Starting Strong VII

Case study compendium

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Overview

The Starting Strong VII policy review

This compendium of case studies is part of the *Starting Strong VII* policy review and a supplement to its main report, *Empowering Young Children in the Digital Age*. The policy review is the culmination of the Early Childhood Education and Care (ECEC) in a Digital World project, which was carried out between 2021 and 2023 to investigate ways in which ECEC systems can respond to digitalisation, harnessing opportunities to promote high-quality and equitable ECEC while minimising the associated risks. The project sought to:

- identify the skills that help children thrive as they live and learn in the digital age

- examine strategies to prepare the ECEC workforce and the sector at large to exploit the affordances of digital technologies to support quality in ECEC, including by engaging with families

- explore the role of ECEC in helping to protect children in digital environments and ensuring equitable outcomes of digitalisation.

The project built on the analytical framework of the *OECD Starting Strong* policy reviews, which distinguish policy levers instrumental for building high-quality and equitable ECEC systems. For this project, these levers are grouped into: 1) quality standards, governance and funding; 2) curriculum and pedagogy; 3) workforce development; 4) family and community engagement; and 5) monitoring and data. In addition, the framework considers equity and inclusion as a transversal theme. The key findings from the project are presented in the main report, *Empowering Young Children in the Digital Age*.

The report provides a roadmap of policies to address key challenges related to digitalisation and ECEC and identifies countries and jurisdictions that are active in specific policy areas or in addressing specific challenges with the goal of informing policy reflection in other countries. The roadmap, and the report in general, recognise that given the limitations of the evidence base, the high speed of change in this space and the varied contexts of ECEC across countries, ECEC systems can respond to digitalisation at different paces and in different directions. The report is based on findings from the latest academic research, responses from countries and jurisdictions to the *ECEC in a Digital World* policy survey (2022), and insights from the case studies included in this compendium. The case studies complement other project inputs by providing further and more detailed insights into the different directions that countries and jurisdictions are taking to make their ECEC systems responsive to digitalisation.

Why and how were these case studies collected?

In 2022, project participants were invited to submit case studies about recent or ongoing policy initiatives or programmes regarding digitalisation and ECEC. Submissions were made using a template provided by the OECD Secretariat as a common framework to ensure coverage of the key elements of these policy

initiatives and enhance the consistency and comparability of the information collected across countries and jurisdictions. The template with the full list of requested elements can be found in Annex A.

The information provided in this compendium of case studies is of a complementary nature to that collected through other project activities. The case studies focus on policy implementation, illustrating how policy initiatives or programmes related to digitalisation are put into practice in a particular national or subnational context or ECEC setting. The case studies aim to facilitate peer learning between countries and jurisdictions by illustrating possible directions for policy action. In addition, the collection aims to shed light on potential success factors and challenges around the implementation of policies or initiatives relating to digitalisation and ECEC.

This opening chapter provides a descriptive overview of the policy initiatives or programmes presented in the compendium, including how the case studies align with the analytical framework of the *Starting Strong* series and the policy roadmap outlined in the *Empowering Young Children in the Digital Age* report. The core of the compendium presents the case studies, as submitted to the OECD Secretariat, in alphabetical order by country and jurisdiction of provenance. Cover pages for each case study offer an overview of key information about the policy initiative or programme.

What kind of policy initiatives and programmes are included in the collection?

This compendium of case studies brings together 20 submissions from 16 countries/jurisdictions (see Table 1 for a full list). This includes 13 OECD member countries plus Brazil, an accession candidate country, as well as two subnational jurisdictions – South Australia (Australia) and Bavaria (Germany). Of the 21 submissions, 20 initiatives were introduced in the last 6 years (2017-22), including 12 launched in the last 3 years (2020-22), which illustrates the growing level of policy activity in the area of digitalisation and ECEC.

The majority of submissions relate to system-level policy initiatives or programmes (i.e. efforts developed by a national (or subnational in the case of federal systems) government administration or agency). This reflects the fact that system-level actors received the initial invitation to participate in the case study collection. However, there are two case studies from the wider ECEC ecosystem (i.e. civil society organisations), one further case study from the sub-system level (i.e. a network of ECEC settings) and three from individual ECEC settings. This diversity serves as a reminder of the many actors involved in integrating digital technologies into ECEC. Furthermore, although the setting and sub-setting level examples are very specific, those such as **Japan**'s Quest for Soil Learning Activity help illustrate how efforts to embed system-level strategies such as curriculum innovations can be interpreted and implemented in ECEC settings' work with children on a day-to-day basis.

In total, eight case studies target older children within the ECEC cohort, that is, those aged 3 and above. Although there are no examples of case studies exclusively targeting the younger age group (i.e. 0-2 year-olds), there are nine submissions for policy initiatives or programmes that extend across the broader ECEC age range (0-5/6 years). For example, **Norway's** Online Competence Packages for Digital Practice in ECEC enable professionals working with children 0-5 years old to access online training relating to digital judgement, digital practice and data protection. Given that much of the wider guidance regarding very young children's interactions with digital technologies has adopted a restrictive approach for 0-2 year-olds (see Chapter 2), it is interesting that these children are not excluded from efforts to respond to digitalisation in ECEC. This echoes one of the key findings from the main report: governments are not generally looking to preserve ECEC as a digital-free space; instead, they are positioning ECEC systems as a crucial support in helping young children to manage the risks associated with digital technologies without foregoing their opportunities (see Chapter 1 of main report).

All the case studies included in this compendium address the curriculum and pedagogy policy lever. While some of them relate specifically to the integration of early digital literacy in curriculum frameworks, for example **Luxembourg**'s Media Compass and **Brazil**'s Support Programme for the Implementation of the National Common Curricular Base, others relate to specific pedagogical approaches, including **Germany**'s Discovering Computer Science - With or Without a Computer, **South Australia's (Australia)** STEM in the Early Years initiative, **Israel**'s Physital Spaces or **Estonia's** ProgeTiger in ECEC. **Korea**'s Online Programmes to Support the Nuri Curriculum is another illustration of alignment with pedagogical principles, in this case a play-based curriculum. The dominance of curriculum- and pedagogy-focused case studies corroborates the broader finding from the policy review that a large majority of participating countries and jurisdictions integrate aspects of digitalisation into their ECEC curriculum, recognising the ways in which digitalisation is increasingly changing young children's everyday experiences (see Chapter 4 of main report).

Workforce development is also a very common focus area within the case study collection, reflecting the double demand digitalisation places on ECEC professionals, who are responsible for implementing curricular and pedagogical approaches for introducing early digital literacy, as well as for ensuring the safe and effective use of digital tools for administrative and management tasks (see Chapter 5 of main report). Case studies that address workforce development include policy initiatives or programmes through which ECEC professionals have access to professional development opportunities (online or offline) that support them with aspects of digital pedagogies or early digital literacy such as **Spain**'s School of Computational Thinking and Artificial Intelligence. It also includes examples where digital technologies are employed to support wider professional development such as the Remote Peer Observation programme implemented in an ECEC institution in **Slovenia** or **Costa Rica**'s Webinars for ECEC Teams.

A smaller number of case studies address the family and community engagement policy lever. This includes efforts that aim to support parents and ECEC professionals to guide young children's engagement with digital technologies coherently and effectively, such as **Australia**'s eSafety Early Years Program and **Germany**'s Readingwith.app. There are also examples where digital technologies are employed to enhance communication and collaboration between ECEC settings and families or communities, such as **Japan**'s ICT to Expand Children's Learning Experiences, where digital tools support ECEC settings to communicate children's learning and development with parents, and **Japan**'s Online Exchanges for Collaboration, where digital technologies facilitate closer cooperation between ECEC settings and schools within a locality.

Although each of the other policy levers – guidelines and regulations, monitoring and data, and equity and diversity – is covered by at least some of the case studies in the collection, none of the case studies has principle aims that directly related to one of these areas. In the case of equity and diversity at least, this emphasises the transversal nature of this policy lever.

Table 1. Overview of the case studies

Country or jurisdiction	Policy initiative or programme	Start year	Governance level	Age group	Scope	Chapter in main report	Policy lever or area					
							Guidelines and regulations	Curriculum and pedagogy	Workforce development	Family and community	Monitoring and data	Equity and diversity
Australia	eSafety Early Years Program	2020	System	0-6	ECEC	3, 5		✓	✓	✓		
Australia (South Australia)	STEM in the Early Years	2017	System	3-5	ECEC – government preschools	4		✓	✓			
Brazil	Support Program for the Implementation of the National Common Curricular Base	2018	System	0-6	ECEC and schools	4	✓	✓	✓		✓	
Costa Rica	Webinars for ECEC Teams	2020	System	0-5	ECEC	5		✓	✓	✓		✓
Czech Republic	Innovation in Education in the Context of Digitalisation	2022	System	3-5	ECEC and schools	3, 4		✓	✓			✓
Estonia	ProgeTiger in ECEC	2017	System	3-5	ECEC and schools	4, 5		✓	✓			✓
Germany (Bavaria)	Digitalisation Strategy for ECEC	2021	System	0-6	ECEC and after-school care	3, 4, 5	✓	✓	✓	✓	✓	✓
Germany	Readingwith.app	2020	Ecosystem	0-6	ECEC	4		✓			✓	
Germany	Discovering Computer Science – With or Without a Computer	2017	Ecosystem	3-6	ECEC	4, 5		✓	✓			
Israel	Physital Spaces	2019	System	3-6	ECEC	4, 5		✓	✓			✓
Japan	Online Exchanges for Collaboration	2020	Network of settings	5	ECEC			✓		✓		
Japan	Quest for Soil Learning Activity	2021	Single setting	5	ECEC	4		✓	✓	✓	✓	✓
Japan	ICT to Expand Children's Learning Experiences	2019	Single setting	0-5	ECEC	3, 4		✓	✓	✓		✓
Korea	Online Programmes to Support the Nuri Curriculum	2020	System	3-5	ECEC	4	✓	✓	✓	✓	✓	✓
Lithuania	Innovations in Kindergarten	2018	System	3-5	ECEC	4, 5		✓	✓	✓		
Luxembourg	Media Compass	2020	System	3-6	ECEC and schools	4, 5		✓	✓			
Norway	Online Competence Packages for Digital Practice in ECEC	2017	System	0-5	ECEC	3, 4, 5		✓	✓			
Slovenia	Remote Peer Observation	2020	Single setting	1-6	ECEC	5		✓	✓		✓	
Slovenia	DIGICHILD	2021	System	3-6	ECEC	5, 6		✓	✓			
Spain	School of Computational Thinking and Artificial Intelligence	2018	System	3-6	ECEC and schools	4, 5		✓	✓			

What insights into policy processes can the case studies offer?

The case studies in this compendium shed light on some of the different ways governments and other actors can support ECEC systems to respond to digitalisation to enable young children to take advantage of its opportunities and confidently navigate the risks posed by digital technologies. More specifically, the case studies offer insight into the processes that support the development and implementation of different policy measures (see Table 2).

First, the policy initiatives and programmes covered by this collection illustrate the policy challenges regarding digitalisation and ECEC that countries and jurisdictions are working to address. The case studies are presented in relation to the key challenges identified in the policy roadmap (see Chapter 1 of main report). The policy efforts collated in this compendium most commonly address the challenges of setting the foundations for young children to develop their digital literacy and of enhancing the quality of the interactions that children experience in ECEC settings and between the ECEC workforce and children's families.

There are fewer initiatives and programmes relating specifically to the challenge of protecting young children in digital environments, which groups many of the most salient challenges identified by governments in the *ECEC in a Digital World* policy survey (see Chapter 2 of main report). Nevertheless, the case studies collated here are only a selection of the policy efforts undertaken by ECEC systems and are not representative of the breadth of policy actions introduced across participating countries and jurisdictions, which in the case of protecting children against digital risks, extend to broader regulatory measures.

Regarding policy design, countries and jurisdictions adopt various approaches to informing or basing their policy initiatives and programmes on evidence. In some cases, this means aligning efforts with international and/or national frameworks already in place. Another strategy is to integrate the latest findings from related research, whether through conducting research reviews or engaging with relevant experts. In **Germany**, for example, the programme Discovering Computer Science – With or Without a Computer was informed by the findings of a working group of experts from the fields of computer science didactics and early years pedagogy. Other efforts to seek input from different stakeholders to inform design processes are evident across many of the policy initiatives and programmes in this collection. For example, in developing **Australia**'s eSafety Early Years Program, the eSafety Commissioner's office consulted ECEC experts from fields such as child psychology and early development as well as representatives from key national bodies and agencies in the ECEC sector and relevant civil society foundations.

Additionally, some countries and jurisdictions choose to pilot their initiatives or programmes with a smaller target group prior to full implementation to identify potential challenges and success factors. In **Germany**, **Bavaria**'s Digitalisation Strategy for ECEC builds on findings from a pilot project carried out in 2018-20 with 100 ECEC centres with the aim of spreading the promising results from the pilot phase more widely across the ECEC system in Bavaria.

Countries and jurisdictions are also generally involving a wide range of stakeholders in the policy processes described in this collection. This means that, beyond the target audience of the policy efforts, relevant stakeholders are being engaged in consultative or collaborative processes that can inform the design, implementation or evaluation of policy efforts. ECEC professionals and experts are commonly among those stakeholder groups consulted. It is less common for families and children themselves to be involved, although there are some examples. In other cases, civil society organisations and policymakers from different levels of government are involved too. **Brazil**'s ProBNCC initiative illustrates the diversity of stakeholders that can be engaged in the development and implementation of curricular reform. The programme was developed through collaboration between federal, state and municipal authorities as well

as civil society organisations. ECEC professionals and children have been involved in implementation planning and monitoring efforts.

Funding for the policy initiatives and programmes included in this collection generally comes from central governments, either through established ECEC budget lines or new dedicated funding programmes. In some cases, these funds are supplemented by financial resources provided by an external partner at the international or national level. For example, **Slovenia**'s DIGICHILD programme is funded through the European Union's Erasmus+ programme, while the **Czech Republic**'s Innovation in Education in the Context of Digitalisation receives financial support through European Union's Recovery and Resilience Facility.

When it comes to monitoring and evaluation, many countries and jurisdictions are conducting ongoing monitoring of their policy efforts, typically through surveys of programme participants. For example, ECEC professionals taking part in the training programmes implemented as part of **Lithuania**'s Innovations in Kindergarten project complete an online survey at the end of their participation. Other approaches include interim or *ex post* evaluations of policies or programmes that have been fully implemented. For example, in **Israel**, as well as monitoring participation in the training offer and of the uptake of dedicated grants, a qualitative evaluation study will bring researchers to observe the use and implementation of physital spaces in selected ECEC settings across the country. Although across the case study collection it is more common for evaluative activities to be undertaken by internal evaluators from within the organisation which has overall responsibility for the policy initiative, in the case of **Israel** and some others, the evaluations are being carried out by external evaluators, usually research teams from higher education institutions.

