Bachelor's thesis

Bachelor of Social Services

2025

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Play-based learning for pre-literacy and numeracy in early childhood education

TURKU AMK
TURKU UNIVERSITY OF APPLIED SCIENCES

Bachelor’s Thesis | Abstract

Turku University of Applied Sciences

Bachelor of Social Services

2025 | 46 pages | 5 pages in Appendices

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Play-based learning for pre-literacy and numeracy skills in early childhood education

The intention of this development work was to make a comprehensive analysis of the potential of structured play activities for the development of literacy and numeracy competences and for increasing the learning readiness of the child.

The development work was conducted using a qualitative research approach, incorporating semi-structured interviews, observations and workshops with early childhood educators. Literature reviews of the existing work on play-based learning were conducted to justify the theoretical background.

The Development work resulted in producing an activity guidebook aims to organize play-based activities to pre-literacy and numeracy for early childhood educators. Educators can use the activities to improve active participation, problem-solving and socialization, leading to a more joyful learning environment.

Keywords:

play-based learning, pre-literacy skills, numeracy skills, early childhood education, learning outcomes

Opinnäytetyö (AMK) | Tiivistelmä

Turun ammattikorkeakoulu

Sosionomi

2025 | 46 siuva, 9 liitesivua

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Leikkilähtöiset menetelmät kielellisten taitojen ja numerotaitojen kehittämisessä varhaiskasvatuksessa

Tämän kehittämistyön tavoitteena oli tukea varhaiskasvatusikäisten lasten kielellisten taitojen ja numerotaitojen kehittymistä. Kehittämistyössä käytettiin laadullista menetelmiä. Tiedonkeruussa hyödynnettiin puolistrukturoituja haastatteluja, havainnointia sekä työpajoja varhaiskasvatuksen ammattilaisten kanssa. Opinnäytetyön teoreettinen tausta perustuu leikkilähtöiseen oppimiseen.

Kehittämistyön tuloksena syntyi varhaiskasvattajille suunnattu käsikirja, jonka tavoitteena on tukea kielellisten taitojen ja numerotaitojen kehittymistä leikkilähtöisin menetelmin. Varhaiskasvattajat voivat hyödyntää materiaalia tukeakseen lasten osallisuutta sekä ongelmanratkaisutaitojen ja sosiaalisten taitojen kehittymistä varhaiskasvatuksen oppimisympäristöissä.

Asiasanat:

leikkilähtöinen oppiminen, kielelliset taidot, numerotaidot, varhaiskasvatus, oppimistulokset

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List of abbreviations (or) symbols

ECEC	Early childhood education and care
DAP	Developmentally Appropriate Practices

1 Introduction

This development work is concerned with the implementation of an activity guidebook on play-based learning at Daisy preschool for 5–6-year-old children. The core of this developmental work will be introducing the activity guidebook that is going to serve as a source book for educators in conducting practical plays in teaching methodologies effectively. This introduction includes discussing what this development work is, why it is needed, how the development work is planned to carry out, as well as to address the importance and benefits of employing by play-based learning as indicated by Finnish national core curriculum for early childhood education and care.

This development work is grounded in the assumption that early years are quite critical for a child in terms of his or her cognitive, social and emotional growth. Research has constantly shown that children learn more effectively while they are playing because it enhances imagination, problem solving and social interaction between them (Hirsh-Pasek 2009). Play-based learning becomes less of teaching technique than a whole viewpoint to match the natural tendencies and developmental stages in children. By engaging in meaningful play activities that bring in literacy and numeracy concepts, educators can have a precious environment for learning that helps overall growth and development. This viewpoint is emphasized regarding the significance of play as attached by the Finnish national core curriculum for early childhood education and care. The curriculum encourages an educational framework where play is considered as a core context in which children learn, therefore meeting the developmental requirements of children pertaining with age (Finnish national agency for education 2022, 33–45).

The developmental work that will be associated includes a thorough review of literature related to play-based learning and how it affects pre-literacy and numeracy skills. The literature review will involve pedagogical theories and frameworks that support the legitimacy of play as a mode of learning and activity guidebook. This activity guidebook would serve as a tool for the

educators at Daisy preschool, hence putting into practice the developed understanding through the literature review. The development work will also involve designing and implementing a range of play-based activities that are specifically designed to enhance pre-literacy and numeracy skills together with the guidance of the commissioner.

This development work will be guided by three broad objectives. First, to enhance the understanding of the concept of play-based learning by the educators at Daisy preschool and educate them with the process to practically apply the concept. Second, the development work will seek to provide a structured framework where the play-based activities should be adopted into the education in such a way that the pre-literacy and numeracy skills are developed in a coherent and organized manner. It will finally look at how the activity guidebook has been evaluated regarding the learning outcomes of the children and provide evidence as to how play-based learning is indeed effective in developing essential skills.

The operating environment of the development work is Daisy preschool, a versatile and multicultural learning community located in Varissuo Turku. Daisy preschool is deeply committed to providing quality early childhood education adhered to the Finnish national core curriculum for early childhood education and care. This setting offers a unique opportunity to investigate the practical application of the strategy of play-based learning and the preschool is supportive of an inclusive setup thereby cultivating the confidence of successful implementation of activity guidebook.

This development work aims to contribute to growing literature related to play - based learning in ECEC with a focus on pre-literacy and numeracy. According to this the development work aims to develop an activity guidebook tailored to the needs of educators and children at Daisy preschool to align the teaching practices with Finnish national core curriculum for early childhood education and care focus play as a core part of learning. The results of this will have implications beyond the context of Daisy preschool and will provide valuable information and activities for educators in Finland and elsewhere.

2 Starting points for the development work

2.1 Background and relevance of the topic in ECEC

Play-based education is one of the cornerstones of ECEC promoting overall development in children while laying the foundation for basic skills in literacy and numeracy. The importance of play is clearly stated in Finnish national core curriculum for early childhood education and care which highlights for children play is central in well-being and learning and supports emotional, cognitive, social and physical development. (Finnish national agency for education 2022, 35). The curriculum further highlights that the play-based method is a means by which children explore and bring meaning to their world, setting a very firm foundation for further learning and later academic success (Finnish national agency for education 2022, 33–45). This in turn makes play nothing less than a medium of learning and an efficient pedagogical approach in early education settings also prepares the children for the schooling life (Hirsh-Pasek 2009,15).

The developmental work is a pedagogical response to the need for improving pre-literacy and numeracy skills in children aged 5-6 years through play. Although curriculum is quite indicative with respect to the value of playing, there are many practical issues on how educators will offer structured activities that are appealing yet focused on skill development (Pyle & Danniels 2017, 2). This develops a gap in practical tools that meet the curriculum goals while addressing unique child developmental needs. This development work has been developed to support educators in designing and delivering play-based activities that foster literacy and numeracy skills, while maintaining a child centered approach.

Early childhood has been considered as a very crucial period in cognitive, social and emotional development (Bodrova & Leong 2007, 111). Therefore, strategies of play-based learning should be implemented holistically. Play-based learning nurtures creativity, problem solving, and collaborative interactions relevant to developing pre -reading, writing, and mathematical

reasoning abilities (Saracho 2017, 6) and that are adopted with this thesis. This development work adopts theoretical frameworks such as sociocultural approach so that could align with the goal of learning that aims on child centered, development. Hence, this resource helps the educators connect the theory to practice in achieving quality and consistency of play-based learning in early childhood education settings.

2.2 Development environment and the commissioner

This development work will be completed at Daisy preschool an English daycare, a multicultural early childhood education and care setting that takes in children aged 5-7 years. The Finnish national core curriculum for early childhood education and care 2022 guides it (Daisy preschool 2016). Therefore, it focuses on child-centered and play-based to assure development in the child. There are two groups of children aged 5-6 years overlooked by two preschool educators. The educators work hard to create an environment which is safe, inclusive and committed to fulfilling the learning requirement of children.

The commissioner of the thesis is the lead educator responsible for leading the 5-6 age group at Daisy preschool. She is an experienced and qualified professional who has wide expertise in early childhood education and pedagogical leadership. They play a very important role in mentoring educators, designing educational activities, and following the curriculum objectives (Daisy preschool 2016).

