for developing a resource that was accessible and immediately applicable to educators' daily practices.

Pilot Testing and Realization:

Conducted a preliminary pilot session to test the initial concept within our daycare setting, leading to insights that highlighted the complexities and challenges in app evaluation.

The pilot feedback, particularly regarding the technical and legal complexities involved, necessitated a reassessment of the project's feasibility and alignment with educators' capabilities.

Adaptation and Collaboration:

Shifted the project's focus to developing a guidebook on privacy and data protection, facilitated by enhanced collaboration with educational stakeholders and guided by continuous literature review.

This phase included brainstorming sessions and iterative feedback mechanisms to ensure the guidebook's content was both practical and relevant.

Refinement and Finalization:

Finalized the guidebook through an iterative design process, incorporating extensive feedback from our manager and other stakeholders to ensure its usability and effectiveness.

Prepared for the presentation at the pedagogical meeting, aiming to introduce the guidebook to a broader audience and integrate it into educational practices.

Table 2: Thesis Development Timeline: Key Activities and Milestones

Month	Goals	Working Method	Key Milestones and Changes
January	Thesis kick-off, Topic analysis	Group meetings weekly, Monthly meeting with manager	Thesis initiation, topic finalized

February	Literature review, Begin guidebook development	Group meetings weekly, Feedback sessions with supervisor	Comprehensive literature review, initial guidebook draft
March	First interim submission, Incorporate initial feedback	Group meetings weekly, Feedback session with supervisor	Submission of first interim report, feedback integrated
April	Continue guidebook development, Prepare for presentation	Group meetings weekly, Consultations with IT Manager, Usability test with work representative	Submission of second interim report, usability test and feedback, guidebook content refined
May	Finalization and presentation, Gather informal feedback	Group meetings weekly, Presentation at meeting	Develop the rest of the chapters, finalize thesis, final adjustments to guidebook based on feedback

3.3 Evaluate the Usability of the Output

The evaluation of the "Guardians of the Digital Yard" guidebook was primarily based on the usability test conducted with Chapter 1, "The GDPR Gauntlet". This test was instrumental in assessing whether the guidebook effectively communicated complex GDPR compliance principles to daycare educators, who are the primary target audience. The feedback obtained was crucial in identifying both the strengths of the guidebook and areas where improvements were necessary.

We selected six participants for the usability test: four educators from within our organization and two from outside of our organization, selected to represent a range of familiarity with digital tools and GDPR concepts. This diversity was intended to capture a broad spectrum of experiences and insights. During the test, participants were provided with a copy of Chapter 1 and asked to read it while making notes on any aspects they found

unclear or particularly insightful. Following the reading session, they completed a structured questionnaire and participated in a semi-structured interview. These interviews were designed to delve deeper into their initial reactions, understanding of the content, and their perception of its applicability to their daily professional activities.

Participants generally responded positively to the narrative approach of the guidebook, noting that the storytelling format made the regulatory information more engaging and relatable. However, the feedback also highlighted some challenges. While the guidebook was informative, participants indicated that some of the legal terms and GDPR concepts could be simplified. They suggested that the inclusion of a glossary or clearer explanations of specific terms would make the material more accessible, especially for those without a legal background.

Moreover, while the case studies and scenarios were appreciated for how they illustrated GDPR principles, educators expressed a desire for more direct examples and actionable guidelines that could be directly applied in their daily interactions in the daycare environment. This feedback underscores a need for the guidebook to not only inform but also equip educators with practical tools and strategies for implementing data protection principles.

Based on the feedback received, several revisions are planned for the guidebook. These include simplifying complex legal jargon, enhancing the visual layout to make the content more engaging, and introducing more practical examples that directly relate to typical daily activities in the daycare setting. The inclusion of visual aids and a more intuitive layout is also expected to improve the overall usability and effectiveness of the guidebook.

This iterative feedback process is crucial for ensuring that the guidebook remains a relevant and useful tool for educators. Regular updates and continued engagement with the users will be key in maintaining its relevance and ensuring it meets the evolving needs of daycare professionals. The ongoing evaluation and adaptation process will help in fine-tuning the content to better serve its purpose and to effectively enhance educators' confidence and competence in managing digital tools ethically and responsibly within their professional settings.

3.4 Illustrate the Connection of the Output to the Knowledge Base and Professional Life

The "Guardians of the Digital Yard" guidebook is an essential tool, meticulously designed to bridge the gap between the theoretical knowledge and practical application of digital tools in ECEC. This guidebook is deeply rooted in the current research on digitalization

within ECEC and is informed by the critical role of digital competence as underscored by the Finnish National Core Curriculum. This curriculum advocates for the integration of digital tools in ways that support educational equality and enrich a broad spectrum of activities including play, interaction, and exploration (FNAE 2022, 23-24).