Table 2. Overview of key policy processes in the case studies

Country or jurisdiction	Policy initiative or programme	Evidence- based design	Stakeholder engagement	Funding sources	Policy evaluation	Policy challenges addressed				
						Protecting against digital risks	Reducing digital divides	Developing early digital literacy	Enhancing quality interactions	Supporting work processes and quality assurance
Australia	eSafety Early Years Program	Research; stakeholder consultation; expert input	Parents; ECEC professionals; ECEC experts; civil society organisations	Central government	*Ex post* evaluation; external and internal evaluators; completed	✓		✓		✓
Australia (South Australia)	STEM in the Early Years	National frameworks; research	ECEC experts; ECEC professionals	State government	External and internal evaluators		✓	✓	✓	
Brazil	Support Program for the Implementation of the National Common Curricular Base	International frameworks	State and municipal authorities; civil society organisations; ECEC professionals; children	Central government	Monitoring; external evaluators; in progress		✓	✓	✓	✓
Costa Rica	Webinars for ECEC Teams	Expert input	ECEC experts; ECEC professionals	Central government	Monitoring; internal evaluators	✓	✓			✓
Czech Republic	Innovation in Education in the Context of Digitalisation			Central government; external partners			✓	✓	✓	✓
Estonia	ProgeTiger in ECEC	National frameworks; research	Different stakeholders, including edtech experts	Central government; external partners	Monitoring; further evaluation planned			✓	✓	✓
Germany (Bavaria)	Digitalisation Strategy for ECEC	Research; pilot stage, stakeholder consultation; international frameworks	ECEC professionals; parents; ECEC providers; children	Central government; external partners	Monitoring; internal evaluators	✓	✓	✓	✓	✓
Germany	Readingwith.app	Expert input, pilot study	ECEC experts	Central government	Monitoring; internal evaluators; ongoing	✓	✓	✓	✓	
Germany	Discovering Computer Science - With or Without a Computer	Expert input; pilot study	ECEC experts; edtech experts; ECEC professionals; children	Central government	Monitoring; internal evaluators; ongoing		✓	✓	✓	
Israel	Physital Spaces		ECEC professionals; children	Central government	Monitoring and interim evaluation; external evaluators;		✓	✓	✓	

Country or jurisdiction	Policy initiative or programme	Evidence- based design	Stakeholder engagement	Funding sources	Policy evaluation	Policy challenges addressed				
						Protecting against digital risks	Reducing digital divides	Developing early digital literacy	Enhancing quality interactions	Supporting work processes and quality assurance
					planned					
Japan	Online Exchanges for Collaboration			Local government					✓	✓
Japan	Quest for Soil Learning Activity	National frameworks; research		Local government	Monitoring; internal evaluators; ongoing			✓	✓	
Japan	ICT to Expand Children's Learning Experiences	International and national frameworks		Central government	Monitoring; internal evaluators; ongoing		✓	✓	✓	✓
Korea	Online Programmes to Support the Nuri Curriculum	National frameworks; research	ECEC experts; edtech experts; ECEC professionals	Central government; local offices	Monitoring; internal evaluators	✓	✓	✓	✓	✓
Lithuania	Innovations in Kindergarten	Research		Central government; external partners	Monitoring; internal evaluators; ongoing		✓	✓	✓	✓
Luxembourg	Media Compass	International frameworks	International policy makers	Central government	Monitoring; internal evaluators; ongoing			✓	✓	✓
Norway	Online Competence Packages for Digital Practice in ECEC	National frameworks	ECEC professionals; ECEC experts	Central government	Monitoring; internal evaluators; ongoing	✓	✓	✓	✓	✓
Slovenia	Remote Peer Observation	National frameworks; stakeholder consultation	ECEC professionals; children	Central government; external partners	Monitoring; internal evaluators; ongoing		✓			✓
Slovenia	DIGICHILD	International and national frameworks; research; stakeholder consultation; pilot study; expert input	ECEC experts	External partners	*Ex post* evaluation; internal evaluators; planned		✓	✓	✓	
Spain	School of Computational Thinking and Artificial Intelligence	International frameworks; research		Central government	Monitoring; internal evaluators; ongoing		✓	✓	✓	✓

Notes: The information presented in this table is based on the case study submissions reproduced in full in subsequent chapters of this publication. Countries and jurisdictions responded to open questions about policy initiatives and programmes via a template prepared by the OECD Secretariat. Blank cells should not be interpreted as indicating that no related action was taken, rather that such action was not reported on in the case study submission.

Australia

Australia's **eSafety Early Years Program** (2020), developed by the eSafety Commissioner, is a play-based online safety programme for children aged 0-5. As well as material aimed at young children themselves, the programme includes professional learning materials for early childhood educators and resources for families. The content, developed in consultation with early childhood experts and representatives from key stakeholder groups, is structured around four key messages: be safe, be kind, ask for help, and make good choices. All educational settings and families across the country can access the resources free of charge.

Curriculum and pedagogy

Workforce development

Family and community engagement

A. Policy goals and design

A.1. Vision and broad objectives

The eSafety Early Years Program is an Australian government initiative providing a suite of advice and free resources to help families and early childhood educators encourage young children to have positive experiences with technology and build their understanding of online safety.

eSafety research shows that 81% of parents with children aged 2-5 report that their child is using the internet. However, only 57% of parents directly monitor usage by viewing what is on their child's screen, and 37% of parents think their pre-school aged child spends too much time online.

eSafety Early Years resources have been created in consultation and collaboration with early childhood experts to respond to this evidence from the eSafety research and what we have learnt from focus groups with families and early childhood educators to ensure our resources are practical, relevant and engaging.

Vision:
The eSafety Early Years Program aims to provide online safety advice and tips within a positive framework for prior to school aged children, their parents, carers and their educators in an Australian context. It aims to:
- Build an understanding of online safety (and networked technologies) in young children.
- Set the foundation for good habits early so they can carry this through to school and beyond — being safe, being kind, asking for help and making good choices.
- Provide educators with the skills and confidence to support the online safety of the children in their care and their families.
- Provide parents and carers with easy access to advice and practical tips.
- Encourage parents, carers and educators to communicate and work together to support young children in online safety.

Challenge:
Balancing the potential benefits and risks offered by new technologies through strong and comprehensive education that empowers children to thrive and have agency in a constantly evolving society. Adequately supporting early childhood educators to integrate digital literacy in their teaching, confidently and to provide parents and carers with the necessary skills and confidence to continue the learning in the home environment.

Key outcomes:
- Provides a suite of resources that fills the gaps in online safety resources for this cohort.
- Provides resources tailored to the needs and preferred modes of communication and engagement with key audiences.
- Involved a phased delivery of assets strategically timed to build awareness and buy-in with parents, carers and early childhood educators:
  - Phase 1 - Hard copy information kit and posters to raise awareness and understanding of key issues.
  - Phase 2 - Professional learning modules and associated resources to deepen level of understanding.
  - Phase 3 - Assets, such as a story book, that enable educators to continue to apply learnings and parents and carers to engage directly with their children on online safety.

Key advice is tailored to the needs of each audience and broken down according to the developmental age of the child:
1. Be safe
Help children develop their understanding of the connected world and how they can protect their personal information.
2. Be kind
Encourage children to be kind and respectful online and model good habits around device use and online sharing.
3. Ask for help
Support children to ask for help and let them know they can come to you with any issue.
4. Make good choices
Teach children to think critically about the content they watch and how they spend time online.

Policy alignment:
The Early Years Program is aligned with the key guidelines and frameworks for early years, including:
- Early Childhood Australia's (ECA) - Statement on Young Children and Technologies

- The National Quality Framework (NQF) and key aspects of the NQF, such as the National Quality Standard (NQS) and the Early Years Learning Framework
- Victorian Early Years Learning and Development Framework

The National Quality Standard and The Early Years Framework outline learning outcomes for children from birth to 5 years old. These outcomes include: feeling safe, secure and supported; developing resilience and a strong sense of wellbeing; using digital technologies to create, investigate and problem-solve; learning to interact in relation to others with care, empathy and respect; and becoming aware of fairness.

A.2. Coverage and eligibility

All educational settings including long day care, preschool, family day care, can access the resources. These have been designed to be flexible enough to adapt to the needs of different professionals and learners. Families nationally have access to all the resources free of charge.

Policy adoption is not compulsory and there are no specific measures to incentivise uptake/engagement.

A.3. Policy tools

There are a range of resources developed which:

- incorporate three key audiences (prior to school aged children, parents, carers and early childhood educators) which functions as a triad, with interrelated and overlapping needs and requirements.
- are child-centred and anchored in the experiences of young children and how they engage with digital technologies at home and in early learning services (as well as the values children, parents, carers and educators place on these activities).
- include tailored advice and resources in line with key child developmental theories and considerations.
- deliver resources and key information in a format that is familiar and takes account of each target audience's preferred ways of accessing, receiving and delivering information (communication between parents, early childhood educators and children).
- take into consideration that young children are only just developing an understanding of the 'internet' or how the 'networked world' works. Through their awareness of online safety at a young age, it is anticipated that young children will develop an understanding of networked technologies and why they need to be safe online that can be built on as they grow older.

There are a number of resources that have been developed across all three key audiences:

- Online safety for under 5s booklet and poster – written specifically for parents, this information book was sent to early learning services and kept by families as a resource to be referred to regularly as their children learn and grow before they are in school.
- Play School special online safety episode – explore safe technology practices as Play School prepares a special birthday party for Kiya. This episode was produced in collaboration with Australia's TV network ABC, for the Playschool series. It was shared in early learning services and then watched at home with families.
- Swoosh, Glide and Rule Number 5! Meet eSafety's sugar glider twins who are learning how to be safe online. Following the launch on Safer Internet Day 2021, the picture book is available online, in all libraries throughout Australia and orderable free of charge from eSafety.
- Our Family Rules Song – Lah Lah's Big Band (a well-known children's band in Australia) sing and dance to keep online safe practices in our minds. Available online in audio and with a dance-a-long video clip and sheet music.
- Playing IT Safe – created with the Alannah and Madeline Foundation and the Australian Federal Police, Playing IT Safe is a website with play-based activities and online games focussed on age-appropriate learnings about digital technologies. Educators and families can play these games and activities with their children.

Additional resources for educators:

- Professional learning online modules – a series of 3 accredited modules for educators and 1 for service directors and managers to support their understanding of safe online practices and current research created with Early Childhood Australia and available through their Learning Hub.
- eSafety checklist for early learning services – linked to the online module for directors and managers, this checklist aligns safe online practices with the National Quality Standard and has been developed in consultation with ACECQA.
- Online safety teaching posters – created as discussion opportunities for classrooms, these posters feature Swoosh and Glide and show children using technology. They come with educator notes and teaching points.

Additional resources for families:
- Parent articles – a series of articles that respond to questions parents/carers have asked or are concerned about for young children e.g., how to choose good online content.
- Story puzzles with Swoosh and Glide – an activity pack for children to play with parents and families.
- Family Tech Agreement – a practical downloadable PDF created with our Play School friends to help families create a set of rules about technology for their homes.

The evidence base for the program is drawn from:
- eSafety research ('Parenting in the digital age' and frontline workers research preliminary findings) and other research.
- Program focus groups with early childhood educators and parents and carers from diverse backgrounds.
- Stakeholder consultation and expert advice, including Early Childhood Australia (ECA), the Australian Children's Education & Care Quality Authority (ACECQA), Education Services Australia (ESA), Early Learning and Care Council of Australia (ELACCA), Australian Childcare Alliance (ACA), Playgroup Australia, Alannah and Madeline Foundation, Raising Children Network, Professor Susan Edwards, Director of the Early Childhood Futures, Australian Catholic University and Shona Innes, Clinical and Forensic Psychologist.

A.4. Funding and resources

The eSafety Commissioner is a federal Australian Government agency and therefore, the eSafety Early Years Program was funded by the Australian Government. All resources developed are available free of charge nationally.

A.5. Stakeholder engagement

Over the course of the program, various stakeholders were consulted (depending on the particular asset). Focus group testing with key stakeholders (parent groups, early childhood educators, key peak bodies in Early Childhood education) took place prior to the development of the program to ensure the needs of each audience were met and various key stakeholders were involved with user testing throughout development. Some resources were developed in partnership with stakeholders (Playing IT Safe | How to stay safe online and Playschool episode).

A stakeholder kit was developed in order to explain the background of the program, key messaging, and links to the digital resources and social media promotion.

There was strategic communication across the lifespan of the program to:
- Convey the aims of the program
- Pique interest and buy-in from key audiences (parents/carers and early childhood educators) in the lead-up to the release of assets
- Raise awareness of assets as they are released
- To help consolidate key messaging within assets

A.6. Future developments, sustainability and scalability

Given the ever-changing landscape of the digital world, eSafety will continue to look at ways we can meet the needs of 0-5 year olds, their parents and educators, which may involve developing new content and resources into the future. We are looking at opportunities to address additional needs for specific groups in this cohort.

In 2022 we launched a new suite of resources for 5–8-year-olds, their teachers and families. Further resources will be launched for this cohort in 2023.
- Mighty heroes
- Online safety classroom posters
- How our class stays safe online
- Family Tech Agreement
- Professional learning for lower primary teachers

B. Types and roles of digital technology

B.1. Digital resources

This program has focussed on touch screen technologies such as tablets and iPads because they are appropriate for children of this age group.

In Australia we have remote communities where access to the internet is unreliable and patchy and access to digital technologies can be expensive. This program allows for exploration of technologies that don't connect to the internet – encouraging the use of toys and the children's own imagination to model safe online exploration e.g. using a building block to represent a phone or a cushion for a laptop. Activities include role plays using "technology" created from non-tech based materials, understanding connectivity using string and paperclips to demonstrate the internet and what a connected world/ networks mean.

B.2. Digital competencies

Key messaging and outcomes from the Early Years Program:
- Is based on the understanding that engagement with technology and connected devices can offer young children opportunities to learn through exploration, play and social interaction. A well-supported start to online safety education for young children can build a solid basis for ongoing healthy habits, online and offline.
- Avoids spreading fear by not concentrating too heavily on risks yet explains why certain activities pose risks.
- Is based on the assumption (and emerging evidence) that if we can help parents, carers and educators understand the ways young children are affected by technology use around them, and how they play with technology, then adults will be more easily able to identify risks and offer practical advice.
- Broadens the understanding of parents, carers and educators to measure the value of using technology, not only in terms of screen time, but also the positive experiences online that provide opportunities for children to develop critical thinking and self-regulation skills and build a foundation for good online habits.

The Early Years Professional Learning modules have been designed to help teachers understand the variety of ways technology is used:
- We SAY and SHARE using technology (communication)
- We MAKE and DO using technology (creation)
- We WATCH and EXPLORE using technology (exploration)

The modules help to build teacher's competencies to explore, create and communicate safely using digital technologies. There are four interactive and competency-based learning modules (each approximately 45 minutes in duration with micro learning sequences for flexibility in learning). Three modules target early childhood educators and cover the concepts of online safety practices, risks and advice. The fourth module targets centre managers, directors and educational leaders of early learning services and focus on service-wide policies and practices to support safe use of the internet for children and educators.

B.3. Uses of digital technology

Key concepts / framing:

Online safety for children is largely described within the 3 risk categories of Contact, Conduct and Content. eSafety Early Years reframes these concepts to include young children's positive online experiences.

This framing provides a practice-based perspective for adults thinking about young children's safe use of technology. It also provides a strong basis upon which young children can build an understanding of online safety concepts and networked technologies. For example, introducing the concept of respect through simple acts of kindness, like taking turns when playing games with others on one device, building the skills of critical thinking by encouraging them to talk about what they are watching and why they like it, and encouraging parents to model kindness and respect through their own use of technology.

We have framed the resources into 3 categories that describe the typical technology engagement of children aged birth to five years.
1. **We SAY and SHARE with Technology.**

'Say and Share' refers to the ways in which young children communicate with others through technology. Say and Share activities encourage language development and help young children to build positive relationships.