The purpose of this development work is not only to enhance pre-literacy and numeracy skills of children with play-based learning but also, it tries to provide the learning educators with insights and strategies that will help educators to continuous implementation of play-based pedagogical activities corresponding with the objectives of the curriculum, along with serving the developmental needs of all children.

These names are not revealed for confidential reasons. The commissioner has agreed to take the role of contact person and provide the necessary guidance

and feedback so that the developmental results of the thesis will be practical and effective. The development work will contribute to raising the level of quality in the play-based learning practices at Daisy preschool in regard to the identified gaps.

2.3 Development needs and the development task

The developmental work aims to design a practical activity guidebook to support early childhood educators in implementing playful strategies to enhance pre-literacy and numeracy skills in 5–6-year-old children. The activity guide will be developed in line with the principles of the Finnish national core curriculum for early childhood education and care 2022, with consideration of children's developmental and pedagogical needs. This development work, therefore, tries to bridge the gap between theoretical guidelines and their practical implementation in early childhood education settings by focusing on structured yet flexible pedagogical activities.

The development task is to develop a digital activity guidebook comprising play-based pedagogical activities that are relevant, inclusive, and engaging for age appropriately. The activities will be representative of major aspects of pre-literacy, like letter identification, phonemic awareness, and basic numeracy skills related to counting and problem solving. Activities will include descriptions of how they can be modified to meet needs associated with diversities in student learning styles and abilities. The guidebook will also be instrumental in pointing out how these activities promote holistic development, such as fostering creativity, collaboration, and critical thinking.

To the commissioner, this is a wellspring of improved practices within their organization. The activity guidebook will provide ready-to-use materials and approaches through which educators can establish meaningful learning opportunities while maintaining alignment with curriculum goals. The resources further the commissioner's larger initiatives in promoting equitable and high-quality early education by ensuring that young children develop the foundational

competences to achieve academically and socially. In this way, the development work contributes to continuous development for teaching methods and the education surroundings in early childhood education settings.

3 Play-based learning as a foundation for pre-literacy and numeracy development

3.1 Role of play in early childhood education

Play is an integral component of early childhood education. It is one of the core media through which children make their explorations, learning, and skill development. Also play-based learning helps children to develop cognitive, social, emotional and physical development. Children, through structured and unstructured play, tell stories, and manipulate objects to lay a foundation in language development, pattern recognition, and mathematical thinking (Fisher et al. 2013, 2).

This approach is in line with the Finnish national core curriculum for early childhood education and care, which emphasizes that the core of every child's early learning is through playing. The curriculum stresses that play-based learning fosters children's well-being, including such aspects as cognitive, emotional, social, and physical development (Finnish national agency for education 2022, 37–45). It fosters the creation of inclusive environments in which children take initiative in the processes of their own learning. A principle of child-centered method from the curriculum, through which children have opportunities to take part in planning and implementing activities. This indeed fosters creativity, collaboration, and engagement in pre-literacy and numeracy experiences.

Finnish legislation, through the early childhood education and care Act 540/ 2018, has created a legal system that supports the quality of early education for all children. In the act, the principles of equality, inclusion, and participation are kept, and role of the play-based method is emphasized in health development (act of early childhood education and care (540/2018)). It prescribes developmentally appropriate approaches that ensure the acquisition of foundational skills in pre-literacy and numeracy in balanced and friendly learning conditions. The act also highlights the collaboration of educators with

families while children's cultural and linguistic diversities are at the heart of their experiences (act of early childhood education and care (540/2018)). The act has ensured that teaching strategies are matched with children's developmental needs, compelling early childhood educators to train properly in play-based methodologies that foster response and assure equitable and inclusive early education to diversified needs of children and families.

Jean Piaget established the stages of the different types of play that develop the cognitive and academic skills of children. Sensorimotor (functional) play (0-2), existing among infants and toddlers, is sensory exploration with repetition of movement that lays the foundation of later numeracy and literacy skills. Activities of block stacking, shape and size sortation of objects, texture exploration enhance mathematics thinking and sense of space (Gregg 2021, 3). Pretending play (ages 2-7) is crucial to the learning of language and literacy skills. Role playing and storytelling by the children enhance vocabulary acquisition, comprehension, and storytelling skills steppingstone to reading and writing (Singer & Singer 1990, 45–64).

Constructive play between the age of 3 to 7 years of age, involves puzzle work, block construction, and patterning with objects. These are the activities that enhance problem solving skills, hand eye coordination, and numeracy concepts at the introductory levels e.g. counting, measuring, shape recognition (Saracho & Spodek 2003, 69–75). Children older learn the skill of playing with a set of rules, facilitating the skill of thinking ahead while also enriching concepts of mathematics like addition, subtraction and probability (Bjorklund & Pellegrini 2002,1693–1695).

Piaget's theory highlights that play is not only to enjoy but also helps with cognitive development as tool which helps children move from stages of learning. Play-based learning in early childhood education improves cognitive skills by enhancing problem solving, creativity, and memory skills. All these skills are important for pre-literacy and numeracy. Children improve their social emotional skills through play as it provides an opportunity for children to practice communication, interaction and self-regulation, which also contributes

to ability in engage rich literacy and mathematical discussions (Whitebread et al. 2017, 6–40). Physical development, especially through movement-based play, strengthens fine motor skills which is essential for writing and numeracy. Language and communication abilities are enhanced by storytelling, role playing, and interactive reading, develop phonic awareness and comprehension (Suggate et al.2021, 2–4).

Research suggests that numeracy and pre-literacy skills are best acquired by children if learning is experientially oriented and play manner rather than formal way. Social dramatic play is the way to develop the skills of story making that support the understanding of reading and the organization of narratives (Van Oers & Duijkers 2013). Engagement of children with mathematical play results in the acquisition of a greater sense of number and problem-solving skills compared to the acquisition of repetition memory (Sarama & Clements 2009).

3.2 Development of pre-literacy skills

“It is much easier for a child to become an early reader if he has enjoyed being an emerging one and feels confident with his growing skills” (Miller and Almon 2009, 34)

Pre-literacy skills offer the foundation for future literacy skills that comprise of phonological awareness, vocabulary development, and print awareness. Phonological awareness defines how children possess awareness of sound in oral words, for e.g. segregation of words by sound or combination of sound rhymes that facilitate decoding of words as well as decoding of word structure (Anthony & Francis 2005, 255). The ability to break up and combine sounds into meaningful units is also linked to children’s achievement within reading acquisition.

Building a solid vocabulary is vital for literacy proficiency since it helps in understanding and the ability to map words to symbols in print (Marulis & Neuman 2010,300). Children with more vocabulary have more advantages in reading fluency and comprehension, while vocabulary acquisition occurs

through explicit teaching, talk, and experience with rich language events such as stories, conversations, and oral readings (Biemiller 2003, 323–335).

Print awareness encompasses letter familiarity, text awareness of direction, and awareness of oral to written word correspondence (Lütfiye Coşkun 2023, 211). Kids with good print awareness have higher probability of enjoying reading, recognizing words, and mastering reading proficiency (Zucker et al. 2009, 62–66). Proficient reading and writing require integration of language skills and decoding skills (Castles et al. 2018)

Research has proven that learning through play is an effective tool through which pre-literacy skill acquisition is promoted. By playing, children have a dynamic, interactive environment where meaningful experience is promoted that stimulates literacy skills (Zigler et al. 2006,31). Play-based activities promote expression, language imitation, and communication, each of which is important to develop confidence in verbal and written language (Neuman & Dickinson 2011, 28–29). By playing, children have an opportunity where phonological awareness is built through singing games of rhyming, playing word games, and playing games of manipulating sounds (international literacy association 2019, 3).

Furthermore, play- based learning environments are shown to enhance children’s academic achievement by exposing them to language rich environment that improve vocabulary and print awareness. Children brought up in rich language interactive environments have superior reading proficiency and academic achievement (Weisleder & Fernald 2013, 2).