The Finnish national core curriculum also underscores the importance of educators guiding children in the versatile, responsible, and safe use of digital environments (FNAE 2022, 23-24). However, a significant challenge emerges when educators themselves lack the necessary training and confidence to use digital tools responsibly and safely. This discrepancy raises a crucial question: How can teachers effectively impart digital competence to children if they themselves are not adequately prepared? The guidebook draws upon these concepts, providing educators with concrete strategies and understanding to implement these tools effectively and ethically.

Further, the guidebook incorporates the "Data Protection Guide" developed by the FNAE, a response to legislative reforms including the data protection reform. This guide provides educators with essential insights and strategies to handle digital technologies in teaching effectively, ensuring compliance with stringent safety and privacy standards. It also serves as a professional development tool that enhances educators' understanding of their roles in safeguarding digital environments (FNAE n.d.). This alignment with national guidelines ensures that the guidebook's advice is both authoritative and directly applicable to educators' daily challenges.

Moreover, insights from the Digital Pedagogy Programs in the cities of Vantaa and Espoo significantly inform the guidebook's framework. These programs illustrate comprehensive strategies for the ethical integration of digital technologies in ECEC settings, emphasizing data protection and responsible digital tool usage. By mirroring these municipal practices, the guidebook ensures that its content is practical, directly applicable in educational settings, and grounded in proven strategies.

The inclusion of real-life case studies and feedback mechanisms within the guidebook further exemplifies the connection to professional life. These elements ensure that the content is not only based on abstract principles but is also grounded in the real-world experiences of educators. This approach facilitates the application of GDPR and digital safety principles in everyday educational activities, making the theoretical knowledge accessible and actionable.

The guidebook also addresses the practical challenges highlighted by Hu and Yelland (2019) and others, who note the shift towards a diverse array of digital tools in ECEC and the need for effective implementation strategies that enhance teacher confidence and capability. By incorporating scenario-based learning and interactive elements, the guidebook directly

responds to these needs, offering educators hands-on examples and reflective questions that build competence and confidence in using digital technologies.

In sum, the "Guardians of the Digital Yard" guidebook exemplifies how theoretical research can be effectively translated into practical tools that enhance professional practice. It connects the dots between the knowledge base in digital education and the day-to-day challenges faced by educators, providing a comprehensive resource that supports the safe, ethical, and effective integration of digital technologies in ECEC. This connection not only enriches the professional lives of educators but also enhances the educational experiences of the children they teach, paving the way for a digitally competent and safe future generation.

4 Research Ethics

In developing the Research Ethics section of this thesis, the management of digital tools and data was meticulously governed by a robust cooperation agreement among the thesis team members. This agreement ensured the ethical use of the Bulb platform, central to our research dissemination and collaboration. Key aspects of the agreement included strict confidentiality of login credentials, in line with Bulb's user terms that emphasize each user's responsibility in safeguarding account security. The agreement also restricted the use of the Bulb account exclusively for purposes related to this thesis, thus preventing misuse and ensuring all activities remained focused on the intended research outcomes. Furthermore, it mandated that, upon the completion of the thesis, the account owner must change the account's password to secure any future activities from interfering with the integrity of the thesis data and materials (Laurea University of Applied Sciences 2023a).

A formal agreement with our work representative was instrumental in supporting the operational aspects of the thesis. This partnership facilitated access to necessary resources such as photocopying, mailing, facilities, and expertise in early childhood education and care, which were essential for the effective execution of the thesis. Ethical dissemination of the results was also a cornerstone of this agreement, ensuring that findings were shared responsibly within an established network of educators, policymakers, and researchers (Laurea University of Applied Sciences 2023b). This network engagement was aimed at promoting ethical digital practices in ECEC settings, aligning with the broader goals of our research.

Throughout our research, we maintained a high level of truthfulness and integrity in the acquisition and handling of data, ensuring the accuracy and reliability of our findings. Feedback from informal consultations with colleagues, conducted in line with ethical guidelines, was crucial in refining our research output. These consultations ensured that no

sensitive information was inappropriately disclosed, aligning with our commitment to ethical research practices.

Furthermore, our research activities were conducted in strict adherence to the ethical guidelines set forth by Laurea University of Applied Sciences, closely aligning with the Responsible Conduct of Research (RCR) guidelines updated on September 7, 2023, by the Finnish National Board on Research Integrity TENK. These guidelines, endorsed by the Ministry of Education and Culture in Finland, emphasize research integrity and the ethical management of allegations of misconduct within the Finnish research community.