Activities include:
- Talking to family, friends or educators through video/audio conferencing (including FaceTime, Skype, phone).
- Playing with toys that are connected to the internet - Internet of Things.

- Playing online games with others using associated voice chat apps (for example, Minecraft).

2. We MAKE and DO using Technology.

'Make and Do' refers to the ways in which young children create content, their own digital footprint and create new learning pathways using technology. Make and Do activities encourage creativity and empower young children to learn with and about technology.

Activities include:
- Taking photos and selfies and sharing them online.
- Making videos for digital storytelling and sharing them online.
- Playing games and activities where they create something new (for example, eBooks and picture collages using popular characters).
- Creating new knowledge and understanding through playing learning games and activities that enable discovery, experimenting and practice of skills.
- Playing with programs or apps that enable them to invent new things and imagine the impossible.

3. We WATCH and EXPLORE on Technology

'Watch and Explore' refers to the ways in which young children watch, listen and explore content online. Watch and Explore activities encourage self-regulation and the development of critical thinking skills.

Activities include:
- Watching YouTube and/or other streaming channels (e.g. Netflix).
- Choosing the types of content they engage with.
- Exploring and discovering the world through online resources (for example, National Geographic, WWF).
- Engaging stories from their own and other cultures.
- Listening, dancing and singing along to music.
- Learning how to do something new (for example, Lego 'how to' videos on YouTube).

The primary aim of the Early Years Program is to promote safe use of technology and to help children start developing digital citizenship skills. This is done through both digital activities (Playing IT Safe) but equally through non-digital resources that were developed – e.g. Swoosh and Glide and Rule Number 5 book, My Family Rules song, posters for Early Learning Centres and the combination of both (Playschool episode).

B.4. Support systems

eSafety has had support from Early Childhood Australia (ECA) – they were consulted on a number of the resources developed including the Strategy and Planning phases and the Professional Learning modules, which are hosted on their LMS platform.

All resources and supporting documents for educators, parents, carers and children under 5, are available through the eSafety website, including links to internationally adapted Early Years resources.

Hard copies of the Online safety for under 5s booklet were distributed to families through Early Learning Services nationally and the Swoosh, Glide and Rule Number 5 picture book was distributed to all libraries across Australia.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Two of the program's resources have been evaluated as part of eSafety's commitment to continuous improvement:
- The Online safety for under 5s booklet for parents and carers.
- Four of the online professional learning modules.

A series of interviews, an online survey and focus groups were conducted with educators, parents and carers who had used the resources. The results were gathered over a six-month period and then evaluated. The findings are presented in two separate reports. The first is an independent report prepared by Synergistiq. It gives an insight into the level of parental engagement with the booklet. It also looks at the degree of practice change among early childhood educators after they finished the learning modules. The second report was prepared internally by eSafety. It provides details about how many people viewed

or downloaded the booklet. It also shows the number of learning modules that educators completed and their immediate reactions after they finished. The reports can be found at: Evaluation of eSafety's Early Years program | eSafety Commissioner

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Key findings:
eSafety's Early Years resources have been positively received by educators, parents and carers since they were developed and released in 2020.

The Synergistiq report
- Most of the parents who were surveyed felt more confident to discuss online safety with their children and take action after reading the booklet.
- Many educators said that completing the learning modules enabled them to reflect on how digital technology could be safely used as a teaching tool.
- Half of the educators surveyed said the learning modules increased their confidence to talk about online safety with children and respond to their concerns.

The eSafety report
- The Online safety for under 5s booklet has been viewed or downloaded 12 805 times, in the first 6 months since its launch in 2020.
- 26 519 hardcover booklets have been ordered by organisations including preschools, community groups and primary schools.
- 3 467 educators completed, or were currently completing, a professional learning module as part of their training.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Some of the feedback from the evaluation of the two resources indicated that the main barrier to success was awareness of the program. Once parents, carers and educators were shown the resources, there was positive feedback but it has been challenging trying to build a presence in a sector that has not previously been focused and somewhat resistant to teaching internet safety.

Additional information
- Early Years Program for educators
- Early Years Program for parents and carers
- Playing IT Safe website developed in partnership by eSafety, Alannah & Madeleine Foundation and the Australian Federal Police
- Internationally adapted Early Years resources

Australia (South Australia)

Between 2017 and 2020, South Australia (Australia) enacted the **STEM in the Early Years initiative** through the possibilities offered by the Early Years Learning Framework, the nationally approved learning framework for ECEC services in Australia, and a range of policies and strategies. The STEM in the Early Years initiative aimed to increase the knowledge, skills and dispositions of educators and children in STEM learning within a play-based curriculum. The initiative included four connected projects, with one of these, the STEM Play Inquiry Initiative, focused on children using digital technology to strengthen their multimodal literacy. The initiative has also resulted in the development of an online professional learning platform.

Curriculum and pedagogy

Workforce development

Reference name: Case Study AUS_SA

A. Policy goals and design
A.1. Vision and broad objectives

The vision of the *STEM in the Early Years* initiative was to increase the knowledge, skills and dispositions of educators and children in STEM learning within a play-based curriculum. The project, informed by national and international research was focussed on educators developing expert teaching and learning in a range of learning environments.

- STEM Botanic (Learning out in the community) Initiative
- STEM POLA (Preschool Outdoor Learning Area)
- STEM Bridge (Continuity of learning preschool to school)

The Preschool STEM Multimodal Representations project was an element of the broader *STEM in the Early Years* project and specifically focussed on:

- Children's representations and the range of ways in which children are able to document their thinking and learning.
- Children's use of digital media and how self-efficacious they are at choosing and using this as a method of representation.
- How educators respond to children's representations and how they record these as a method of documentation (including multimodal representations).
- How educators use children's representations to design and plan for future STEM teaching and learning.

The *STEM in the Early Years* initiative evolved into a coding project and subsequently the multimodal project. The multimodal project was not the starting point, it was an evolution of the learning at system and site level.

Vision/Aspirational Situation: The *STEM in the Early Years* initiative was guided by the following:

- Belonging, Being and Becoming: The Early Years Learning Framework (EYLF) for Australia provides a foundation for enabling children in all ECEC settings to experience quality teaching and learning. The framework emphasises play-based learning and has been designed for use by early childhood educators working in partnership with families. The EYLF notes that "digital technologies can enable children to access global connections and resources, and encourage new ways of thinking". The EYLF reports that one of the key components of learning related to outcome 4 of the framework ('children are confident and involved learners') is that children resource their own learning through connecting with people, place, technologies, and natural and processed materials. Educators can promote this learning when they introduce appropriate tools, technologies and media to promote a child's learning. One of the key components of learning related to outcome 5 of the framework ('children are effective communicators') is that children use ICT to access information, investigate ideas and represent their thinking. Educators can promote this learning by providing children with access to a range of technologies as well as integrating technologies into children's play experiences and projects.
- The South Australian Department for Education's STEM Learning Strategy 2017-2020 also guided the 'STEM in the Early Years' initiative. The STEM Learning Strategy had three key areas for action:
    - o build expertise in STEM teaching and learning across all years of public education;
    - o engage students at all year levels in STEM education;
    - o develop systematic excellence in STEM education.

Alignment with Broader Policy Developments: The SA STEM Learning Strategy 2017-2020 aligned to the Australian National STEM School Education Strategy 2016-2026. The national strategy signed by all Australian Education Ministers recognises that the development of skills in critical and creative thinking, problem-solving and digital technologies are essential in the 21st century. It recognises the importance of a focus on STEM in the early years, to be maintained throughout schooling.

The EYLF supports Goal 2 of the Melbourne Declaration on Education Goals for Young Children, and the more recent Alice Springs (Mparntwe) Education Declaration, that: "All young Australians become confident and creative individuals, successful lifelong learners, and active and informed members of the community". Of particular note, the Declaration describes lifelong learners as those who are "productive and informed users of technology as a vehicle for information gathering and sharing and are able to adapt to emerging technologies into the future".

Intended Outcomes of the *STEM in the Early Years* initiative: Project findings would lead to the development and launching of an online professional learning platform and resources for educators. It was also intended that children demonstrated increased levels of engagement in curiosity, and critical and creative thinking, and leaders and teachers demonstrate efficacy, agency and expertise in designing STEM learning.

A.2. Coverage and eligibility

Projects under the *STEM in the Early Years* initiative involved South Australian metropolitan and country located government preschools selected to participate following an application process. The preschool staff participating demonstrated a willingness and capacity for new learning and for sharing practice and resources within their own site, through their local partnership (the collective of geographically defined preschool and school sites in close proximity), and through co-designing the production of online resources to share across the state.

Notably, the SA ECEC environment is unique in its preschool delivery model compared to other states and territories in Australia. In 2020, 83% of children enrolled in a preschool program in SA accessed a government preschool. The intention was to share learnings from the project system wide, to support more systemic growth of educator practice and children's learning across all department sites.

A.3. Policy tools

The SA Department for Education STEM Learning Strategy 2017 to 2020, aligned to the National STEM School Education Strategy identified four key levers for improving engagement, participation and achievement in STEM:
*   Build positive dispositions towards STEM so that learners, teachers, leaders and school communities are inspired to take on more challenging STEM learning experiences and subjects
*   Strengthen STEM teaching Preschool to Year 12 so that every learner develops strong disciplinary knowledge of STEM and the underlying skills of critical and creative thinking, problem-solving and entrepreneurial thinking
*   Support the establishment of effective partnerships for STEM related teaching and learning, within and between schools, and with business, industry, universities and community
*   Promote approaches to Preschool and school structures and organisation that build student engagement, participation and achievement in STEM education.

The SA Department for Education developed the STEM Evaluation Framework to assist with the evaluation of government STEM initiatives. The framework identified 4 evaluation questions aligned to the STEM Learning Strategy key aims and 4 key levers.
*   In what ways does STEM develop cognitive, interpersonal, intrapersonal skills and enable students to become inquirers and problem-solvers prepared to be challenged in their learning.
*   To what extent are strong discipline and pedagogical content knowledge contributing to improved learning outcomes in mathematics, science and technologies? (NB: This question did not apply to the EYs project).
*   What pedagogies optimise inclusivity in the learning environment to encourage students to achieve their potential in STEM?
*   In what ways do organising structures, spaces and resources enhance student and teacher outcomes in STEM?

A.4. Funding and resources

The *STEM in the Early Years* initiative was resourced through government education funding. Those preschool staff participating in the project were committed to an inquiry-based approach including reflecting and documenting their research to evidence the learning for children, educators and families.

Project support staff included a university researcher (and protagonist) and a dedicated team of project officers who brought a particular digital focus based on their expertise and strengths. There were site visits from these support staff, as well as centralised professional learning days. In addition, each site shared their learning at a 2-day state-wide exhibition which was a free event for all early childhood educators across the state (government and non-government educators).

A.5. Stakeholder engagement

As part of the *STEM in the Early Years* initiative, a STEM multimodal project was undertaken as a collaborative research project between two department preschools, the department's Early Years Learning Improvement Directorate and Flinders University. Multimodal representations can be described as information that is represented and communicated using two or more modes, such as writing, sound and image. These multiple modes are seen as complementary and can be used interchangeably to allow children to explore, represent and communicate their thinking and learning. Multimodal play enables children to make meaning in different modalities to enrich their understandings of their everyday life-worlds.

The learnings from the project were communicated through a 2-day state-wide exhibition, research articles, and sites sharing the learning with families. Additionally, "STEM Quest: Online STEM professional learning for early years educators" was

developed during the project and continues to support wide access to professional learning. STEM Quest is a collection of online resources that have been developed to guide and support early years educators design STEM learning. STEM Quest supports the improvement of STEM teaching and learning for all young children, offering media rich resources intentionally designed for collaborative viewing. STEM Quest invites ECEC staff to view, consider and learn from academics, teachers and leaders involved in co-designed STEM research projects here in South Australia.

Professor Nicola Yelland, who was involved in the *STEM in the Early Years* initiative, presented on the multimodal play project at the European Early Childhood Education Research Association Conference (Glasgow, August 2022). Professor Nicola Yelland has also written about the multimodal project in an edition of Early Childhood Australia's Every Child Index publication (Vol 27, No.4, 2021). Early Childhood Australia is a peak Australian advocacy organisation which supports young children, families and those in the early childhood field. Content and resources related to the STEM in the Early Years initiative can be accessed by SA government staff including early years educators and teachers via the online professional learning platform or through the department's intranet.

A.6. Future developments, sustainability, and scalability

The *STEM in the Early Years* initiative has resulted in the development of an online professional learning website ('Designing STEM learning for the early years') which features STEM in the early years learning design resources, information about department research projects including case studies, and academic research on STEM in the early years, to promote government-employed early years' educators and teachers STEM inquiries and pedagogies. This website is complementary to STEM Quest which is on the department's online learning management system.

The department's Preschool Upgrade project addresses aging ICT infrastructure and devices in government preschools across South Australia. Through the project, preschools received a suite of upgrades to both their internet connections and equipment, ensuring that staff now have access to up-to-date technology and ongoing ICT support. This project was mostly funded by the department with each preschool making a small financial contribution. This project has benefited preschools by reducing educators' administrative burden, enabling digital learner records, supporting engagement with parents and community online, and enabling staff to undertake professional learning online. The provision of faster internet, reliable Wi-Fi, devices, and hardware also means that staff have increased ability to share engaging content and undertake on-line training to use new technology. It has also opened up opportunities for children to actively use technological devices to support their learning and critical and creative thinking development.

B. Types and roles of digital technology

B.1. Digital resources

Digital devices used in the STEM Multimodal Representations project included iPads, iPods and digital pencils. Mobile devices had a limited range of apps that focused on construction and creativity, over passive consumerism. Preschool sites participating in the project experimented with iPads and found them useful for documenting learning as well as recognising learning opportunities. iPads, for instance, could be utilised effectively for multimodal representations through image, video, drawing, music and voice.

Digital devices were used to photograph artwork and models, and to capture animated play situations. Educators also used them to film scenarios, games and small-world play adding music, audio, and commentary.

B.2. Digital competencies

Digital competencies for ECEC professionals
The STEM Multimodal Representations project aimed to increase early childhood education and care professionals' confidence and competency to use digital resources to expand children's multimodal literacies. The project also examined how educators use children's representations to design and plan for future STEM teaching and learning. Educators moved away from hardware or software (or apps) that instruct and entertain, to those which supported children to create, construct and communicate knowledge and skills. Educators' emergent pedagogy was intentional and responsive to children's play, supporting children to safely and capably choose and use digital devices. Findings from the STEM Multimodal Representations project have been made more widely available to promote how educators can adopt and/or utilise digital technologies in their practice.

Young children's early digital literacy
The STEM Multimodal Representations project sought to investigate the ways that young children choose to represent their STEM understanding, including through digital media, and how educators use this documentation to inform their design for teaching and learning. Through the project, children were also able to explore the rich potential of digital technology to expand their knowledge and ideas in play and become confident in using digital technologies for creating and communicating their understanding in combined modalities.

B.3. Uses of digital technology

Combination/balance between digital technologies and non-digital activities and tools
One key research question that the STEM Multimodal Representations project aimed to address included: would the use of digital technologies complement existing modalities and encourage communication through modes that may not be readily used or understood by educators and children? The STEM Multimodal Representations project was interested in examining how digital devices such as iPads, iPods and digital pencils could be used by children alongside other materials and tools. This work also bridged into robotics with preschool children engaged in coding – using Beebots and Cubetto.