Incorporating storytelling, singing, and other activities that are full of literacy within play-based learning enables children to establish phonemic awareness and other pre-literacy skills that matter. While engaging in these activities, children learn to understand the form of language, learn new vocabularies, and learn how to use print conventions early on. Such early childhood teaching that makes using play as a valuable means of building up literacy has been shown to improve children’s skill levels concerning identification of letters to sounds,

and ultimately fluency of writing and reading (Mol et al. 2009). Play-based learning also creates avenues through which children can learn social emotional skills that can contribute to self -regulation, cooperation, and problem solving, key determinants of success within school and overall development.

3.3 Development of mathematical skills

Numerical sense, counting, and basic arithmetic in the earliest years of children are considered major mathematical fundamentals contributing to cognitive development and academic achievements. Number line theory has been theorized to suggest individuals' mental representation of numbers on a straight-line scale, such that they can understand size, order, and relative distances between numbers (Siegler & Opfer 2003, 237). It is also evident with children's mathematics abilities and their competence with numbers being improved when their knowledge of numbers' understanding is enhanced through number line tasks (Booth & Siegler 2008, 1016).

The constructive theory, drawing on Piaget's theories, highlights that child acquiring knowledge from exploration experiences and interaction with individuals (Clements & Sarama 2014, 3–5). According to this perception, mathematical concepts initially emerge from interacting with objects and peer and adult conversations. Play-based learning has been widely accepted as being one of the best methods of developing mathematical skills in the early years. Objects manipulating skills reinforce children's understanding of numbers, counting, spatial understanding, and geometric knowledge (Clements & Sarama 2014, 3–5). Problem solving, measurement, and concepts of balancing naturally develop from solid material exploration, e.g. use of cardboard, shells, tires, sand etc. (Cankaya et al. 2023, 2). Research has revealed counting and sorting games' contribution towards developing numerical fluency, identifying patterns, and classification skills, closing the gap between mathematical understanding and real experience (Ginsburg et al. 2008, 4–5).

Guided play, a pedagogical approach combining the benefits of free play with systematic scaffolding from adults, has been shown to foster greater early knowledge of numeracy (Ndabezitha & Gravett 2024, 1-2). Guided play provides a positive setting for children's mathematical discovery with scaffolding from adults, extending their understanding of concepts (Clements & Sarama 2014, 4). Adults can promote children's learning in a purposeful and playful way, with key mathematical concepts being introduced and established by considerable interaction (Zosh et al. 2022). The flexibility and social setting of guided play promote foundational and academic knowledge with a specific benefit for numeracy (Zosh et al. 2018, 3).

Manipulatives play a significant role in setting the foundation for mathematical knowledge in early years. Activities involving the use of mathematical games and puzzles and blocks establish the foundation for mathematical and spatial knowledge (Clements & Sarama 2014,124). Toys for example, facilitate children's knowledge of spatial concepts, symmetry, and pattern and problem solving and shape identification abilities with the use of puzzles (Luen et al. 2024, 3–4). Board games involving counting and dice rolling mechanisms facilitate the identification of numbers and one to one correspondence, reinforcing elementary mathematical abilities (Ramani & Siegler 2008, 656). Research has proved that the use of manipulatives in interactive settings for children enhances their ability for understanding mathematical concepts, and learning becomes engaging and meaningful (Montague Smith et al. 2017, 19)

The integration of teacher guided and play-based approaches of teaching mathematics in the early years strengthens mathematical problem solving and mathematical fluency and fosters the strengthening of positive mathematical skills. The approaches emphasize the relationship between individual exploration and teacher guided play, and this ensures children achieve sound mathematical skills. The approaches emphasize teacher guided and children's independent exploration, and the result is children with firm mathematics foundational competences (Sharif-Rasslan & Hassidov 2022).

3.4 Educator's role and support

Educators play a significant role in the formation of mathematics and literacy skills during the early years through offering rich, supportive, and developmentally appropriate settings. High quality early education depends upon educators who prepare and make available high-quality opportunities for exploration, problem solving, investigation, and interaction (Phillips & Boyd 2023, 3). In support of the sociocultural theory by Vygotsky, the cognitive advancement of the child strongly depends upon interaction and the support from individuals possessing superior knowledge, including educators (Mcleod 2024, 2–6) This understanding highlights the need for educators to provide scaffolding for the child's learning through supported activities and guided activities for the advancement of numeracy and literacy skills (Clements & Sarama 2014, 4).

A key theory supporting early childhood education is developmentally appropriate practice which is based on child development and the nature of child learning. DAP underlines the importance placed by practice in education upon the appropriateness for the child's age, their individual need, and their culture (national association for the education of young children, 2020). Educators can apply DAP for informing the structure of child led activities for engagement and the child's education. This could involve activities planned for the child's level of development, where the skills for numeracy and literacy can be introduced through fun and accessible ways.

By adopting child-lead practice, the educator observes the child's interest and introduces relevant opportunities for the child to build upon their knowledge pre-literacy and numerical skills through play. Play supported learning allows for pre-literacy by offering opportunities for the child to experiment with the boundaries of the word, storytelling and symbolic expression through the word (Whitebread 2012, 22). Secondly embedding mathematics into day-to-day activities like use of the word for the story, building blocks, and pretend has also been proved to enhance the child's knowledge about the concepts supporting

mathematics (Clements & Sarama 2014). Educators enable this by raising open-ended questions, offering Mathematical words, and encouraging problem solving skills (Miller and Almon 2009,51).

Moreover, the practice of the social pedagogue extends beyond cognitive advancement towards prioritizing the child's emotional and social wellbeing. Social pedagogy is supported by a pedagogy that prioritizes providing overall care including education, society where the child is secure, valued and empowered within their setting (Eichsteller 2009, 59–60). Educators work alongside the social pedagogue providing inclusive and engaged pedagogy through the child's spontaneous processes for knowledge and learning (Cliffe 2024). This is proven by Bronfenbrenner's ecological systems theory where the child's interaction with their environment is crucial for their advancement (Tudge et al. 2009, 57).

Social pedagogues also promote the establishment of resilience and emotional development by setting the setting for trusting relationships, respectful relationships, and belonging (Cameron & Moss 2011). It is shown that Children establishing strong skills for regulating their emotions through good relationship which also closely connected to improve their academic learnings and problem-solving skills (Denham et al. 2012,133). By combining social emotional intelligence with pre-literacy and numeracy, social pedagogues work towards closing care and educational gaps in an ECEC environment.

Collaboration between the educators and the social pedagogue enhances the quality of early childhood education through the facilitation of inclusive, culture responsive, and child responsive learning environments (Cliffe 2024, 3–4). This collaboration ensures the laying of strong foundations for a lifetime of learning by nurturing curiosity, developing confidence, and forming the right attitude towards studying and being social (Cliffe 2024, 3). By bringing balance through child-led exploration and guided pedagogy, the educators and the social pedagogue collectively empower the child for future achievements in education.

3.5 Play activities and child's cognitive development

Neurosciences have long confirmed the role of play in brain function, particularly in areas responsible for language development and math capabilities. Play is not a leisure activity alone. It actively engages in a variety of processes of thinking, shaping neural networks that contribute to development and learning (Yogman et al. 2018, 2).

Research has also identified the engagement of multiple brain regions for the function of planning, decision making, and problem solving. These executive functions form the basis for cognitive flexibility, work memory, and the capacity for self-regulation, all being fundamental for the formation of early numeracy and literacy (Diamond, 2013, 153–155).

Neuroimaging research also reveals that brain areas involved in language development and language processing and become maximally activated in pretend play and storytelling (Lillard et al. 2013). Pretend play and narrative story motivate children to experiment with language, develop vocabulary, and towards developing emerging reading and writing skills in them. Pretend play also shapes social language, and children become skillful in language processing and language production in meaningful settings (Yogman et al. 2018, 2).

Spatial play and problem-solving activities engage the parietal cortes, the brain region for understanding quantities and math problem solving. Problem-solving skills and awareness about space are enhanced through activities like block building, sorting shapes, and pattern recognition (Verdine et al. 2017,1870). These activities lay the foundations for math. Children also learn about quantities through them, perceive relationships between quantities, and establish core arithmetical abilities (Mix et al. 2002).