5 Conclusions and Reflections

This thesis, "From Playgrounds to Pixels: Navigating Data Privacy and Ethical App Selection in Early Childhood Education," has offered a detailed exploration into the integration of digital tools in ECEC. Through our research, we discovered a significant lack of knowledge and skills among educators in using digital tools responsibly and ethically. Educators often struggled with the complexities of digital technologies, particularly in areas concerning data privacy and the ethical use of these tools in Early Childhood Education and Care (ECEC) settings. The specific areas where knowledge gaps were most evident included General Data Protection Regulation (GDPR), data protection, and privacy policy evaluation. These gaps highlighted the need for targeted educational resources that address these critical aspects of digital tool usage.

Our comprehensive literature review helped bridge these gaps by providing in-depth analysis and actionable insights into GDPR, data protection, and privacy policy tailored for ECEC environments. By synthesizing current research and best practices, the review laid a robust theoretical foundation that informed the development of the educational guidebook, making complex regulations accessible and applicable for everyday use by educators.

The development process of this thesis was marked by a collaborative approach that significantly enhanced the quality and applicability of the research outcomes. The iterative feedback and direct involvement of our work representative were instrumental in refining the educational guidebook that formed a central part of the thesis output. This collaborative work underscored the practical relevance of the research, ensuring that the final guidelines were not only theoretically robust but also practically applicable in daily educational activities. Further enriching this collaborative approach, we provided a verbal screencast report, summarizing the feedback and insights gathered from our manager throughout the project. The screencast report is accessible here: <https://eu.bulbapp.com/u/collaboration->

[and-feedback-from-work-representative-e0?sharedLink=3fc9f82b-8263-4de9-becf-584b1f60f1d7.](#)

Our thesis supervisors played an indispensable role throughout the development of this project. Their expert guidance helped us refine our topic and ensure its relevance and clarity. Their assistance in accessing local resources, particularly those in Finnish, was essential for grounding our research in the local context of Finnish ECEC settings. The supervisors' dedication to timely and effective support significantly enhanced our research process, from the initial stages of design to the execution of practical elements such as pilot tests and usability testing. Their willingness to conduct these tests upon request and offer individual guidance meetings allowed for a research process that was not only thorough but also tailored to the specific needs of our project.

Reflecting on our own learning and expertise, this project has significantly contributed to our professional growth, deepening our understanding of the intersection between education, technology, and data privacy and protection. The experience has highlighted the importance of flexibility and adaptability in research, as initial plans evolved significantly in response to stakeholder feedback. This adaptive process not only improved the quality of the research but also enhanced its relevance for real-world applications.

To further enhance the utility and scope of the educational guidebook, it is recommended to expand its content to include modules on cyberbullying prevention, digital citizenship, and the ethical implications of using artificial intelligence in educational settings. This expansion will equip educators with a broader range of strategies and knowledge to address the complex digital landscapes they and their children navigate, promoting safer and more responsible online environments.

Developing an interactive digital platform could significantly enhance the accessibility and effectiveness of the guidebook. This platform should serve as a supplementary resource, offering real-time updates, additional resources, and community support for educators. Such a platform would not only facilitate the exchange of best practices but also allow for dynamic content updates as new challenges and technologies emerge.

Given the evolving nature of digital technologies, further research is recommended to explore the long-term effectiveness of the guidebook and its adaptability to different educational contexts. Future studies could also examine the impact of enhanced digital training modules on educators' confidence and the overall quality of early childhood education.

It is essential to explore the scalability of the guidebook's application across different educational settings and cultural contexts. Adapting the guidelines to various educational

systems and technological infrastructures can help maximize their impact, ensuring that educators worldwide can benefit from the research findings and implement them effectively.

In conclusion, this thesis has meticulously explored the integration of digital tools in ECEC, emphasizing the critical importance of adhering to ethical standards and robust data protection practices. Through the development and iterative refinement of the "Guardians of the Digital Yard" guidebook, this research has provided educators with actionable strategies to effectively and ethically integrate digital technologies into their teaching practices. As digital technologies continue to evolve, this thesis underscores the ongoing need for educators to balance technological opportunities with the imperative to protect and empower young learners. Moving forward, it is crucial that the insights from this research inform future educational policies, guidebook updates, and professional development programs, thereby contributing to the creation of safer, more inclusive, and educationally enriching digital learning environments.

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Figures

Figure 1: Figure 1: Knowledge of concepts related to data protection facilitates the understanding of data protection-related issues (the main texts are translated from Swedish) (FNAE n.d.). 24

Tables

Table 1: Summary of GDPR Compliance Case Studies in ECEC Settings
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Table 2: Thesis Development Timeline: Key Activities and Milestones 32