B.4. Support systems
Addressed in section A4 of the template.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

As noted in section A3, the department created the STEM Evaluation Framework to assist in evaluating STEM Learning Strategy initiatives including the STEM in the Early Years project and related Multimodal Research element.

Three big questions were used as the organising construct for evaluation of the Early Years project:

1. In what ways does STEM develop cognitive, interpersonal, intrapersonal skills and enable students to become inquirers and problem-solvers prepared to be challenged in their learning?
2. What pedagogies optimise inclusivity in the learning environment to encourage students to achieve their potential in STEM?
3. In what ways do organising structures, spaces and resources enhance student and teacher outcomes in STEM?

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

As noted in section A5, evidence on the outcomes and impact are available and have been shared in wider academic and sector stakeholder groups. Resources, tools and information have also been developed and can be accessed via the department's professional online learning platform.

The STEM Multimodal Research project evaluation reported the following findings:
Educators:
- Became confident and competent users of digital devices;
- Utilised hardware, software (apps) which supported children to create, construct and communicate knowledge and skills;
- Extended their pedagogical repertoire through the co-construction of knowledge with children, enabling them to choose, use and evaluate multimodal resources.

From the educator's developing pedagogy, it was evident that:
- Intentional and responsive pedagogy supported children to safely choose and use digital devices;
- Creating rich learning environments provided children with agency to access a range of digital and non-digital modalities, and time to explore them;
- Embedding multimodal approaches to learning offered children ways to deepen their meaning-making through play-based explorations within an emergent curriculum.

Children (when offered a range of modes):
- were able to explore the rich potential of digital technology to expand their knowledge and ideas in play;
- identified, articulated and modified their thinking when selecting appropriate modalities;
- became confident in using digital technologies for creating and communicating their understanding in combined modalities.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g., evaluation reports, stakeholder feedback, research studies, etc.)?

Implementation of the policy/program was enacted uniquely at each site, with services documenting their learning in digital records (videos). This enabled them to share their stories with other sites, and contribute to the building of a learning community and evidence-base around play-based pedagogical practice using digital affordances. As such, the project sought to make a real-world difference to children's learning and staff professional learning outcomes.

Additional information

In 2020, Australian Education Ministers commissioned an update of the EYLF to ensure that it continues to reflect contemporary developments in practice and knowledge as well as support all educators. A national consortium led by a partnership between Macquarie University, Queensland University of Technology and Edith Cowan University was engaged by the Australian Children's Education and Care Quality Authority (ACECQA), on behalf of all governments, to deliver the approved learning frameworks project. A literature review conducted as a part of the update found that the inclusion of digital technology in the EYLF would support children's 'digital citizenship'. The project's discussion paper has also emphasised that nurturing a child's critical skills to operate in the digital environment is of growing importance. Additional details including the literature review and discussion paper, and the updated EYLF released in early 2023 can be found here: Approved learning frameworks | ACECQA

The South Australian Government's Early Learning Strategy 2021 to 2031: All young children thriving and learning articulates a strong commitment to giving South Australia's youngest the best start in life, so that all young children are thriving and learning. It recognises that high-quality early childhood education helps children build the foundations to become creative, entrepreneurial, resilient and capable learners.

Brazil

At ECEC level, Brazil's **Support Programme for the Implementation of the National Common Curricular Base** (ProBNCC, 2018) supports municipal authorities to implement curricular reform. The reform, which covers curricula across ECEC (0-6 years) and schools, sees digital skills embedded within several transversal competencies as well as the establishment of a new curriculum area "Computing for Early Childhood Education". Implementation supports offered via the ProBNCC include financial support for training for the technical teams adapting the curricula and for teachers, a digital platform with good practices, supports to engage with standardised teaching material and financial support for the evaluation of pedagogical practices.

Standards and governance

Curriculum and pedagogy

Workforce development

Monitoring and evaluation

Reference name: Case Study BRA_1

A. Policy goals and design

A.1. Vision and broad objectives

The ProBNCC aims to support departments in the development of all necessary actions for the implementation of a curriculum that proposes the following main innovations:
- based on competence, clearly indicating what students should know and know how to do;
- committed to Integral Education, including the cognitive, affective, artistic, cultural, corporal, social dimensions;
- committed to equity and diversity.

Among the skills and abilities provided laid down in the BNCC are those related to the digital world. The BNCC presents 4 out of 10 general competencies that address issues related to the digital world, with emphasis on the competency: *"Understand, use and create digital information and communication technologies in a critical, meaningful, reflective and ethical way in various social practices (including the school ones) to communicate, access and disseminate information, produce knowledge, solve problems, and exercise protagonism and authorship in personal and collective life."*

For Early Childhood Education, the BNCC also brought innovations by pointing out six learning rights (living together, playing, participating, exploring, expressing, and getting to know oneself) and five fields of experience ((1) the self, the other and the us; 2) body, gesture, and movements; 3) traits, sounds, colours and shapes; 4) listening, speech, thinking and imagination; and 5) spaces, times, quantities, relationships and transformations).

For computational competencies, the BNCC of Early Childhood Education includes 2 Axes (Computational Thinking and Digital World) and 4 Premises:
1. Developing recognition and identification of patterns, building sets of objects based on different criteria such as: quantity, shape, size, colour and behaviour;
2. Experiencing and identifying different forms of interaction mediated by computational artefacts;
3. Creating and testing algorithms playing with objects in the environment and with body movements individually or in groups;
4. Solving problems by breaking them down into smaller parts identifying steps, steps or cycles that repeat and that can be generalized or reused for other problems.

With the implementation of ProBNCC, MEC had the following main objectives:
- To technically and financially support state and municipal departments to align their curricula with the BNCC.
- To expand the technical capacity of the Education departments.
- To support technically and financially in the training of education professionals.
- To support the alignment of didactic materials to the BNCC.
- To expand the technical capacity of the Education departments for the development of infrastructure and pedagogical practices aligned with the BNCC.

The curricular changes brought about by the BNCC of Early Childhood Education converge with international guidelines, in particular:
- Jomtien Declaration (1990), which introduced the notion that the "learning begins at birth".
- Convention on the rights of the child (1989), which recognized Education as a human right to be guaranteed free of charge and obligatorily for all children.
- The Dakar Framework for Action: Education for All (2000), which recognized the importance of investing in early childhood education to increase the chances of school success, especially for the most vulnerable, and reinforced the importance of ensuring greater access to Early Childhood Education.
- Moscow Framework for Action and Cooperation (2010), which listed several international commitments to increase the time and access to Early Childhood Education, as well as increase funding, need for teacher training, and monitoring the quality of this stage of Basic Education. Among the commitments of this document, one that is closely related to this policy stands out below: "Improve curricula and methods in tune with childhood, evaluating play, affection, cooperation, talent and creativity, joy, the fostering of self-confidence and autonomy, as well as active learning pedagogies that take into account a child's point of view".
- Agenda 2030: sustainable development goal 4, specifically topics 4.2 and 4.7.
- Tashkent Declaration and Commitments to Action for Transforming Early Childhood Care and Education (2022), which reinforced countries' commitments to universalizing equitable early childhood education, including public and

free education; improvement of training and appreciation of education professionals; increased ECCE funding; and expansion of mechanisms for monitoring and evaluating the public management of Education.

A.2. Coverage and eligibility

This policy reaches 8 319 399 enrolled children, 3 417 210 in daycare and 4 902 189 in preschool, according to the Statistical Synopsis of Basic Education (INEP/2021) *(Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* / National Institute of Educational Studies and Research Anísio Teixeira). There are 595 397 teachers working at this stage, 312 872 in day care centres and 322 850 in preschools. Early childhood education establishments total 112 927 schools, including nurseries and preschools. More than 5 500 municipalities in Brazil have already aligned their curricula with the BNCC, as well as benefited in some way from the actions developed within the scope of the ProBNCC. To participate in the Program, the Education departments had to sign up via a term sent to the MEC, however, there was no exclusion criterion.

A.3. Policy tools

The Programme included:
- Financial support for training technical teams responsible for preparing curricula.
- Financial support for teacher training.
- Platform with curricula and good practices included.
- Public call notice for the purchase of the teaching materials selection aligned with BNCC, via PNLD (*Plano Nacional de Livros Didáticos* / National Plan for Textbooks). The PNLD 2022 provided teaching materials for teachers and students of the Early Childhood Education.
- Financial support for carrying out actions to evaluate and improve the quality of pedagogical practices in Early Childhood Education, as well as the purchase of pedagogical materials, via the *Programa Primeira Infância na Escola* / Early Childhood in School Program.

A.4. Funding and resources

Approximately BRL 146 million were invested and distributed:
- Financial support with scholarship holders from the technical teams for the preparation of curricular references: BRL 15 900 000
- Financial support for teacher training: BRL 83 million
- Financial support for schools, via Early Childhood Programme at School: BRL 41 million
- Policy monitoring evaluation: BRL 5 million

A.5. Stakeholder engagement

The ProBNCC was created in a Collaboration Regime between MEC, the *Conselho Nacional de Secretários de Educação* / National Council of Education Secretaries Education (CONSED) and the *União Nacional dos Dirigentes Municipais de Educação* / National Union of Municipal Education Directors (UNDIME), which form the National Committee for the Implementation of the BNCC. Also there is participation from civil society organizations and institutional representations of National, State and Municipal Councils, namely, the CNE, the *Fórum Nacional dos Conselhos Estaduais de Educação* / National Forum of State Councils of Education (FONCEDE) and the *União Nacional dos Conselhos Municipais de Educação* / National Union of Municipal Councils of Education (UNCME).

MEC Ordinance No. 268 of March 22, 2018, amended by MEC Ordinance No. 757 of April 3, 2019, establishes the National Committee for Implementation of the BNCC. The program's stakeholders are also constituted by the municipal departments of Education, professionals from school units, as well as students. Finally, the MEC has a partnership with the Federal University of Juiz de Fora to monitor the policy and with the Federal University of Ceará to promote initiatives for the evaluation and improvement of pedagogical practices.

A.6. Future developments, sustainability, and scalability

The next steps include:
- Disclosure of the BNCC Computing.
- Specific teacher training for the BNCC Computing.
- Expansion of school infrastructure to improve pedagogical practices in computing.

- Evaluation of pedagogical practices for better targeting the recommendations and intervention proposals alongside school units with greater difficulties in implementing the BNCC's pedagogical proposals.

B. Types and roles of digital technology

B.1. Digital resources

For the Early Childhood Education Stage, Computer Teaching allows exploring experiences always moved by playfulness through interaction with peers. These relate to the several fields of experience in Early Childhood Education and to the axis of computational thinking and the digital world. In this way, most of the competencies and skills developed in this stage do not require a technological infrastructure, since they include pattern recognition and identification, algorithm testing and problem solving, activities that can be carried out with the pedagogical materials already available in schools of Child education. However, some of the proposed skills may require the use of computers and internet access. In this sense, the MEC coordinates the National Policy for Innovation and Connected Education, which provides technical and financial support to enhance school connectivity.

B.2. Digital competencies

Within the scope of the general curriculum for Early Childhood Education, the BNCC still incorporates technologies in several aspects. One of the learning rights, for example, is "To explore movements, gestures, sounds, shapes, textures, colours, words, emotions, transformations, relationships, stories, objects, elements of nature, at school and outside of it, expanding their knowledge about culture, in its various modalities: the arts, writing, science and technology." Still, among the fields of experience for the development of competencies and skills in early childhood are: "Traits, sounds, colours and shapes" which involves living with different artistic, cultural and scientific manifestations, local and universal, in the daily life of the school institution, enabling the exercise of authorship (collective and individual) with sounds, strokes, gestures, dances, mimes, staging, songs, drawings, modelling, manipulation of various materials and technological resources". The BNCC of Early Childhood Education is even more specific in the use of technology by pointing among the learning and development objectives: "(EI01EF07) Knowing and handling printed and audio-visual materials in different carriers (book, magazine, comic book, newspaper, poster, CD, tablets, etc.)."

In BNCC Computing, there are two axes with eleven learning objectives:
1. To recognise pattern repetition in sequence of sounds, movements, drawings.
2. To express the steps for carrying out a task in a clearly and orderly manner.
3. To experience algorithm execution by playing with (non)electronic objects.
4. To create and represent algorithms to solve problems.
5. To compare different algorithmic solutions to solve the same problem.
6. To understand decisions in two states (true or false).
7. To recognize electronic (and non-electronic) devices, identifying when they are on or off (open or closed).
8. To understand the concept of interfaces for communication with (non)electronic objects.
9. To identify computing devices and different forms of interaction.
10. To use digital technology in a safe, conscious, and respectful way.
11. To adopt healthy habits in the use of computational artifacts, following recommendations from competent health bodies.

B.3. Uses of digital technology

The policy provides support for Education departments and school units to implement the curriculum, which includes several skills and abilities related to computational thinking and the digital world. Once the curriculum is implemented, it will ensure the use of technology by professionals (who receive specific training in the use of new technologies, including through the provision of laboratories for teacher training) and students, who will have a specific time in the timetable for the development of the respective learning objectives. Many of these skills do not need the use of technology to be taught since they address general principles and concepts related to computational thinking.

B.4. Support systems

The policy relies on the following systems:
- BNCC Portal for the general community.
- BNCC Platform for managers municipal and teachers.
- AVAMEC for education professionals (managers and teachers).

- • [LabInova](#) for the general community, managers, and education professionals.
- • [Connected Education Portal](#) for the general community, managers and education professionals.
- • [Plan of Articulated Actions](#) for municipal managers and technical teams from the Departments of Education.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Yes. To monitor the implementation of the BNCC, a partnership was established with the Federal University of Juiz de Fora. The survey involved 220 municipalities, 1 490 school units, 24 262 respondents. The objective of the study was to identify aspects related to pedagogical practices, the level of participation of professionals in the elaboration and implementation of the BNCC and the perception of the effects of the BNCC on educational management and professional culture.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Yes.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

The main challenge lies in teacher training and changes in pedagogical practices in the classroom. This is one of the conclusions pointed by the study mentioned above. Furthermore, we have challenges with the infrastructure and pedagogical material distribution scopes.

Costa Rica

Since 2020, Costa Rica has been running **Webinars for ECEC Teams**, working in diverse settings that are part of the National Child Care and Development Network (REDCUDI). The webinars initially aimed to ensure continuous and appropriate care for 0-5-year-olds during the COVID-19 pandemic but have since expanded to cover any issues related to enhancing the holistic development of young children. The training takes place via Microsoft Teams and so aims to enhance digital skills among ECEC staff while also enabling them to access training on early child development and care more easily and regularly. Training is developed by a panel of experts and participation is free of charge.

Curriculum and pedagogy

Workforce development

Family and community engagement

Equity and diversity

Reference name: Case Study CRI

A. Policy goals and design

A.1. Vision and broad objectives

The initiative's vision is to be a central means by which ECEC services access virtual training processes on issues related to early childhood and child development. The objective is to provide tools and topics relevant to the work of ECEC staff working directly with children.

The initiative is part of the work undertaken by the National Child Care and Development Network (*Red Nacional de Cuido y Desarrollo Infantil,* REDCUDI), which aims to establish an ECEC system with public, universal access and solidarity financing that brings together public and private ECEC settings and providers to strengthen and expand care alternatives.