Moreover, play is a vital component in the brain development during early childhood, actively engaged and building upon the brain connections relevant to mathematics and language. Integrating the use of playful education

methodology during the formational stage can strongly support cognitive development, laying the solid groundwork for future academic achievement (Hassinger-Das et al. 2017, 10).

4 Implementation of the development work

4.1 Development process and development methods

The development work began when we first met the commissioner and decided on a topic. When choosing a topic, it is recommended to consider whether it would motivate the author (Creswell 2009, 39). During the first meeting we realized that the commissioner is truly fascinated by play-based learning and suggested we can provide a guidebook which contains play-based pedagogical activities for pre-literacy and numeracy. The development process followed linear models, and it progresses in well-defined stages, ideation, planning, execution, output, and finally evaluation and decision making. (Salonen et al. 2017, 52).

Following the linear model of development the first step was the determination of the goals of the work on development (Moilanen et al. 2022). The primary goal was to create a practical and user-friendly activity guidebook to promote pre-literacy and numeracy. The goals were developed through discussion with the commissioner and examination of current education within early childhood setting. After setting the goal a thorough literature review was conducted to find out current practices and theories in play-based learning and early childhood education. We were able to find plenty of literature related to the topic. This also consisted of studying applicable frameworks such as Early childhood and care act and Finnish national core curriculum for pre-primary education. Understanding of these theories is required for informing planning and content of learning interventions (Richey & Klein 2005, 28).

After the product of the development work and its approach is decided it is time to plan the methods that we are planning to utilize to support the development (Ojasalo et al. 2015, 104). Accordingly, we moved to the planning stage, and in which we planned to first conduct focus group discussions but due to some difficulties in gathering all the educators at one table we changed our idea. Therefore, **semi-structured interviews** were conducted with four educators.

Semi structured interviews are good in a scenario where the purpose is to gather comprehensive information about what people truly think about the given topic field (Moilanen et al. 2022). These interviews provided valuable insights on how the guidebook must be developed to be effective and easy to use. Bringing together the literature and insights gained from interviews was extensive. To address this, the content was methodologically brought together, and only the most relevant activities included in the guidebook.

The execution process involved developing the guidebook content, balancing theoretical views and practical application. It was clear for the us that activities needed to be engaging, adaptable, and developmentally appropriate to early childhood environment. By this time, we designed a rough version of the activity guidebook including 10 pedagogical activities for pre-literacy and 10 for numeracy. We were able to give due consideration to the requirements laid in the Finnish national core curriculum for pre-primary education. After having the initial version of the guidebook, we moved to the next development method which was to conduct pilot activities.

Pilot activities in preschool classrooms were employed to test the guidebook's practicability, namely, to establish the ease of following the instructions and performing the activities. One member of the development team carried out two activities for pre-literacy and numeracy and the other member with three educators continued with observation. The aim of observing was to get a clear understanding of the applicability of the guidebook activities in real world setting as a third party. Observation can start off being in a setting as a stranger (Moilanen et al. 2022). We sought feedback from the educators regarding the guidebooks' clarity, flexibility and usability, and amendments were made where necessary. The second version was then shared with educators for additional feedback.

Finally, the process was concluded by evaluation and decision making in which we utilized our last developmental method. The **workshop** was conducted in which educators discussed the usability and feasibility of the final version of guidebook in real classroom settings. A workshop is a place for generating,

refining and applying ideas. It is an interactive setting in which individuals learn, gain new insights, and engage actively in problem-solving and innovation on a topic. (Ørngeen & Levinsen 2017, 70). The workshop session provided solid insights into how educators used the activity guidebook and also the problems they faced. They also provided insight into how it could be made even better.

One of the essentials features of development work is that it is evidence or research-based knowledge (Salonen et al. 2017, 60–61). The iterative nature of the development process ensured that the completed guidebook was research informed but practice driven. By combining literature, professional knowledge, and practical pilot, the development outcome guidebook was structured but flexible, with a mission to build pre-literacy and numeracy skills through play-based learning. The guidebook aimed to give back to Daisy Preschool.

Throughout the process of developmental work, we adhered to the principle that theory-based development is not guided by theoretical goals but by practice-oriented goals supported by theory (Moilanen et al. 2022). Our primary goal was to create a user-friendly guidebook for educators rather than a theoretical document. The process of developing started with the identification of the driving reasons behind it. The ultimate goals were to contribute positively to working life through empowering educators with a useful tool for promoting the learning of children through play (Moilanen et al. 2022).

4.2 Phasis and schedule of the development work

Development was done through a structured process with well-defined phases. Ideation, planning, execution, output, evaluation, and decision making (Salonen et al. 2017, 52). The process started in December 2024 with the commissioner and the selection of the theme. The following month was used for literature review, planning session consisted of finalizing the developmental methods. Following that conducted semi-structured interviews and gaining insights from educators. Following these practical suggestions, we moved into the execution phase where the writing of the guidebook was tested within preschool

classrooms. The final version was refined based on feedback collected through a workshop with educators. The table below indicates the phases and timeline of the process.

Time	Development work	Actors	Methods	Outcome
12/2024	Topic selection & ideation	Commissioner	In person	Development work topic
1/2025	Verbal agreement	Commissioner	Physical	Agreement confirmed
1/2025	Literature review		Reading	Theoretical basis for the guidebook
1/2025	Planning & approval	Commissioner Supervising teacher	Email	Thesis plan
2/2025	Drafting interview questions	Supervising teacher	Email	Interview questions
2/2025	Conduct interviews	educators	Interview	Collected data
2/2025	Data analysis		Analysis	Structured data
2/2025	Guidebook outline		Drafting	Content framework
2/2025	initial guidebook draft		compilation	First version
2/2025	Conducting the pilot activities and collecting feedback	Educators	Practical implementation and feedback collection	Observation and feedback
2/2025	pilot activities & feedback	educators	Implementation & observation	Collected feedback
3/2025	Guidebook revision		Refinement	Updated version
3/2025	Workshop & feedback	Commissioner and educators	workshop	Collected feedback
3/2025	Final guidebook refinement		adjustments	Finalized guidebook

4.3 Results of the data obtained

When analyzing the results of the **semi-structured interviews** it was clear the need to employ simple instructions to facilitate ease of use and accessibility. A pastel color scheme was favored to have as the guidebook will be more visually appealing and eye catching for users. It was suggested to include pictures and clear instructions to enable understanding. To make the guidebook effective in varied educational environments, modifications were recommended to suit various learning styles, with more flexibility in implementation. Educators recommended to have adequate number of pedagogical activities in the guidebook, and it was also suggested that the materials should be needed for those have to be available within the preschool context.

The **pilot testing** of the activity guidebook in the preschool setting was highly interactive and effective in building skills in children. Ten out of eleven children stated that they enjoyed it, particularly in visual aid and hands-on activity. It was notable that these activities had a positive impact to improve pre-literacy skills like recognizing phonic sounds, letters and numeracy skills like counting, simple additions and subtractions. Some children, however, required additional assistance in following directions, with indication for differentiated instruction. Educators provided general positive feedback regarding the easiness to incorporated in daily routines with two finding it very easy to integrate and one having neutral comment. Social interaction and teamwork were also increased, with two educators said deeper peer interaction, while one recorded moderate levels of teamwork. The activities encouraged teamwork and collaborative play, with children developing good relationships with peers. Educators confirmed that the guidebook is highly effective in helping pre-literacy and numeracy skills. Some areas for improvement were recorded, such as time constraint in preparation for activity, with flexibility in scheduling emphasized. Educators also suggested the inclusion of praise and frequent encouragement to enhance children’s interaction and learning process.

The feedback received during the **workshop** indicated that the guidebook was highly acceptable, with very little in terms of suggestions for improvement. All educators grade it a usability level as high citing that it was very easy to use. They described the instructions as easy to understand and follow but advised that activity information be summarized into two pages for ease of reading. Design and layout were commended as visually appealing and well laid out, with easy navigation. While references were in the initial presentation were not checked, educators stated that they would need them if necessary.

The flexibility in the use of the guidebook was another key finding. Educators appreciated the flexibility in the activities in the guidebook, which made it simple to adjust according to the various learning needs. Materials for implementation were within their preschool environments, so procurement was unnecessary. The flexibility incorporated in the guidebook made it simple for educators to adapt to the activity according to various cultural and linguistic needs.