Implementation of the webinars began in May 2020, as a response to the need for training in childcare and development alternatives, as well as to the national situation deriving from the COVID-19 pandemic. The process was initially called "Guidance on approaches for staff in alternative care settings in the context of the COVID-19 pandemic". It was then renamed "Training webinars for staff in alternative ECEC settings" [*Procedimiento de capacitaciones mediante el uso de dirigido a las personas trabajadoras de las alternativas de cuidado y desarrollo infantil*], with the purpose of being a continuous and permanent process within the work carried out by the Technical Secretariat of REDCUDI.

One of the biggest challenges has been working with new technologies, implementing and at the same time motivating the participation of staff in ECEC settings, as well as emphasising the importance of continuous training for those who work with children. During 2020, 2 189 people participated; in 2021, 1 600 people participated; by September 2022, 2 089 people had participated. The initiative provides valid information for the analysis work of the Office of Education and Early Childhood (*Oficina de Educación y Primera Infancia*) since it involves engaging in the digital world in order to promote the improvement and quality of ECEC services.

A.2. Coverage and eligibility

The target population is those working in ECEC settings, however, the trainings are open to anyone interested in participating and who works on childhood issues or in a public institution that is part of REDCUDI.

The trainings are developed by a panel of experts who work on topics related to care, child development and any other pertinent areas.

The scope is national; ECEC staff from any care modality anywhere in the country can participate. There are no previous selection criteria other than having interest in and commitment to the training. It is important that participants have the digital means and skills to access Wi-Fi and use Microsoft Teams.

Participation in the webinar is free of charge. Participants are asked to fill out a registration form and complete the attendance record during the training.

A.3. Policy tools

The project is sustainable over time since there is an interest in taking advantage of virtual tools to train children's centres. The Technical Secretariat of REDCUDI follows-up on the goals established in the Management Plan and the results are shared technical and political representatives within the institutions that make up REDCUDI.

A review of the initiative is planned for 2023 to establish improvement actions as required.

A.4. Funding and resources

The resources used for the development of the virtual trainings come from REDCUDI's institutional resources (i.e. two officials from the REDCUDI Technical Secretariat are in charge of the organisation and logistics of the Webinars). The panel of experts is made up of officials from other public institutions or academia and they participate on a voluntary basis after inter-institutional coordination.

A.5. Stakeholder engagement

Webinars are shared on social networks, as well as by emails exclusively targeting childcare and development settings. Likewise, the invitation is extended to the REDCUDI Inter-institutional Technical Commission (CTI), which brings together more than 9 public institutions.

With respect to those who develop the trainings, the management team coordinates collaboration processes with institutional entities and contacts that oversee issues related to childhood, ECEC and child development.

The webinars seek a maximum participation of ECEC staff so that the topics can become embedded in their ECEC provision and to support digitalisation processes through the use of digital platforms, in this case, Microsoft Teams.

A.6. Future developments, sustainability and scalability

There are plans to continue implementing this initiative. The process requires coordination with both internal and external institutions so that the trainings are sustainable over time and to help improve the trainings further.

B. Types and roles of digital technology

B.1. Digital resources

With regard to technological resources, the use of the Microsoft Teams digital platform stands out, which allows greater and better communication with the webinar participants. Likewise, "Google Forms" is used to create surveys to find out the satisfaction of the quality of the webinars, for virtual assistance and for registration processes for the webinars.

B.2. Digital competencies

The webinars themselves promote the development and digital skills as well as knowledge. Those interested in participating must learn to use the digital platform and interact through it with their peers and with the speakers. Added to this, the process generates new knowledge on child development.

B.3. Uses of digital technology

This initiative is aimed at adults who work in care alternatives and aims to generate educational content that supports the work of the children's centre. At least two training sessions are held each month with the support of ECEC experts. The Microsoft Teams tool allows a greater reach, when compared to face-to-face activities, in addition, it allows people from all provinces of the country to join from their workplaces or homes, either through a computer or even from their mobile, reducing transportation costs, for example.

B.4. Support systems

In the REDCUDI Technical Secretariat there is an Information Technology professional who provides support if required and when necessary. In addition, there is access to Wi-Fi and the necessary equipment to implement the process. These resources are supported by the REDCUDI institutional budget.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

A follow-up process is outlined in the Institutional Management Plan of REDCUDI, which details the activities carried out and the main results. In addition, different evaluation strategies are used to measure success, such as: 1. Webinar satisfaction surveys. 2. Feedback through Facebook posts to the REDCUDI Technical Secretariat. 3. Number of certificates of participation that are issued.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

As a recent initiative, there is currently no evidence indicating the impact that the webinars have generated. However, participation numbers indicate an increase for 2022 on previous years.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Like any process, there are certain obstacles and factors that can influence implementation. The advantages and disadvantages of this process have been as follows:

- Advantages of webinars: Access from anywhere, flexible hours, savings in travel, lodging, food and other expenses for participants and trainers, simple and automated registration processes, easy exchange of information before, during and after the webinar, variety in the different actions that can be executed, possibility to publish or download additional digital material, ability to save the presented content.
- Disadvantages of webinars: Technical difficulties, not all those interested can participate, equipment may not provide good audio and video.

Additional information

Different publications and feedback related to the webinars can be found on the page of the REDCUDI Technical Secretariat: https://www.facebook.com/redcudicr/

Czech Republic

The Czech Republic's **Innovation in Education in the Context of Digitalisation** programme (2022) within the post-COVID National Recovery Plan supports the development of age-appropriate digital and information literacy and the promotion of children's computational thinking. It also aims to close the digital divide by funding digital infrastructure and equipment across educational settings and to enhance the digital competencies of education professionals. The programme extends across the full education system from pre-primary level (3–5-year-olds). The programme is funded through the Ministry of Education and Culture and the European Union's Recovery and Resilience Facility.

Curriculum and pedagogy

Workforce development

Equity and diversity

Reference name: Case Study CZE

A. Policy goals and design

A.1. Vision and broad objectives

Vision: The suitable and age-appropriate use of digital technologies should be a matter of course in all areas of education. It should become a meaningful part of the teaching process and promote both computational thinking and digital literacy among students. The teaching of Informatics itself should not be limited to the principles of digital technologies but should be a prerequisite for the effective application of digital technologies in all areas.

Challenge: Thanks to technological trends, teachers can improve the efficiency and quality of teaching, but also more easily develop innovative methods and forms of education. It is necessary to ensure good material conditions for the introduction of such innovations and to support children to develop digital literacy.

Intended outcomes: Kindergarten teachers will have sufficient material equipment (ICT, digital) for the development of children's computational thinking and digital competencies. They will be able to use them effectively.

The initiative *Innovation in education in the context of digitisation* is related to the development of digital learning, which is part of the strategic document *Strategy 2030+* (Strategic line 1: Transforming the content, methods and assessment of education).

A.2. Coverage and eligibility

The policy is comprehensive, from pre-primary education to upper secondary level, not targeted only at pre-school education. At ISCED level 02 (ages 3-6), all educational facilities and staff have access to the related financial resources.

Schools established by the state receive these funds automatically in their budget. Private and church schools can apply for funding in the form of a subsidy program. The [methodological portal](#) of the Ministry of Education and Culture motivates schools to use the money and engage with the programme.

General note: According to the Education Act, kindergartens are obliged to improve the education process based on the research findings from science, research and development and to apply effective modern pedagogical approaches and methods in education. Kindergartens are responsible for providing material equipment for the implementation of the school educational program. It depends on each school which ICT technologies it wants to use and which it buys from the funds it receives.

A.3. Policy tools

Effective use of the digital equipment acquired through the initiative is supported considerably through the various methodological supports available to kindergarten teachers, prepared in particular by the National Pedagogical Institute of the Czech Republic. The concept of cross-curricular development of students' digital literacy was verified in 2019-20 in kindergarten, primary and secondary schools. Many methodological materials have been created that can be used by teachers in kindergartens:

Methodological manual for pre-school and primary education ([Digital competence for all](#))
As well as a pdf version, the methodological manual is presented as an interactive mind map through the OrgPad interactive environment. It provides a comprehensive overview of individual areas of digital competence and at the same time allows users to conduct quick searches for specific material or inspiration to feed directly into lessons. Three areas of digital competence are developed in the manual:

1. device and data security, health protection, etiquette;
2. use of digital technologies;
3. the importance of digital technologies.

The National Pedagogical Institute's Support System for the Professional Development of Teachers and Principals (SYPO) programme developed a **webinar to support educators to use the methodological manual** ([How to develop digital competence in kindergarten and 1st grade](#))

Methodological material to support teachers in pre-primary and primary education to foster digital literacy

- The [Digital literacy at nodal points in education](#) publication was created as a tool to support teachers to set learning goals in the development of digital literacy while also providing support for monitoring learners' progress . It shows not only the "what" to teach, but above all the "how" to teach, so that each child achieves maximum development in the given area in a given period.

- The TIO project makes a series of teaching units on digital literacy available for educators in pre-primary and primary schools. The aim of the material is to introduce children to the topics of communication, ethics and safety in the digital world through a robot, TIO, and the stories of his digital experiences.
- The Algorithms using robotic toys for children under the age of 8 publication presents a comprehensive set of lesson plans and teaching activities to support the development of computational thinking. The materials focus on the development of spatial perception, which makes it possible to understand the relationships between individual objects, or objects and us, and is important for the development of mathematical skills.

Specific measures for staff in ECEC settings

- The Digital technologies in kindergarten publication aims to show how to develop digital literacy and computational thinking in children in kindergarten.
- The Digital Technologies in Pre-Primary Education lecture series deals with the development of digital literacy and computational thinking of preschool children.
- The Digital Technologies in Pre-Primary Education educational material covers topics related to the development of computational thinking in preschool children in the areas of algorithms, robotic toys, children's programming environments, etc.

A.4. Funding and resources

Funds for the implementation of the National Recovery Plan (including the initiative *Innovation in education in the context of digitisation*) will be provided to the Czech Republic from the European Union through the Recovery and Resilience Facility (2021-26). Activities are also financed from the budget of the Ministry of Education and Culture. The exact budget that is earmarked explicitly for pre-school education cannot currently be precisely defined.

A.5. Stakeholder engagement

A webpage publishes updated information about the implementation of the initiative at school level and support for schools looking to access and use funds.

A.6. Future developments, sustainability and scalability

This is a long-term strategy; it will continue to be supported. The Framework educational programme for preschool education (national curriculum) will be updated (up to 2024) to support the development of children's' digital competencies and schools/kindergartens will be continuously provided with targeted methodological support for its implementation.

B. Types and roles of digital technology

B.1. Digital resources

The initiative supports teachers to embed a variety of digital technologies across their teaching so that learners may be exposed to a full range of tools and technologies across their education, either learning about them and/or through them

The digital learning equipment that kindergartens can buy with the funds from the initiative includes:

- Robotic and programmable digital learning aids, for example, robots, robot kits.
- Digital devices for children with special educational needs, such as aids for alternative computer control, software for voice recognition, enlarging the image on display, automatic text reading, readers for the visually impaired, etc.
- Equipment for so-called unplugged activities developing computations thinking and digital competence.
- Software equipment such as licenses or online applications that provide or are usable for education or serve as a means of education (e.g. educational software, operating systems or applications or parts of applications beyond the scope of those freely available).
- Basic digital devices such as laptops, Ultrabooks, Chromebooks, tablets, smartphones, etc. including accessories (e.g. charging boxes, packaging) and software equipment.
- Accessories for basic digital devices (e.g., webcams, mice, headphones, keyboards, packaging, etc.)

B.2. Digital competencies

In pre-primary education, this initiative focuses on improving the digital equipment of kindergartens. The intention is to support the development of students' digital and information literacy. The intention is also to develop the digital competencies of pedagogues, which is a necessary prerequisite for teaching innovation and for supporting children to acquire the above-mentioned literacy skills.

B.3. Uses of digital technology

No specific uses of digital technology are promoted, rather the policy aims to support teachers to integrate various uses of technology into the classroom. The policy adopts a fully integrated approach to using digital technologies by promoting their application to teaching and learning across the curriculum so that they complement non-digital activities and tools rather than replace them.

B.4. Support systems

As already mentioned above, teachers are provided with methodological support through the Ministry of Education and Culture's website and through the dedicated web portal on the National Pedagogical Institute's website.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Not yet.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not yet.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Not yet identified.

Estonia

Between 2017 and 2022, Estonia's **ProgeTiger** programme focused on developing technological literacy and digital competence among teachers and children in ECEC. The programme addresses three thematic fields: engineering sciences, design and technology, and information and communications technology. Through developing teaching and learning materials and guidelines, as well as professional development opportunities and support with procurement processes for digital technologies, the programme works to embed these fields into the teaching and learning of different subjects and extracurricular activities. By 2022, 99% of Estonian kindergartens with children aged 3 to 5 had participated in the programme.

Curriculum and pedagogy

Workforce development

Equity and diversity

Reference name: Case Study EST

A. Policy goals and design

A.1. Vision and broad objectives

One of the strategic goals of the Estonian Lifelong Learning Strategy 2020 was applying modern digital technology to teaching and learning in a more efficient and effective way, improving the digital skills of the entire population, and guaranteeing access to the next generation of digital infrastructure. Following a 2017 study on 'Digital education, learning of digital competencies, attitudes and capabilities in general education schools and preschools' (*IKT-haridus: digioskuste õpetamine, hoiakud ja võimalused üldhariduskoolis ja lasteaias*) [link], the Estonian Ministry of Education and Research and Educational and Youth Board planed new initiatives for ECEC.

According to the Estonian Education Strategy 2021-2035, the most important developmental activities in preschool are having competent and motivated teachers and heads of preschools, a diverse learning environment and a learner centred approach to learning and teaching. Related action trajectories are adopting a contemporary approach to teaching and learning curricula, smart learning resources and methodologies based on the principles of contemporary approaches to teaching and learning, shared space of culture and values, high-quality Estonian-language instruction and learning of Estonian, next generation of teachers and support specialists and next generation of leaders of educational institutions. One target for 2035 is digital pedagogy – ensuring educators are familiar with trends, opportunities, risks and methodologies related to new technologies, and apply the technologies in a purposeful way. Smart learning resources and methodology support engaging and effective teaching and learning and help to give and receive immediate and substantial feedback.

The overarching goal of the ProgeTiger programme is to enhance learners' technological literacy and digital competence. Sub-goals include:
1. To enhance technological literacy of teachers and instructors, by supporting them with the development of technological literacy and with integration of relevant activities into teaching processes across different fields, including the use of age-appropriate methodologies and educational activities.
2. To encourage interest, skills and the involvement of children and young people in the fields of engineering sciences, by increasing the availability and attractiveness of technological activities for different age groups, aiming to encourage the development of algorithmic thinking, problem-solving skills and programming skills among children and young people.
3. To promote networking among teachers and instructors who are active in the field.
4. To support the procurement of equipment for institutions of preschool, general and vocational education to necessary for different teaching methodologies and to conduct learning activities.

Challenge:
Developing technological literacy in children is becoming increasingly important. Developing the skills necessary to cope in a society of technological abundance and support the emergence of the creators of technology we need to start as early as possible.

Intended outcomes:
All Estonian students, regardless of their gender, location, or other characteristics, would have access to high-quality technology education. There would always be enough competent teachers, up-to-date syllabus, suitable teaching materials and the necessary equipment to do so.

A.2. Coverage and eligibility

The ProgeTiger programme targets the entire early childhood education and care sector in Estonia.