4.4 Development work output

The outcome of our development work is an activity guidebook for play-based learning, which is designed to support early childhood educators in the facilitation of the development of 5–6-year-old children's pre-literacy and numeracy skills. The guidebook is written in the form of a structured but adaptative framework, with stimulating and interactive activities that establish the foundation for learning through play.

The guidebook begins with an introduction, description regarding the frameworks, ten pre-literacy and ten numeracy activities. Each with a clear breakdown of materials needed, step- by -step procedures, and suggested adaptations to cater to different learning styles and abilities. Activities are created to stimulate children's curiosity, cooperation, and problem-solving abilities while helping the identification of letters, awareness of phonics, accuracy in counting, and simple mathematics. Integrating visual pictures into each activity and external links to related sources are also provided in the

guidebook to make it easy for educators to get extra materials and sources. This way the guidebook is an accessible and valuable resource for use by educators to incorporate meaningful play-based activities into diverse early childhood educational settings.

The guidebook is in digital format, but those who are willing can print it and use it. For instance, Daisy Preschool educators are interested in having a hard copy with them. Some of the activities have been extracted from external resources and at the end of the guidebook the list of references mentioned to make sure the fulfillment of copyrights also pays due gratitude to original inventors.

5 Evaluation and discussion

5.1 Evaluation of the implementation and development work output

The evaluation of development work is an ongoing process that happens not only at completion but also while it is being carried out. This involves stopping, evaluation and moving (Salonen et al. 2017, 53). Throughout this development work, we continuously monitored the progress, timeline, and our effort to determine that the implementation proceeded as planned and made sure it is well aligned with the objectives we set. One of the most important tasks during this implementation was to determine the effectiveness of the chosen play-based activities for enhancing pre-literacy and numeracy skills. The activities we chose according to their pedagogical value and applicability into the needs of early childhood educators.

During the development phase, we carefully thought how well the chosen activities achieve the desired learning outcomes. Since play-based learning needs flexibility, we questioned ourselves whether the activities could be easily implemented in different early childhood education settings also whether it can support with children's involvement and skill progression. Conversation with educators and observations provided valuable feedback on the applicability of the activities. We also made the guidebook structure and instructions simple and easy to follow for educators who may have different levels of experience with play-based learning.

The implementation stage proceeded as planned with minor changes. To ensure the efficiency We tested few activities in the guidebook wile finalizing the content. We also evaluated the guidebook with educators in the preschool including the commissioner to justify the pedagogical appropriateness of activities. Their feedback ensured that the activities were practical, entertaining, and appropriate for different educational environments.

In refining our development work we carried out pilot activities to assess the efficiency of the guidebook. Observations received from one of the development

members and educators provided us with useful insights regarding the usability and also validity of the activities. Moreover, getting direct but casual feedback from children in a way of their engagement and responses to the activities made us know the effectiveness of the activities in terms of enhancing pre-literacy and numeracy skills. These methods allowed refinement as needed, so that the activity guidebook would be a usable resource for early childhood educators.

The final version of the activity guidebook succeeds in its objectives by being user friendly, clear and a practical resource for early childhood educators. The activity guidebook forms activities in a logical manner, with appropriate visuals and clear information about implementation, that makes it simple for educators to select and adapt activities to the needs of children.

From our perspective, the development work produced an effective and useful activity guidebook that bridges theory and practice. Throughout the process, we remembered the effectiveness of the activities by being flexible, interactive, and instructive. The guidebook is not just a list of activities but a tool for inspiring educators to implement play-based learning in a systematic and flexible manner.

The commissioner provided valuable feedback during evaluation process and appreciated the guidebook's practicality to early childhood education practice with the activities maintaining the focus of play-based learning also being child-centered in design. The commissioner appreciated the activity guidebook's flexible structure, which allows educators to modify activities to children's levels of learning.

Even though the guidebook is completed, there is room for future improvements like Increasing the number of activities, adding digital resources and methods to further differentiated instructions could further enhance effectiveness. Including thorough data about theocraticals would provide educators a clear understanding of the ideas behind the activities. Overall, this development work has been a worthwhile experience of combining literature, pedagogy and

practice. The guidebook is a practical resource to support children's early literacy and numeracy skills through rich, play-based learning experience.

5.2 Ethics and reliability

When conducting development work developer must follow good scientific practice that is development work ethics. The ethics of development work involve following general rules in relation to educational institute, the development target, the commissioner and other stakeholders. The developer must follow ethically appealing data collection and development methods that have been approved by the scientific community. This is the meaning of good scientific practice (Vilkka 2021, 41).

When working in an early childhood education environment with professionals and children, ethicality is something important. The competencies of a Bachelor of Social Services in early childhood education emphasize ethical competence in early childhood education. In line with this we ensured children's safety, participation, equality, and equity to adhered with ethical competency.

During our development work on play-based learning for pre-literacy and numeracy skills we were given due consideration to ethical and also reliability aspects. We ensured that our work was adhered by the guidelines of the Finnish code of conduct for research integrity and ethical guidelines for thesis writing at university of applied sciences. Moreover, we maintained transparency, fairness, and confidentiality throughout the process. Since the development work as students conducting in an educational setting, we identified the potential conflicts of interest, mainly due to one of the development members' professional backgrounds with the educational setup including previous training experiences in the preschool setting. Conflicts of interest occur when the author has a relationship with the people, place and the topic (Arene 2017, 8). To maintain objectivity, the relevant we maintained a clear separation between our role as an educator and a development worker, ensuring that our observations and conclusions were unbiased. We consulted our thesis supervisor and

commissioner to validate our developmental methods and output. By being transparent about our role and avoiding any personal influence on the decision-making process.

Before initiating our development work, we studied relevant literature on ECEC, child development, and pedagogical methods as this made sure we have a thorough understanding about the development topic, and it is required to be familiarized with the topic to execute the development work. We studied the relevant literature and obtained professional opinions from the field to ensure our development work is reliable and ethical. From an ethical perspective it is recommended development team to be through with the subject and the methods (Arene 2017, 8). The reliability of our development work ensured by choosing credible sources and consulting educators at every step of the process.

One of the key features of human research is that it is needed to voluntary and informed participation (TENK 2023). To ensure with this aspect we obtained necessary consent from all the participants, including the educators in the preschool, parents or guardians were informed when necessary. We made the purpose of the development work clear to the participants and the use of data collected and guaranteed to maintain the privacy of the participants. The data gathered through interviews, feedback and observations was stored securely with limited access to connected participants and we also ensured the data gathered was used for academic and professional development purposes and do not share beyond the scope of development work. (Vilkka 2021). Moreover, the anonymity of children and educators participating is strictly maintained and we made sure sensitive data is handled responsibly (Vilkka 2021).

We maintained ethical standards by being honest, transparent, and diligent in every possible way (TENK 2023). We followed ethical development standards for development work with human subjects, maintaining the rights and well-being of the participants also frequently consulting with supervising teachers and attached preschool educators to ensure our development work was within best practices in ECEC setting. Since our work involved involvement of small

children, we recognized the necessity of being additionally ethically cautious (TENK 2023). Nevertheless, our development work did not require any sperate ethical review we ensured activities were developmentally appropriate, safe and adhered with Finnish national core curriculum for pre-primary education. We collaborated with early childhood professionals and educators to make sure all activities were conducted ethically and inclusively and avoided any step that could place children at risk or make them discomfort.

In planning and throughout the execution of our development task, we were especially careful to guarantee the reliability, completeness, and correctness of reading sources and citations to give the best possible outcome. Precise and detailed references are characteristics of adherence to good scientific practice (Vilkka 2021). When selecting sources, we were careful to observe their year of publication to ensure that the findings are most up to date.

By applying these ethical principles to our development work, we were able to carry out the task in a responsible manner, protected the rights of the participants, and ensured the integrity of scientific research. This way we were able to validate reliability and contributed to the ethical advancement of play-based learning activities in early childhood education.

5.3 Professional development

The development process has been a major turning point in our professional growth as a future social pedagogue in early childhood education and it has played a significant role in our professional competencies and identity. Through the process we developed a better understanding of play-based learning, child-centered pedagogy, and the role of the educator including social pedagogues in ECEC as a facilitator of children’s development. Our development task was to design and implement play- based activities that support pre-literacy and numeracy which we considered the diversity of children, and this is aligned with the competencies outlined for social pedagogues in ECEC such as the competency to plan developmentally appropriate leaning setup, facilitate

children's overall development, and cooperate with professionals (SOAMK 2023).

Social pedagogy mainly focusses on an overall development to education with children's well-being and participation (Cliffe 2024). Being capable of creating inclusive and caring learning settings that promote children's well-being, growth, and development is one of the most significant competences of a social pedagogue in early childhood education (SOAMK 2023). Throught our development work, we gained the ability to monitor children's playing behavior, assess their development needs, and design activities that encourage play-based learning. Understanding the different stages of play and their implication for children's cognitive and social development was a significant aspect of our professional learning.

The other major aspect of our development work was pedagogical planning and implementation, which aligns with the competence of educational and developmental support. As a social pedagogue in ECEC, linking theoretical knowledge to practical work is important. Our development work required us to explore available literature related to play, apply pedagogical theory, and design activities to address children's individual needs. We actively adhered with the requirements laid in the Finnish national core curriculum for pre-primary education which ensured that our work combined in evidence-based practices. Educators must be competent in the design and implementation of pedagogical activities to support children's development, learning, and well-being, an area in which our development has significantly developed our competence of client work in early childhood (SOAMK 2023).

Furthermore, teamwork and cooperation were essential for our professional growth. Social pedagogy focuses on working in multiprofessional collaboration to support children's development in an integrated way (Petrie 2011, 16). Collaboration with professionals improved our communication skills and this practice improved our ability to work in multidisciplinary teams. This is a key feature for a social pedagogue in ECEC that is the need for educators to practice collaboration with professionals to ensure the individual needs of the

children are met through collaboration with families and other professionals (SOAMK 2023).

The development process also enhanced our skills to document, observe children and reflect on children's learning experiences which is one of the core competences of critical and participatory social competence (Petrie 2011, 13). Documentation in early childhood education is important for assessing children's development and opportunity in decision making (SOAMK 2023). Our developmental work addressed child participation through the design of play-based activities not only helping pre-literacy and numeracy skills but also autonomy, creativity and peer communication. This has a direct link with child-centered practice which is at the center of the social pedagogue's work in early childhood education.

Throughout our development work, we acquired leadership and problem-solving skills, which are competencies in social pedagogy in ECEC (Storø 2013). Flexibility, skill in anticipating challenges, and decision-making abilities were required in planning and implementing play-based activities. Leading the development work confirmed the abilities as a social pedagogy in ECEC, preparing us for future work in early childhood education settings.

Overall, our development work has been a worthwhile experience, refining our professional skills and identity as social pedagogues. It has equipped us with practical approaches to support children's learning through play, developed our competencies in working with professionals and improved our understanding of child-centered pedagogy. We are more confident in our ability to plan meaningful, developmentally appropriate learning experiences in line with goals of Finnish early childhood education. By adopting these values of social pedagogy, we can support children's well-being and listen to their voices. Our professional development is closely connected to the competencies of social pedagogy in early childhood education, particularly in pedagogical competence, multiprofessional collaboration, child-centered education, and ethical reflection (SOAMK 2023).

References

Act of Early Childhood Education and Care (540/2018)

Anthony, J. L. & Francis, D. J. 2005. Development of Phonological Awareness. Current Directions in Psychological Science, Vol 14, No 5, 255–259. Accessed on 2.2.2025.https://doi.org/10.1111/j.0963-7214.2005.00376.x

Biemiller, A. 2003. Vocabulary. Needed If More Children Are to Read Well. Reading Psychology. Vol 24, No 3-4, 323–335. Assessed on 6.2.2025. https://doi.org/10.1080/02702710390227297

Bjorklund, D.F. & Pellegrini, A.D. 2002. The origins of human nature. Evolutionary developmental psychology. Washington. American Psychological Association.

Bodrova, E. & Leong, D. 2007. Tools of the Mind. The Vygotskian Approach to Early Childhood Education. 6th edition. Columbus. Merril Prentice hall.

Booth, J.L. & Siegler, R.S. 2008. Numerical Magnitude Representations Influence Arithmetic Learning. Child development. Vol 79, No 4, 1016–1031. https://doi.org/10.1111/j.1467-8624.2008.01173.x.

Cameron, C. & Moss, P. 2011. Socia pedagogy and working with children and young people. Where Care and Education Meet. London: Jessica Kingsley Publishers.

Cankaya, O., Rohatyn-Martin, N., Leach, J., Taylor, K. & Bulut, O. 2023. Preschool Children's Loose Parts Play and the Relationship to Cognitive Development. A review of literature. Vol 11, No 8, 151. https://doi.org/10.3390/jintelligence11080151.

Castles, A., Rastle, K. & Nation, K 2018 Ending the Reading Wars: Reading Acquisition from Novice to Expert. Psychological Science in the public Interest. Vol 19, No 1, 5 –51. https://doi.org/10.1177/1529100618772271.

Creswell, J.W. 2009. Research Design. Qualitative, quantitively, and mixed methods Approaches. 3rd edition. Los Angeles: SAGE Publications. E-book. Accessedon30.1.2025.https://oscarjaramillo.cl/wpcontent/uploads/2015/12/version-nueva-creswell-2008-Research-Design.pdf.

Clements, D.H. & Sarama, Julie 2014 Learning and Teaching Early Math. 3 rd, edition. New York: Routledge.

Cliffe, J. 2024. (Re) imagining the social pedagogy within early childhood education and care: a (re)exploration of the power and importance of relationships and connections. International journal of social pedagogy. Vol 13, No 1, Article 14. https://doi.org/10.14324/111.444.ijsp.2024.v13.x.014.

Daisy preschool. 2016. About Preschool En. Accessed *on* 1.3.2025 https://www.daisy.fi/copy-of-about.

Denham, S.A., Bassett, H.H. & Zinsser, K. 2012. Early Childhood Teachers as Socializers of Young Children's Emotional Competence. Early Childhood Education journal. Vol 40, No 3, 137–143. https://doi.org/10.1007/s10643-012-0504-2.

Diamond, A .2013. Executive functions. Annual Review of Psychology. Vol 64, No 1, 135 –168. https://doi.org/10.1146/annurev-psych-113011-143750.

Eichsteller, G. Holthoff S. 2012.The art of being a social pedagogue: Developing cultural change in children's homes in Essex. International journal of social pedagogy. Vol 1, No 1, 30 –45. https://doi.org/10.14324/111.444.ijsp.2012.v1.1.004.

Fisher, K.R., Hirsh-Pasek, K., Newcombe, N. & Golinkoff, R.M. 2013. Taking Shape: Supporting Preschoolers' Acquisition of Geometric Knowledge Through Guided Play. Child Development. Vol 84, No 6, 1872–1878. Accessed on 4.2.2025. https://doi.org/10.1111/cdev.12091.

Ginsburg, H.P., Lee, J.S. & Boyd, J.S. 2008. Mathematics Education for Young Children: What It is and How to Promote It. Social policy report. Giving child and

youth development knowledge away. Vol 22, N0 1. 1 –23. Accessed on 3.2.2025. https://doi.org/10.1002/j.2379-3988.2008.tb00054.x

Gregg, S. (2021). Spatial Reasoning in early childhood. Early childhood math group. E-book. Accessed on 26.2.2025. https://www.iseemaths.com/wp-content/uploads/2021/06/Spatial-Reasoning-Document.pdf.

Hassinger-Das, B., Toub, T.S., Hirsh-Pasek, K. & Golinkoff, R.M. 2017. A matter of principle: Applying language science to the classroom and beyond. Translational Issues in Psychological Science. Vol 3, N0 1, 5 –18. Accessed on 4.3.2025. https://doi.org/10.1037/tps0000085.

Hrish-Pasek, K.2009. A mandate for playful learning in preschool. Presenting the evidence. New York: Oxford University Press.