A.3. Policy tools

1. Developing, updating, translating, and adapting learning and sample materials. These materials include both methodological guidelines and examples of how to integrate technology into teaching and learning. All materials are available free of charge under a Creative Commons license. Development of learning materials and guidelines is based on the needs of both beginners and advanced learners to ensure the continuous development of their competencies. Learning materials and guidelines are created to improve technological literacy by integrating it into the learning of various subjects.
2. Training for teachers and instructors.

3. Activities by programme networks. This involves employees of educational institutions active in the field of technology who, in one way or another, are engaged in programme-related activities at their institutions. By coordinating networks, we ensure a new generation of instructors for the programme. Members of the networks are instructors of the training programme, information sharers and popularisers at the regional level.
4. Supporting the procurement of the technological equipment that educational institutions need to implement the ProgeTiger programme and for teaching and learning.
5. Information-sharing and popularising activities, including organising student competitions, preparing information materials for target groups, organising informative events, organising student events and contests which develop technological literacy, supporting students and teachers who participate in international student contests, and introducing the programme and its results to a wider public.

A.4. Funding and resources

The ProgeTiger programme is coordinated by the Education and Youth Board of Estonia. The programme is supported and funded by the Estonian government through the Ministry of Education and European Social Funds (ESF)

- Action plan of ProgeTiger programme 2018-2020 (budget total EUR 1 837 000)
- Application round for equipment of ProgeTiger programme for educational institutions 2014–21 (budget total EUR 1 946 708) (link)
- Measure 2022: Diverse and high-quality education with digital learning materials - IT learning tools. Support is provided for the purchase of IT teaching aids (total EUR 783 972). As a result of the grant, learning in the field of basic, general and vocational education is diversified by acquiring IT learning tools (link).

A.5. Stakeholder engagement

Communication strategy:

In the ProgeTiger Facebook group, information is regularly shared about the activities of the programme as well as the opportunities for technology education more broadly. A mailing list is regularly used to distribute information to subscribers.

In addition, the social media accounts of the Education and Youth Board, newsletters, etc. are used. Different stakeholders are constantly involved in the activities of the programme, be it the process of creating educational materials, discussions about the curriculum, organising events, etc. ProgeTiger cooperates with many leaders in the technology education field.

A.6. Future developments, sustainability and scalability

The current funding period for the programme ended in August 2022, and planning of new activities is currently underway according to the Estonian Education Strategy 2021-2035 (link)

B. Types and roles of digital technology

B.1. Digital resources

A programme supports the procurement of technological equipment that educational institutions need in order to implement the ProgeTiger programme and for teaching and learning such as robotics devices, 3D printers, programmable drones etc.

B.2. Digital competencies

The emphasis of the programme is on the development of technological literacy among teachers and students. This includes:
- purchasing digital devices for teachers;
- supporting the creation of digital learning materials,
- advancement of teachers' digital skills;
- the advancement of teachers' networks for sharing good practices among practitioners;
- providing support to teachers, parents and directors, supporting technology-based remote learning.

B.3. Uses of digital technology

No specific uses of technology are promoted, rather the programme aims to support teachers to integrate various uses of technology into learning activities. The reality is that children learn programming without a device. They learn it through play and hands-on methods, outdoors and indoors, with and without robots.

In preschools, teachers teach and use different robots like Qobo, mTiny, Blue-Bot, Matata Lab, LEGO WeDo Set, tablets with coding games or animation creation apps. At this age it is important to give students the basic knowledge of coding and digital media through playful and fun activities – learning by doing. Digital safety is also an important topic.

B.4. Support systems

The e-School bag provides online games and exercises for preschool children targeted at improving language skills or to be used for intervention purposes. Many different programmes and environments are used for teaching various subjects (music, mathematics, physics, biology) including e-labs etc.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

A survey is conducted after every training. Also, data is collected annually as to how many kindergartens and schools have participated in ProgeTiger's activities. In 2023, a more extensive study will be conducted to find out the impact of the ProgeTiger programme on technology education at different age levels.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

99% of Estonian kindergartens have participated in the programme in one way or another.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

The key to the success of the programme can be considered its systematic approach in that one activity always supports the next.

Additional information

Links about the ProgeTiger program:
https://www.educationestonia.org/progetiger/
https://www.educationestonia.org/progetiger-programming-school-kindergarten/

Germany (Bavaria)

Bavaria's **Digitalisation Strategy for Early Childhood Education and Care** (2021) aims to introduce the digital educational mandate at ECEC level and ensure early, high-quality media education for as many children aged 0-6 years as possible. The Strategy includes two key activities: blended professional development programmes for ECEC professionals and an online platform of free educational resources for ECEC. The Strategy builds on findings from a pilot project with 100 ECEC centres from 2018-20 and is funded by the Bavarian government, with co-funding from the Federal government.

Standards and governance Curriculum and pedagogy Workforce development Family and community engagement Monitoring and evaluation Equity and diversity

Reference name: Case Study DEU_Bav

A. Policy goals and design

A.1. Vision and broad objectives

Vision

Digital media are becoming more and more ubiquitous by the day. In the future, children's opportunities in life will depend ultimately on how competently and creatively they use digital media to achieve their aims. The sooner children learn to use digital media – at first supported and guided by competent adults – the more likely it is they will become media literate adults. Daycare centres reach almost all children and parents and can thus play a key role in the early development of media literacy.

Against this backdrop, the key objectives of the *Bavaria Digitalisation Strategy* are to introduce the digital educational mandate in the ECEC field, implement it through the professional development (PD) of educators and thus ensure early and promising media education for as many children as possible.

By the time they start daycare, most children bring with them some experience with digital media and, crucially, they have the rights to media access, to education and to protection in the digital world, all of which must all be fulfilled.

1. Daycare centres are tasked with integrating children's experience, helping to enforce their rights and supporting children to use digital media creatively, critically and safely. In a protected environment, educators give children the opportunity to get to know the potential of digital media for creative design and learning, to discuss their risks and thus to find their way in the digital world. This goal is achieved through intelligent opportunity and risk management taking the central criteria into account when designing educational activities with and about digital media (see B.3 below).
2. Providing proper support for children in the digital world requires a team effort from daycare centres and families. Effective cooperation with parents is based on three pillars: (a) Parents need to be informed as to why and how digital media are used in daycare centres, (b) educators need to include parents' expertise, requests and suggestions, and (c) parents need encouragement to use digital media creatively and safely at home with their child.
3. In addition, daycare centres should also use digital media for documentation, communication and administration as well as for professional development (PD) and training, since these uses might relieve staff and at the same time open up new opportunities for children, parents and educators to participate.

Main Problem/Challenge

Digitalisation in ECEC is facing several challenges in Germany. These include inadequate and outdated ICT equipment, inadequate digital and media pedagogical competence of the teaching staff and sometimes - though no longer dominant - a sceptical attitude among childcare providers, early childhood educators and parents towards ECEC's educational mandate concerning digital media. Critically, the provision of ICT alone does not create pedagogy. At present, the need for PD of staff coincides with a substantial staff shortage in German daycare centres, which reduces the willingness to participate in additional training despite the fact that aspects of digitalisation (e.g. digital administration) might also free up staff's time in the long run.

Key intended outcomes

The goal of the Bavarian Digitalisation Strategy is to spread more widely the promising results from the pilot project. The focus is on PD of educational staff so they can use digital media safely in educational activities with children in an integrated manner making the most of digital media's potential (e.g. by photo, audio or video activities with children).

Policy Alignment

The Digitalisation Strategy for ECEC in Bavaria is embedded in the existing legal and curricular groundwork for the educational area "ICT, Media", which were set at state level in 2005:

- § 9 "Child Education Regulation" [*Kinderbildungsverordnung AVBayKiBiG*]: "In Bavarian daycare centres, children should get to know the meaning and potential uses of common ICT devices and media in their environment.")
- Chapter 7.4 of the "Bavarian Educational Curriculum" (*Bayerischer Bildungs- und Erziehungsplan BayB*EP)

However, the media world has changed significantly since 2005 so that a modern interpretation and application of the educational mandate in the digital world in line with more recent EU regulations has become essential. The *Digitalisation Strategy for ECEC in Bavaria* therefore further builds on the following initiatives previously introduced at European level:

- Council of Europe Strategy for the Rights of the Child 2016-2021
- Guidelines to Respect, Protect and Fulfil the Rights of the Child in the Digital Environment Recommendation CM/Rec (2018)7 of the Committee of Minister
- DigComp - European Digital Competence Framework for Citizens 2013, 2.0 in 2018, 2.2 in 2022
- DigCompEdu - Digital Competence Framework for Educators, 2017

A.2. Coverage and eligibility

The *Digitalisation Strategy for ECEC in Bavaria* aims to cover all 10 300 government-funded Bavarian daycare centres (i.e. all crèches, kindergartens, after-school care centres and children's homes) with and without previous digital training.

Eligibility for the PD initiative "Starting Opportunity ECEC.digital" (Startchance kita.digital)

Cities and districts are eligible to apply through their Youth Welfare Offices. A course is offered by the State Institute for Early Childhood Research and Media Literacy (IFP) if an ECEC.digital.coach is available in the respective region. Multiple courses may be offered in larger cities or districts. After acceptance by the IFP the local youth welfare office advertises the course for daycare centres to apply. Daycare centre must fulfil the following criteria:

- At least 2 tablets (iOS or Android) with authorisation to install the children's apps (*KinderApps*) that are required for training
- Individual work e-mail address for each member of staff in order to access the "ECEC Hub Bavaria"
- Stable and reliable internet connection in the daycare centre (25 Mbit/s or more are recommended)
- IT and data protection support for the daycare centre must be provided by the childcare provider
- Time and human resources for participation in all course elements
- Advance information of team and parents' association about participation in the course
- Cooperation agreement between the daycare management and the respective ECEC.digital.coach (coach that supports implementation of digital activities etc.)
- Willingness of team to actively engage in the digital education process
- Implementation and documentation of short activities with children in the practical phase including a short presentation at the final meeting
- Networking with other daycare centres participating in the course
- Participation in one short online survey by the IFP at the end of the course (participation in two online surveys was required in the 1st campaign year)
- No participation in the pilot project "Strengthening Media Literacy in Early Childhood Education"
- No (full) participation in the 1st campaign year 2021/22

Up to ten daycare centres can participate in one course. The local youth welfare centre decides which centres participate if demand exceeds supply based on the following criteria:

a) governmental funding of the daycare centres according to BayKiBiG;
b) fulfilment of the conditions for participation in the campaign course (see above);
c) representation of all types of daycare centres in participating institutions (crèche, kindergarten, after-school care centre, children's home);
d) representation of diverse childcare providers. Cross-regional online courses coordinated by the IFP are also offered.

Eligibility for the use of the "ECEC Hub Bavaria" and its services

The ECEC Hub connects ECEC stakeholders in a professional network. All (online) services are free of charge and compliant with data protection laws. The long-term goal is for all educational staff in Bavarian daycare centres to have access to the ECEC Hub and its services. For technical and organisational reasons, access is currently being given to educators and facilitators participating in PD courses offered by the IFP or the Bavarian Ministry for Family, Labour and Social Affairs (StMAS). All users have to agree to the terms of use upon registration and ensure that they are ECEC professionals who exclusively use the Hub services in professional contexts and refrain from illegal activities.

Eligibility for accessing Pixel Workshop

The Pixel Workshop space at the IFP (see A.3) is also open to all staff working in ECEC in Bavaria.

A.3. Policy tools

PD Initiative "Starting Opportunity ECEC.digital" (*Kampagne Startchance kita.digital*)

The PD for educational staff in daycare centres uses a blended learning format. The course takes a year to complete; courses are offered over a number of years to reach all 10 300 government-funded daycare centres in Bavaria. The initiative helps daycare centres to fulfil their digital educational mandate (§ 9 AVBayKiBiG; BayBEP, Kap. 7.4). The course enables staff to implement this mandate successfully and creatively (i.e. to use media with children and include parents in a professional manner).

The initiative focuses on three fields of action:

a)   digital educational activities with children;

b)   parent information and communication about the digital educational mandate and its implementation in the respective daycare centre;

c)   use of ECEC Hub Bavaria (i.e. the MOOC (massive open online course) Starting Opportunity ECEC.digital ("*Startchance kita.digital*") and digital networks.

Within each of these three fields, each daycare centre receives coaching and support to take the individual steps towards becoming a "digital daycare". The blended learning courses are offered in cities and districts that applied for participation. Courses start in September and end in July. Up to ten daycare centres from different providers can participate in the same course. The PD course includes modules and coaching delivered by a qualified ECEC.digital.coach with training in media and early education.

The courses involve all relevant stakeholders: individual educators, entire staff teams as well as provider and parent representatives. In-person sessions are combined with digital learning modules, practical tasks and documentation of sample educational activities with children, regional networking meetings, needs-based coaching and parent information services (see course concept in the flyer of the initiative). Modules and material are developed centrally to ensure a common base for all courses. Most of the materials are made available on the ECEC Hub Bavaria as open educational resources.

ECEC Hub Bavaria: Digital infrastructure of initiative

The ECEC Hub is a growing service and educational platform that is free of charge and compliant with protection law. It is the digital centre for e-learning, communication and educational resources for ECEC in Bavaria. The aim is to create an educational ecosystem for Bavaria's early childhood community including an online toolbox covering the staff's needs. The Hub's potential is unlocked through deliberately linking individual components following the motto "The whole is more than the sum of its parts." The multifaceted services and opportunities allow educational staff to communicate, train, create, share experiences and expertise, support one another and work together. Services include:

- Courses: Using Moodle as a learning management system and educational platform, courses can be set up both for the initiative and for individual training courses. For each course, a room is set up to provide participants with material, assignments, activities and to allow for the submission of assignments. Open online courses, such as the MOOC Starting Opportunity ECEC.digital, are also accessible.

- Chat: Rocket.Chat serves as a communication tool through instant messaging. It includes channels focusing on specific ECEC topics and technical support and allows educational staff to ask questions.

- Meeting: The video conference tool Big Blue Button can be used for live online courses, networking meetings and internal purposes for individual daycare settings (e.g. parents' evenings).

- Short link service: Long or long-winded URLs can be transformed into concise short links and QR codes can be generated. Data on the number of views can be accessed.

- Scheduling & survey tool: Framadate can be used to schedule meetings and create surveys.

- Notes: Teams can use HedgeDoc for shared notes and collaborative documents that can be also shared with other teams or users.

- Open educational resources (OER): A repository of open educational resources covering a number of topics for early childhood educators is being prepared (see below).

Open Educational Resources, located on ECEC Hub Bavaria

In the repository, open educational resources for early education are provided free of charge, organised by educational field. The idea is to assist educational staff in finding adequate, high-quality information, material, tools and activities for their PD and practice.

The first educational field covered is 'Digitalisation and media literacy". It includes seven topics: technology; digital education with children; parental involvement; communication, documentation and administration; digitalised daycare centres; law; online PD. Materials include basic knowledge, practical examples, films, online courses, expert reports, technical contributions and instructions. The IFP (co-)developed the material and ensures quality control. Additional educational resources from other expert institutes in Germany (e.g."*Media license Bavaria*" of the Media Education Foundation Bavaria, and "Grab your mouse and tablet" from the Institute for Private Broadcasting and New Media Hesse) and other German-speaking countries (e.g. "Media daycare Vienna") are also made available.

Information service "KitaApps", **part of the OER collection**

KitaApps are apps that help educators fulfil documentation requirements, administrative needs and communication with parents and colleagues. The service advises educators about the available apps for Germany taking experience from the field as well as the data protection regulation (DSGVO) into account. The service is continually updated due to the dynamic market. An overview sheet informs educators, providers and other stakeholders about the apps to be included in upcoming updates. The IFP also prepares statements on current research studies of relevance, for example on the study on data security by KitaApps from July 2022.

"MOOC Starting Opportunity ECEC.digital", **located on ECEC Hub Bavaria**

The MOOC serves to get educators and teams started on the digital development process. It aims to capture the interest of educational staff by introducing them to methods and tools to use in digital educational activities with young children. The MOOC includes 8 units on the following topics:

1. Making media a topic to talk about
2. Playing with audio
3. Creative work with photography and photoshopping
4. Filming and camera tricks
5. Storytelling with and about media
6. Exploration and inquiry with digital media – indoors and outdoors
7. Coding and robotics
8. Cooperation with parents as partners

Each unit is structured in the following manner:

- Introduction to the topic
- Interactive presentation: "Video inspirations" (a film with two anchors explains the topic with video examples from daycare centres), educational goals, quizzes, questions to guide reflection on one's own practice, first steps
- Resources: Basics, video tutorials, useful links, relevant literature, practical examples, app profiles, online courses for consolidation (under development)

Other films that are or will be included in the MOOC:

- Promotional film on the initiative – longer version under development
- Digital education – even for toddlers?
- Language education through digital media (coming soon)
- Longer best-practice films (under development)

Pixel Workshop – Space for exploration and learning, contact via ECEC Hub (opened in Autumn 2022)

The Pixel Workshop is a real-world space at the IFP for ECEC professionals to try out and experience digital media, tools and new technology. The goal is for them to learn and critically reflect upon new developments and how they might be used in educational activities with children. It can be booked or visited during opening hours.

ECEC staff receive new ideas and inspiration for educational activities with children and the integrated use of digital media in daycare centres. Additionally, researchers, experts, politicians and other stakeholders are invited to visit the Pixel Workshop to develop, discuss, try out and disseminate concepts addressing future challenges in digitalisation in ECEC. The idea is to invite interdisciplinary cooperation and bring stakeholders together in order to create new educational concepts and projects.

The Pixel Workshop is connected to the ECEC Hub such that educational resources can be accessed via screens or tablets, hybrid events can be carried out in the Workshop space. The Pixel Workshop can be contacted through the ECEC Hub.

Previous policy/ initiative informing choice of policy tools

The pilot project "Strengthening Media Literacy in Early Childhood Education" [*Medienkompetenz in der Frühpädagogik stärken*] preceded the current policy and initiative, which is built upon its insights. Findings and results from the pilot project stem from repeated online surveys of 19 media coaches, centre heads, parents and educators of the 100 participating daycare centres (Lorenz, Schreyer, Danay, Krause, 2021) and from children's interviews on tablet use in their centre (Lorenz, Schreyer 2021). Several meta-analyses on the use of digital media in ECEC were further conducted to inform the digitalisation strategy and initiative (Egert, Cordes & Hartig, 2022a, b; Egert, Hartig & Cordes, 2022).

A.4. Funding and resources

- Main funding: Bavarian Ministry of Family, Labour and Social Affairs (BayStMAS)
- Co-funding: Federal Ministry of Family Affairs (BMFSFJ)
- Co-funding of the film and MOOC project: Bavarian Industry Association (vbw) – non-disclosure agreement as to the amount of funding

BMFSFJ funding via "Good Daycare Law" (Gute-Kita-Gesetz) and the contract with Bavaria for the period 2021/2022

- Budget 2021/2022 for the PD initiative: EUR 2.2 million
- Additional budget offering grants for tablets to daycare centres that take part in the initiative, mediated through funding guideline by BayStMAS (pending)
- Additional budget named "management and administration bonus" that daycare centres can also use to purchase a KitaApp license, mediated through funding guidelines from BayStMAS

A.5. Stakeholder engagement

Communication Strategy

- IFP website informs about the initiative Starting Opportunity ECEC.digital", the ECEC Hub Bavaria and the MOOC and provides relevant links
- Calls for cities and districts (to participate in initiative) via StMAS and IFP
- Call for ECEC.digital.coaches via Institute for Media Research and Media Education (JFF) and IFP
- Call for daycare centres via Youth Welfare Offices and an online registration provided by IFP
- StMAS newsletter from 11 May 2022 informed about the start of new courses, open courses and open educational resources on ECEC Hub Bavaria
- Regular reports on the Digitalisation Strategy in all committees and boards of IFP and in yearly print publication "IFP information service" ("IFP-Infodienst") (e.g., Infodienst 2021, pp. 7ff.)
- Local press reports about courses (sample press release available)

Policy design and stakeholder involvement

- Phase 1 (2016): Development of a basic concept called "Daycare 4.0 – Digitalisation as an opportunity and challenge" ["*Kita 4.0 – Digitalisierung als Chance und Herausforderung*"] at the IFP as commissioned by StMAS reflecting digital developments in ECEC and providing federal government with recommended actions (Reichert-Garschhammer, 2016, short version: link).
- Phase 2 (2017-2020): Conceptualisation, preparation, implementation and evaluation of pilot project "Strenghthening media literacy in ECEC" at IFP as commissioned by the StMAS (concept, website 1, website 2); goal: develop sustainable concepts and material for implementing digital media in educational practice in three fields (educational activities with digital media, observation/documentation, cooperation with parents) and help participating daycare centres create a media curriculum; involvement of all stakeholders in the field of media pedagogy in Bavaria including the JFF, daycare providers, centre heads with expertise in digital media, schools for initial training and industry.
- Phase 3 (2018-2020): Conceptualisation and implementation of blended learning course on the basics of digital media education in ECEC; conceptualisation and construction of ECEC Hub Bavaria by the Centre for Media Literacy in Early Education [*Zentrum für Medienkompetenz in der Frühpädagogik*], which is now part of the IFP.
- Phase 4 (2020/2021): Development and creation of films and MOOC by IFP and JFF.
- Phase 5 (since 2021): Conceptualisation and implementation of Digitalisation Strategy for ECEC including start of initiative Starting Opportunity ECEC.digital, extension of ECEC Hub Bavaria and setting up the Pixel Workshop (see A.3)

Implementation

- Coordination of initiative by steering committee headed by the IFP (partners: StMAS, JFF, etc.)
- Involvement of participating daycare centres and coaches in refinement of initiative through online surveys and discussions
- Agile implementation of initiative and strategy allowing tailor-made solutions and support measures in the face of change (e.g. pandemic)

A.6. Future developments, sustainability and scalability

Intended duration of PD initiative is until 2026. It has been suggested to start an online-supported PD and networking system for digitalisation in ECEC as well as a pool of ECEC.digital.coaches as strategic objectives for the long-term continuation of the digitalisation process in Bavaria. Future milestones might include:

- Until 2026: Continuation of PD initiative and extension of pool of ECEC.digital.coaches
- From 2023: Maintenance of network structures of daycare centres that completed a PD course of the initiative or participated in the pilot study
- From 2023: Further extension and refinement of ECEC Hub Bavaria as central digital infrastructure for ECEC professionals
    - Development and implementation of a more general, adaptable registration form
    - Construction of a central user management site
    - Development/ programming/ implementation/ extension of chatbots
    - Provision of the new landing page as an app in Google Play Store and Apple App Store
    - Provision of adapted open-source software solutions for the software community ("public money – public code")
    - Extension of the open educational resource repository; establishing a content management system for administration and quality control, for external content in particular, thus facilitating a culture of open work
- From 2023/24: Development and implementation of additional PD modules for daycare centres and continuous adaptation of existing material, resources, information and PD courses
- From 2027: Establishing and maintaining a PD and networking system
- Long-term: Establishing Pixel Workshop Spaces in each Bavarian administrative district

All plans are still pending financing.

B. Types and roles of digital technology

B.1. Digital resources

ICT equipment in daycare centres (hardware and software)

Basic ICT equipment in daycare centres should include tablets (iOS/Android) with protective shells, recommended apps for educational use (KinderApps), printer, projector and adaptor as well as reliable wifi. Important accessories are microphones, loudspeaker, headphones, digital microscope, endoscopic camera and educational robots for children.

Based on experience and insights from the preceding pilot project, the following requirements for technical equipment were formulated and are continuously updated:

1. Guidelines "ICT equipment and management in daycare centres" ("*IT-Ausstattung und IT-Management Kita*", IFP/JFF 2022)
2. Guidelines "Tablets in daycare centres – Clues for getting started" ("*Tablets in der Kita - Wichtiges zum Einstieg*", IFP/JFF 2021)
3. Guidelines "Tablets in educational activities in daycare centres – Recommended security settings for iOS 14.3" ("*Tablets im Bildungseinsatz der Kita - Empfehlungen zu den Sicherheitseinstellungen für iOS 14.3*", IFP/JFF 2021)
4. Guidelines "App list for educational use in ECEC" ("*KinderApp-Liste Kita*", IFP/JFF 2022)
5. Evaluation form for apps for educational use in ECEC ("*KinderApp-Einschätzbogen*", IFP/JFF 2021)
6. Expertise "KitaApps – Apps and software solutions for documentation, administration and communication in ECEC" ("*KitaApps – Apps und Softwarelösungen für mittelbare pädagogische Aufgaben in der Kita*", IFP 2021, 2nd edition)

App profile sheets are being developed for each app recommended for educational use in ECEC. Samples can be accessed here:

- KinderApp profile sheet "Stop Motion Studio pro"
- KinderApps profile sheet "Puppet Pals HD Director's Pass"

Digital infrastructure of the ECEC Hub Bavaria

The ECEC Hub Bavaria consists of many distributed services that are operated on a self-orchestrated high-availability cluster. The cluster is with a certified hosting provider with a server location in Germany. Individual services that are independent of each other are connected via open interfaces and, if necessary, integrated with one another and thus remain adaptable and interchangeable. Only open-source software is used for the administration of the cluster, user management as well as for the tools and services offered to end users in order to guarantee maximum, individual adaptability and sustainability as well as to avoid unnecessary costs and dependencies.

Pixel Workshop equipment

To strengthen educators' media literacy, connect them and foster communication, the Pixel Workshop is equipped with a large variety of digital media and tools. The Workshop Space is divided into topic areas and provides explanations, instructions and examples for educational activities in the areas of photography, filming, audio tools, making, coding and robotics, digital games and exploration and inquiry (STEM). Areas can be explored individually and self-organized during opening times or in the context of training, courses or workshops. A conference room is also part of the Pixel Workshop. It is equipped with event technology allowing for innovative, interactive and hybrid conference and training formats including live streaming via the technical infrastructure of the ECEC Hub Bavaria.

Tablets, extensive touch screens and other devices are available to visitors. They can be used to access services on the ECEC Hub Bavaria or, alternatively, talks or insights from workshops can be fed directly into the OER repository to be digitally available to all educators in Bavaria. Analog and digital services merge and complement each other.

B.2. Digital competencies

The heart of the Bavarian Digitalisation Strategy for ECEC is to strengthen children's digital literacy. This is why the "Competence Framework for Digital Education in Bavarian ECEC Institutions" ["*Kompetenzrahmen zur digitalen Bildung an bayerischen Kitas*"] (IFP 2021) was developed. It draws on the EU framework DigComp as well as its German adaptation for schools (KMK 2017) and takes into account the educational goals laid down in the Bavarian Educational Curriculum, Chapter 7.4. The competence framework contains seven areas:

1) Basic media skills
2) Searching, processing and retention
3) Communicating and collaborating
4) Producing and presenting
5) Protecting and acting safely
6) Problem-solving and acting
7) Analysing and reflecting

The IFP further compiled a competence framework for ECEC professionals (IFP/Reichert-Garschhamer u.a. 2020, 96). It entails three fields of competence:

1) Digital competence (using digital media safely and in accordance with the law for one's own work)
2) Media pedagogical competence (developing a positive attitude towards digital education; using the creative potential of digital media with learning goals in mind; knowing about opportunities and risks and acting accordingly)
3) Professional competence (using digital media to cooperate with parents efficiently; knowing and using KitaApps for communication, documentation and administration; taking responsibility for lifelong learning).

B.3. Uses of digital technology

To support educators' planning, implementing and reflecting of educational activities with digital media with children, the IFP published the checklist "Opportunities and Risk Management – a how-to guide" based on children's rights ("*Chancen- und Risikomanagement konkret*", 2021, updated 2022). Guidelines from the preceding pilot project were refined based on evaluation interviews with children ("*KinderFragen*").

- The checklist addresses central criteria, principles of professional framework, pedagogical implementation and ICT & law and provides links to additional resources.
- Central criteria of the checklist are: starting digital education early, no passive consumption of media or use in isolation, collaborative organisation of digital educational activities by children and adults, tablets in the hands of children to experience self-efficacy and reflection of digital educational activities.

In accordance with the checklist around 60 practical examples (from the pilot project) are currently being prepared, so they can be accessed as open educational resources on the ECEC Hub Bavaria. Two prototypes are already available and linked to the respective app profile sheets (see B.1):

- Practical example "Our first Stop Motion animation" ["*Unser erster Stop-Motion-Trickfilm*"]
- Practical example "Digital puppet show"] ["*Digitales Puppentheater*"]

See also the trailer of the initiative (German; English) containing selected scenes from the eight MOOC units (see A.3) to learn more about the wide variety of digital educational activities in ECEC.

Additional ideas as to which digital educational activities may be interesting for children under 3 are given in the film "Digital education – for toddlers already?" ["*Digitale Bildung – bereits mit den Jüngsten?*"].

B.4. Support systems

Central network of ECEC.digital.coaches in Bavaria

The first coaches were recruited for the preceding pilot project, 15 coaches continued to work in the initiative, additional coaches were recruited. 42 coaches worked for the initiative in the first year, 35 in the second. Most coaches run one course in the initiative, which amounts to a 25% position. Most coaches freelance and also work for other PD providers in the ECEC field. They primarily provide expert support and – to some extent – technical and legal advice, despite daycare providers being responsible for technical and legal support. ECEC.digital.coaches bring with them media educational expertise in the early childhood field and undergo further qualification in preparation of their role in the initiative. The extra training is provided by the IFP and JFF. Coaches are invited to actively contribute to the refinement and ongoing development of the initiative and the Digitalisation Strategy.

Support system for ECEC Hub Bavaria

- Facilitators/ trainers and daycare centres participating in projects or PD that use the tools and services of the ECEC Hub Bavaria receive step-by-step introductions to these tools and services.
- Whenever no free tutorials are available, explanatory videos are produced for individual services, e.g., the chat or the video conference software. A wiki is currently being developed for facilitators/trainers to illustrate and explain how the Hub services are operated, how they intertwine and how they can be used successfully and effectively for educational activities.
- Open Rocket.Chat channels are accessible to all registered users of the Hub for general information, requests, urgent problems or questions concerning the ECEC Hub Bavaria: "#Questions.ECEC-Hub" *[#Fragen.Kita-Hub]*, "#Questions.TechnicalSupport" *[#Fragen.Technik]* and "#Questions.LegalIssues" [*#Fragen.Recht*]. Several people maintain these channels so that questions and issues are resolved in a timely manner.
- The OER repository (including instructions, expert reports etc. on digitalisation and media literacy) as well as open online courses such as the MOOC Starting Opportunity ECEC.digital are free of charge and accessible without registration. Both support and development systems can be directly accessed by daycare centres and their providers.
- Currently a chat-based ticketing and live support system (called Omnichannel) is being set up. The plan is for Omnichannel to be supported by a chatbot that enters data from open topic channels in the long run.
- For all questions about individual accounts (e.g. problems logging in or concerning personal login data), general user support at the IFP is available.