Hyvä tieteellinen käytäntö ja sen loukkausepäilyjen käsitteleminen Suomessa 2023. Accessed on 31.3.2025.https://tenk.fi/sites/default/files/2023-03/HTK-ohje_2023.pdf.

International Literacy Association 2019. Phonological Awareness in Early Childhood Literacy Development. Accessed on 1.2.2025.https://www.literacyworldwide.org/docs/default-source/where-we-stand/ila-phonological-awareness-early-childhood-literacy-development.pdf.

Lillard, A.S., Lerner, M.D., Hopkins, E.J., Dore, R.A., Smith, E.D., & Palmquist, C. M. 2013. The Impact of Pretend Play on Children's Development. A review of Evidence. Psychological Bulletin, Vol 139, No 1, 1 –34. Accessed on 4.3.2025. https://doi.org/10.1037/a0029321.

Lütfiye Coşkun 2023. Relationship of Print Awareness Skills with Child's Gender, Maternal Education, and Writing Readiness Skills for Preschoolers. E-kafkas Journal of Educational Research. Vol 10, N0 2, 210 –224. Accessed on 2.2.2025. https://doi.org/10.30900/kafkasegt.1146672.

Luen, L.C., Guo, Y. & Jian, L. 2024. Engaging Play and Toys Foster the Development of Multiple Intelligence in Preschool Children. International Journal of Academic Research in Business and Social Science. Vol 14, No 2, 2155– 2161. *Accessed on 4.3.2025.* http://dx.doi.org/10.6007/IJARBSS/v14-i2/21011.

Mcleod, S. 2024. Vygotsky's Theory of Cognitive Development. E -book. Referred 0n 7.3.2025. https://www.researchgate.net/publication/383241126_Vygotsy's_Theory_of_Cognitive_Developemnt#fullTextFileContent.

Marulis, L.M. & Neuman, S.B. 2010. The Effects of Vocabulary Intervention on Young Children's Word Learning. A meta-analysis. Review of Educational Research. Vol 80, N0 3, 300–335. Accessed on 24.1.2025. https://doi.org/10.3102/0034654310377087.

Miller, E. & Almon, J. 2009. Crisis in kindergarten. Why children need to play in school. College Park, MD: Alliance for Childhood. E-book. Accessed on 2.2.2025. https://files.eric.ed.gov/fulltext/ED504839.pdf.

Mix, K.S., Susan Cohen Levine & Janellen Huttenlocher 2002. Quantitative development in infancy and early childhood. Oxford; New York: Oxford University Press.

Mol, S.E., Bus, A.G. & de Jong, M.T. 2009. Interactive Book Reading in Early Education. A Tool to Stimulate Print Knowledge as Well as Oral Language. Review of Educational Research. Vol 79. N0 2, 979–1007. Accessed on 4.2.2025. https://doi.org/10.3102/0034654309332561.

Moilanen, T., Katri Ojasalo & Jarmo Ritalahti 2009. Kehtittämistyön menetelmät.Helsinki: WSOYpro. E-Book through Ellibs. Accessed on 3.3.2025.

Montague-Smith, A., Cotton, T., Hansen, A. & Price, A. 2017. Mathematics in early years education. 4th ed. New York: Routledge, Taylor & Francis Group.

National Association for the Education of Young Children 2020. Developmentally Appropriate Practice (DAP) Position Statement | *NAEYC*. Accessed on 2.2.2025 https://www.naeyc.org/resources/position-statements/dap/contents.

National core curriculum for early childhood education and care Regulation OPH-700-2022 The Finnish National Agency for Education 1. 2022. Accessed on 1.2.2025. https://www.oph.fi/sites/default/files/documents/National%20core%20curriculum%20for%ECEC%202022.pdf.

Ndabezitha, L.B. & Gravett, S. 2024. Guided play as a pedagogical tool for the early grades. South African Journal of Childhood Education. Vol 14, No 1, Accessed on 3.3.2025. https://doi.org/10.4102/sajce.v14i1.1345.

Neuman, S.B. & Dickinson, D.K. 2011. Handbook of Early Literacy Research. New York: Guilford Publications. Accessed on 2.2.2025.

Ojasalo, K.; Moilanen, T. & Ritalahti, J. 2015. Kehittämistyön menetelmät. Uudenlaista osaamista liiketoimintaan. 3–4. painos. Helsinki: Sanoma Pro Oy. E-book through Ellibs. Accessed on 8.3.2025.

Ørngeen, R., & Levisen, K. T. 2017. Workshop as a Research Methodology. Electronic Journal of E- Learning, Vol 15, No, 1, 70–81, Article 569. Accessed on16.3.2025.https://vbn.aau.dk/ws/portalfiles/portal/257686207/_rngreen_Levinsen_Workshop_as_a_Research_methodology_ejel_volume15_issue1_article569.pdf.

Petrie, P. 2011. Communication skills for working with children and young people. Introducing social pedagogy. 3rd edition. Philadelphia: Jessica Kingsley Publishers. E-book. Accessed on 31.3.2025. https://www.google.fi/books/edition/Communication_skills_for_Working_with_Ch/nukCp9m5Ntqc?hl=en&gbpv=1&pg=PA6&printsec=frontcover.

Phillips, A. & Boyd, W. 2023.Re – imagining teaching improvement. Singapore: Springer. E-book. Accessed on 5.2.2025. https://www/google.fi/books/edition/Re_imagining_Teaching_Improvement/QbjrEAAAQBAJ?hl=en&gbpv=1&pg=PA2&printsec=frontcover.

Pyle, A., & Dnniels, E. 2017. A continuum of Play-based learning. The role of the teacher in Play-based pedagogy and the fear of hijacking play. Early Education and Development, Vol 28, No 3, 274–289. https://doi.org/10.1080/10409289.2016.1220771.

Rector's conference of Finnish universities of applied sciences 2023.Ethical recommendations for thesis writing at university of applied sciences. Accessedon31.3.2025. https: // arene.fi/wpcontent/uploads/Raportit/2025/ETHICAL%WRITING%20AT%20U NIVERSITIES%20OF%20APPLIED%20SCIENCES.pdf?_t=1739804910.

Richey, R.C. & Klein, J.D. 2005. Developmental research methods: Creating knowledge from instructional design and development practice. Journal of Computing in higher Education. Vol 16, No 2, 23 –38, Accessed on 10.3.2025. https://doi.org/10.1007/BF02961473.

Salonen, K;. Eloranta, S.; Hautala, T.;Kinos, S. 2017. Kehittämistoininta ja kehittämisenmenetelmiä ammatillisessa korkeakoulutuksessa. Turun ammattikorkeakoulun oppimateriaaleja 108. Tampere: Juvenes Print. https://urn.fi/URN:ISBN:978-952-216-649-4.

Saracho, O.N. 2017. Literacy and language: new developments in research, theory, and practice. Early Child Development and Care. Vol 187, 299–304. Accessed on 5.2.2025. https://doi.org/10.1080/03004430.2017.1282235.

Sarama, J. & Clements, D. 2009. Early Childhood mathematics education research. Learning trajectories for young children. New York: Taylor & Francis.E-book. Accessed on 15.2.2025. https://www.google.fi/books/edition/Early_Chilhood_Mathematics_Education_Re/JBmOAgAAQBAJ?hl=en&gbpv=1&pg=PA3&printsec=frontcover

Sharifi- Rasslan, A. and Hassidov, D. 2022. Special Issues in Early Childhood Mathematics Education Research. Learning, teaching and thinking. Leien: Brill.

Sieger, R & Oper, J. 2003. The Development of Numerical Estimation: Evidence for multiple representations of numerical quantity. Psychological Science, Vol 14, N0 3, 237–250. Accessed on 30.1.2025. https://doi.org/10.1111/1467-9280.02438.

Sieger, R. S., & Ramani, G.B. 2008. Playing linear numerical board games promote low-income children's numerical development. Developmental Science, Vol 11, No 5, 655–661. Accessed on 30.1.2025.https://doi.org/10.1111/j.1467-7687.2008.00714. x.

Singer, D & Singer, J. 1990. The house of make believe: children's play and the developing imagination. Cambridge: Harvard University Press.

Suggate, S.P., Lenhart, J., Vaahtoranta, E. and Lenhard, W. (2021). Interactive elaborative storytelling fosters vocabulary in pre-schoolers compared to repeated-reading and phonemic awareness interventions. Cognitive Development. Vol 57. No 1, Accessed on 8.2.2025. https://doi.org/10.1016/j.cogdev.2020.100996.

Storø, J. 2013. Practical social pedagogy. Theories, values and tolls for working with children and young people. Bristol, UK: Policy press. E-book. Accessed on 31.3.2025. https://www.google.fi/books/edition/Practical_Social_Pedagogy/XWumAwAAQBAJ?hl=en&gbpv=1&pg=PA1928&printsec=frontcover.

The Finnish national board on research integrity.2023. Hyvä tieteellinen käytänto ja sen loukkausenpäilyjen käsitteleminen suomessa. Accessed on 4.4.2025. https://tenk.fi/sites/default/files/2023-03/HTK-ohje_2023.pdf

Tudge, J. Mokrova, I. Hatfield, B. & Karnik, R. 2009. Uses and Misuses of Bronfenbrenner's Bioecological Theory of Human Development. Journal of family theory and Review. Vol 1, No 4, 198–210. Accessed on 3.2.2025. https://doi.org/10.1111/j.1756-2589.2009.00026.x

Yogman, M. Garner, A. Hutchinson, J. Hirsh-Pasek, K. & Golinkoff, R.M. 2018. The Power of play: a Pediatric Role in Enhancing Development in Young Children. Pediatrics. Vol 142, N0 3. Accessed on 5.2.2025. https://doi.org/10.15 42/ peds.2018-2058.

Van Oers, B. & Duijkers, D. 2013. Teaching in a play-based curriculum: Theory, practice and evidence of developmental education for young children. Journal of curriculum studies. Vol 45, No 4, 511–534. Accessed on 6.2.2025. https://doi.org/10.1080/00220272.2011.637182.

Varhaiskasvatuksen sosionomin kompetenssit 2023. Accessed on 31.3.2025. https://www.sosiaalialanamkverkosto.fi/wpcontent/uploads/2023/12/Varhaiskasv atuksen-sosionomikompetenssit-2023.pdf.

Verdine, B, Golinkoff, R. Hish-Pasek, K. & Newcombe, N. 2017. Results links between spatial assembly, later spatial skills and concurrent and later mathematical skills. Vol 82. N0 1. 71–80. Accessed on 18.3.2025. https://doi. Org/10.1111/mono.12283.

Vilkka, H. 2021. Näin onnistut opinnäytetyössä. Jyväskylä: PS-kustannus. Accessed on 31.1.2025. E-book through Ebliss.

Weisleder, A., & Fernald, A. 2013. Talking to Children Matters. Early Language Experience Strengthens Processing and Builds Vocabulary. Psychological Science, Vol 24, No 11, 2143–2152. https://doi.org/10.1177/0956797613488145

Whitebread, D., Neale, D., Jensen, H., Liu, C., Solis, S., Hopkins, E., Hirsh-Pasek, K. & Zosh, J. 2017. The role of play in children's development: a review of the evidence white paper. The LEGO foundation. Accessed on 25.2.2025. https://cms.learningthroughplay.com/media/esriqz2x/role-of-play-in-childrens-development-review_web.pdf.

Zigler, E., Gilliam, W.S. and Jones, S.M. 2006. A Vision for Universal Preschool Education. E-book. Accessed on 26.2.2025. https://assets.cambridge.org/97805 21612999_frontmatter.pdf

Zosh, J.M., Hrish-Pasek., Hopkins, E.J., Jansen, H., Liu, C., Neale, D.,Solis, S. L. and Whitebread, D. 2018. Redefining play as Spectrum. Frontiers in psychology. Vol 9, No 1124. Accessed on 3.2.2025. https://doi.org/10.3389/fpsyg.2018.01124.

Zosh, J.M., Hassingerdas, B. and Laurie, M. 2022. Learning through play and development of holistic skills across childhood. The LEGO publisher, 1-19. Accessed on 30.1.2025. https://cms.learningthroughplay.com/media/gjndcaea/holistic-skills.pdf.

Zucker, T. Carlo, M. Landry, S. Masood-Saleem, S. Williams, J & Bhavsar, V. 2019. Iterative Design and Pilot Testing of the Developing Talkers Tiered Academic Language Curriculum for PreKindergarten and Kindergarten. Journal of research on educational effectiveness. Vol 12, N0 2, 274 –306. Accessed on 5.3.2025

Semi structured interview questioner

1. Can you introduce yourself and state your background in early childhood education?
2. What role does play based learning serve in your practice?
3. What are the greatest challenges in teaching early literacy and numeracy through play?
4. Are there any gaps in present provisions for early reading and early numeracy?
5. Have you noticed any variation in the way in which children react to organized instruction and free play?
6. What would one hope for in a guidebook for supporting early reading and numeracy through play?
7. What kind of activity, in your view, can make a guidebook useful and worth reading?
8. Should the guidebook have alternative activity levels for a range of learning requirements?
9. Would you prefer structured lesson plans or flexible activity ideas that can be adapted?
10. What format will most benefit them?(printed, electronic, activity cards, instruction sheet, etc)
11. How important is it for a guidebook to include pictorial aids? such as photographs, illustrations and videos?
12. Should the guidebook include teacher guidance sections or reflections for assessing children's progress?
13. How much time can one normally allocate for play reading and math in a week or day?
14. Do you see any impediments in utilizing z book like this in your settings?
15. What support or additional resources would make integration of these activities in your instruction easiness

Observation checklist for educators

Date……..

Developmental team member conducting activity…….

Observers (Educators & Developmental team member)……

Activity observed……

Criteria	Low	Medium	High	Comments
Children's engagement (Interest, enthusiasm)				
Participation (are all children involved?)				
Interaction with peers (collaboration, communication				
<u>Pre Literacy skills</u> Letter recognition Phonemic awareness Expressive language use				
<u>Numeracy skills</u> Counting accuracy Number recognition Recognizing patterns or simple problem solving				
Activity enjoyment (Do children seem happy and engaged?)				

Reflective note for educators

To document a short description of how the challenges faced? , activities went, possible improvements.

Name…….

Date……

Activity Conducted …….

1.What went well in today's activity?

2. How did children respond to the activity? (Engagement, interest, challenges)

3. Did you notice children recognizing letters or engaging with language?

4. Did they show improved counting, number recognition, or simple math skills?

5. Is there any challenges in implementing activity?

6. Other reflections or notable observations?

Observer's report template (For developmental team members)

To observe how the activity is implemented, whether it engages children naturally, and whether the guidebook is effective.

Date……

Activity observed……

Developmental team member conducting ……..

Observer (s) (developmental team member) ……..

General observations

1.Describe the classroom setting and atmosphere ?

2.How did children initially respond to the activity?

Engagement & Interaction

3.Were children actively engaged throughout the activity? Provide examples?

4.Did children interact and collaborate with each other?

Effectiveness of the guidebook?

5.What evidence suggests children develop preliteracy skills? (e.g. letter recognition, pnonemic awareness?)

6.What evidence suggests children develop numeracy skills? (counting, recognizing numbers?)

Suggested improvements

7.Any changes needed to enhance the guidebook or activity?

Workshop Questionnaire

1.On a scale of 1-5, how easy to use were you finding this guidebook?

2. Were the instructions easy to follow and clear? Could you please clarify?

3. How would you assess the visual appeal of the guidebook?

4. Did the layout facilitate easy movement through content?

5. Was the information presented in a logical sequence?

6. Did you employ references?

7. How adaptable were activities to ECEC environments that were diverse?

8. Were you able to modify the activities to suit diverse learning needs?

9. Did the activities recommended involve resources that were readily available within your environment?

10. Were you able to replace any of the suggested materials?

11. Were you effective in adjusting activities to your students' levels of backgrounds? Provide examples

12. Did you notice children's pre literacy skill enhancement after using activities of guidebook?

13. Were there changes or enhancements that were noticeable in children's numeracy?

14. How engaged were children during activities of playing?

15. Did you notice greater interest in learning? Present your findings.