ICT support and data protection support by daycare providers

Technical and legal support must be guaranteed by daycare providers (condition for participation in initiative, see A.2). It is further recommended that each centre form a technical support team that coordinates and communicates with the technical and legal support of the provider. For further information see B.3.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Facilitation and evaluation of Starting Opportunity ECEC.digital

The initiative "Starting Opportunity ECEC.digital" is evaluated by the IFP (Dr. Lorenz/ Dr. Schreyer) using online surveys of all ECEC.digital.coaches, who run a minimum of one course in the first year (n=42), and all centre heads participating in the first year (n=435). Both groups are surveyed at the beginning and the end of the initiative. The aim is to readjust and refine course elements, structures, material etc. based on the longitudinal data collected. The ECEC.digital.coaches further participate in group sessions to reflect on individual steps in the process together.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

German-language publications are available:

- Lorenz, S. & Schreyer, I., Danay, E. & Krause, M. (2021). Ergebnisbericht der wissenschaftlichen Begleitung des Modellversuchs „Medienkompetenz in der Frühpädagogik stärken". Teil I: Basisbefragung der Kitaleitungen, Mediencoaches und Eltern – Teil II: Befragung der Fachkräfte. Munich: IFP. (link)
- Lorenz, S., Schreyer, I., Winterhalter-Salvatore, D. & Goesmann, C. (2021). KinderFragen! Eine Studie zu Tablets in der Kita aus der Sicht der Kinder. IFP-Projektbericht 38. Munich: IFP. (link – additional information link)

- Egert, F., Cordes, A.-K. & Hartig, F. (2021). Abschlussbericht – Metaanalysen zu Nutzung und Wirkung von digitalen Medien in Kindertageseinrichtungen. Munich: IFP. (link – additional information link).

The evaluation report on the first year of the initiative (Lorenz & Schreyer) was published at the end of 2022 as well as the report on the results of the follow-up survey of the 100 daycare centres that took part in the Bavarian pilot project (Lorenz & Schreyer).

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

The final survey of centre heads and coaches in the preceding pilot project revealed seven factors that contribute to successful digitalisation:

1. Proactive commitment of centre heads to the digital educational mandate in ECEC (key success factor).
2. Provision of sufficient resources (devices, time, funds) by the daycare providers (necessary condition).
3. A positive or interested attitude among the staff team, provider and parents is helpful to start the process. Additionally, successful experiences contribute to positive perceptions or encourage more sceptical stakeholders. Parents' attitudes towards digital media use are mostly positive and have become more positive since the pandemic.
4. Encouraging staff members with a penchant for media and ICT to form a technical support team within the centre has proved beneficial for the digitalisation process.
5. It is vital to involve the entire team and allow plenty of time for testing and discussing digital media within the team (initially without children).
6. Expert external coaching and facilitation is perceived as conducive to implementation.
7. Regional networks for daycare centres encourage discussion and cooperation.

Additional information

The Bavarian pilot study and Digitalisation Strategy for ECEC have attracted considerable attention nationwide. For this reason, the BMFSFJ has commissioned the IFP to write an expert report on the use of digital media with children in ECEC (*Nutzung digitaler Medien für die pädagogische Arbeit in der Kindertagesbetreuung*: IFP/Reichert-Garschhammer u.a. 2020). The IFP has since received invitations and requests for talks and seminars nationwide and internationally.

The IFP profited from pilot projects in other federal states that included 10 to 12 daycare centres as well as from online expert platforms in Hesse and Austria ("Grab your mouse and tablet", Institute for Private Broadcasting and New Media, Hesse, Blickwechsel e.V., link; "*Medienkindergarten Wien*", Wiener Bildungsserver, link). The close collaboration of IFP and JFF allowed for the first time to integrate media pedagogical know-how with a genuine early childhood perspective (rather than merely adapting principles for youth media education to younger children).

Germany (1)

Recognising the potential of digital apps to promote the development of children's language and reading skills playfully, Germany's Reading Foundation launched the **Readingwith.app** (2020) with financial support from the Federal government. The initiative aims to identify high-quality pedagogical apps for language and reading promotion. Apps are reviewed, tested, and evaluated for their suitability for children aged 0-6 years. Guidance on how to enjoy digital learning and reading with young children via the selected apps is presented through short explanatory film clips, blog entries and checklists. The initiative thus supports families and ECEC professionals to explore digital media with young children in a way that seeks to harness the opportunities offered by new technologies.

Curriculum and pedagogy

Family and community engagement

Reference name: Case Study DEU_1

A. Policy goals and design

A.1. Vision and broad objectives

Families provide the most important place for the development successful reading. However, the results of studies on early literacy indicate that many children lack early reading stimuli at home. More precisely, 32% of parents of children aged 2-8 never or rarely ever read to their children (cf. Stiftung Lesen 2019). There are many moments in everyday family life when parents implement activities with their children that are close to reading aloud. These include storytelling, singing, rhyming, looking at photos on the smartphone or tablet, and leafing through brochures.

There are a variety of reasons parents give for not reading aloud like lack of time or shortage of books. Around half of the parents who do not read aloud or rarely read aloud state that they would like to read aloud more often. This basic willingness to read is of high value for reading promotion and reading aloud programmes, especially in view of the spread of digital media (cf. Stiftung Lesen 2020).

Developing early literacy and subsequently learning to read takes place in educational institutions such as day-care centres and elementary schools. However, even in these educational settings, up to one-fifth of students have problems with reading and writing. Furthermore, 18.9% of fourth-graders do not have an adequate level of proficiency in reading (cf. Hußmann et al. 2016) and 20.7% of 15-year-olds have difficulties in reading and writing in Germany (cf. OECD 2019).

With the onset of the COVID-19 pandemic, educators working in day-care centres and schools had to establish new ways of reaching children and their families at home. Aside from the COVID-19 context, the guided use of apps has the potential to empower and motivate educational professionals to engage with the topic of digital education.

The aim of the 'lesenmit.app' initiative is firstly to give families and professionals an overview of the range of apps available for promoting language and reading development, and also to classify the available applications in regard to their pedagogical value. Thereby this initiative motivates and empowers families with pre-schoolers and children in elementary schools as well as professionals to explore the world of digital media together with children using apps, while simultaneously encouraging language development and reading proficiency.

Sources

- Stiftung Lesen, Deutsche Bahn Stiftung, DIE ZEIT (2019). *Vorlesen: Mehr als Vor-Lesen! Vorlesestudie 2019 – Vorlesepraxis durch sprachanregende Aktivitäten in Familien vorbereiten und unterstützen*. Repräsentative Befragung von Eltern mit Kindern im Alter von 2 bis 8 Jahren (link).
- Stiftung Lesen, Deutsche Bahn Stiftung, DIE ZEIT (2020). *Wie wird Vorlesen im Alltag möglich? Vorlesestudie 2020*. Eine Befragung von Eltern, die nicht oder selten vorlesen (link).
- Hußmann, A., Wendt, H., Bos, W., Bremerich-Vos, A., Kasper, D., Lankes, E.-M., McElvany, N., Stubbe, T. & Valtin, R. (Hrsg.) (2017). IGLU 2016. *Lesekompetenzen von Grundschulkindern in Deutschland im internationalen Vergleich*. Waxmann (link).
- OECD (2019): PISA 2018 - *Ergebnisse (Band I). Was Schülerinnen und Schüler wissen und können*. wbv Media (link).

A.2. Coverage and eligibility

The core task of the initiative is to review, test and evaluate apps as to their suitability for promoting language and reading development. Thus, a review committee consisting of several reviewers test, evaluate and rate apps on a scale ranging from one to five stars. This type of rating allows users to see at a glance whether the app is well suited to promoting language and reading. In addition to a content classification and description, users will find a differentiated evaluation of the app, where they can also find potential uses and other facts about the application.

Since smartphones and tablets are available in many families and are also suitable for inclusive use, these devices offer opportunities for establishing contact, passing on didactic impulses, and for early language and reading promotion activities in family settings, day-care centres, kindergartens, after-school care and schools.

'lesenmit.app' addresses the entire ECEC sector in Germany. Professionals as well as families are both target groups of this service. For this reason, the website has different sub-sections by audience.

In the family section, users will find information on the use of apps and a checklist for evaluating apps. The professionals section also contains materials for professionals working in schools and preschools. In addition, app screencasts and interviews with experts are available in both areas. By combining textual and video-based contributions on the subpages for families and professionals, this initiative empowers and supports a wide audience in using digital applications for learning and reading in a reflective way. By doing so, the use of digital media, which takes place in many families on a daily basis, is accompanied pedagogically.

All materials are available free of charge.

A.3. Policy tools

On the initiative's own website www.lesenmit.app interested parties will find several forms of content that have been produced during the first and second term from 2020 to 2022. At the heart of the site are the app articles, which can be found via 'App-Suche'.

The review committee of lesenmit.app is made up of experts in the field of literacy research and practise, such as psychologists, early childhood educators and pedagogical professionals. The review committee screens, tests and evaluates apps with regards to their suitability for promoting language and reading skills. Thus, the interdisciplinary composition of experts guarantees a comprehensive and perspective-rich view of the apps.

The apps are examined in a two-part selection procedure: First, the project team of 'Stiftung Lesen' verifies all apps with regards to their suitability before they are entered into a test pool. One criteria is, for example, that the applications are not merely gaming apps. In a second step experts can choose which application they would like to test out of this test pool. The focus is on apps that are suitable for promoting oral skills, reading skills, written language skills, and grammatical skills. Development studios, publishers, and users can submit apps for review at any time, with the current focus on apps that are also available in German. Up to four evaluations per app are submitted by different reviewers, which are then compiled into a review by 'Stiftung Lesen' staff.

Short explanatory film clips, blog entries and checklists provide parents and professionals with guidance on how they can enjoy digital learning and reading with their children. In the family section, users will find information on the use of apps and a checklist for evaluating apps by themselves. The professionals section also contains materials for professionals working in schools and preschools. In addition, app screencasts, online seminars and interviews with experts are available in both areas.

Interviews with experts
- Using apps in the daycare center - Reading with App
- App in the daycare center - Reading with App
- App to the family - Reading with App
- Apps at home - Reading with app
- App to Elementary School - Reading with App
- App to primary school practice - Reading with App

Online seminars
- Apps for vocabulary development in kindergarten and primary school
- Apps to promote phonological awareness
- Apps to promote text comprehension
- Apps to promote reading fluency

Checklists
- For families
- For professionals

All video content can be found on the dedicated playlist on YouTube.

A.4. Funding and resources

'lesenmit.app' is an initiative of 'Stiftung Lesen', funded by the 'Federal Ministry for Family Affairs, Senior Citizens, Women and Youth'.

Budget 2020 – 2021: EUR 210 000

Budget 2021 – 2022: EUR 170 000

A.5. Stakeholder engagement

The review committee of 'lesenmit.app' is made up of experts in the field of literacy research and practise, such as psychologists, early childhood educators and pedagogical professionals. Thus, the interdisciplinary composition of experts guarantees a comprehensive and perspective-rich view of the apps. All of them tested and rated apps, so that in June 2022 more than 200 reviews could be found on the website. Some experts also appeared in front of the camera in the online seminars, mentioned in A.3.

It has proven expedient to use a broad variety of communication channels in order to reach many various professionals in the field of education and development. This ranges from the so-called 'Bildungsserver' (information, communication and

cooperation platforms for schools and extracurricular educational institutions), which exist in the federal states for both the day-care and school sectors, to social media channels and internal and external newsletters. In this context, approaches targeting institutions and cultivating networks in order to be included in their communications channels were important.

To engage ECEC and primary school professionals from an early stage, 'Stiftung Lesen' has informed the training centres of pedagogical professionals about the events offered by the foundation in addition to maintaining a large distribution list of kindergarten and school addresses.

A.6. Future developments, sustainability and scalability

In the future, app reviews will be sustainably integrated into the 'Stiftung Lesen' media database, where users can find a broad range of media and ideas for actions.

We expect an increase in the frequency of the use of our app reviews as well as the possibility to reach professionals and families who are not originally looking for digital media recommendations. Our goal continues to be to encourage the use of a broad mix of media that is reviewed by experts, in order to convey and promote the joy of speaking and reading to children.

B. Types and roles of digital technology

B.1. Digital resources

The initiative 'lesenmit.app' deals with apps that can be used on smartphones, tablets and PCs. The presence of these devices is therefore a basic prerequisite for the use of the content. In addition, an internet connection must be available in the institutions in order to install the content on the devices, test it and thus prepare for practical use. Many apps can be used offline, which is helpful for the missing WLAN as well as data security.

Results of the miniKIM Study 2020 show that families with children aged between 2-5 years old have a very broad media repertoire: In every household there is access to the internet, there is a mobile phone or a smartphone in 97% as well as a TV. 90% have a laptop or PC. With the age of the child, the degree of self-determination in the use of digital media is increasing. In terms of engagement with various media, for 2-5 year-olds the book continues to be the most used medium (70% use it [almost] every day), followed by audio play/audiobooks/podcasts (35%).

In addition to this technical equipment, the digital competence of professionals and guardians is required, who must first be familiar with the handling of the hardware as well as the use of the software. Both are necessary to pick the right app that suits the needs of the child/group.

To reach children with (read-aloud) impulses in their living environment we need offers that are adapted to their everyday life. Besides analogue media and formats, digital offerings are on the rise.

Medienpädagogischer Forschungsverbund Südwest c/o Landesanstalt für Kommunikation (LFK): miniKIM-Studie 2020. Kleinkinder und Medien. Basisuntersuchung zum Medienumgang 2- bis 5-Jähriger in Deutschland (link).

B.2. Digital competencies

The use of digital media in child daycare requires digital competence among the professionals who accompany children in their use and advise families regarding this topic. They need to know how to integrate digital media into their work successfully. The foundation for later media use is laid in early childhood. Adult caregivers serve as role models for children. That is why adults need to reflect on their own habits in using digital media, before using them together with children.

In the practice-oriented online seminars of 'lesenmit.app' (mentioned in section A.3.), we address the use of digital media to promote specific competencies that are needed for speaking and reading development. In online consultations, professionals and families were also given the opportunity to ask questions about the use of apps for language and reading promotion. The website also offers the possibility to ask the team of 'lesenmit.app' questions.

B.3. Uses of digital technology

In addition to 'lesenmit.app', two other initiatives of 'Stiftung Lesen' were funded by the 'Federal Ministry for Family Affairs, Senior Citizens, Women and Youth': 'vorleseideen.de' and '#medienvielfalt'. In combination, these three initiatives reach multipliers such as nursery school teachers, teachers and other educational actors to use a wide range of media in order to provide regular language and reading promotion activities in various settings.

The three programmes combine analogue and digital media. The initiatives are characterised by their practical relevance. Their use is free of charge and they are geared to the needs of the target groups.

The use of media to promote language and reading aims to ensure that children do not act as mere consumers, but as active producers of language and content – both in digital and analogue formats.

In the app reviews, readers will find indications of whether an app is suitable for use in a media network (i.e. whether there is any analogue media directly related to the app.)

Learning takes place in social interaction, which is why we encourage families and professionals to engage with the media together with the children, to ask questions and to exchange ideas about the content.

B.4. Support systems

In addition to the above-mentioned training formats, the team of 'lesenmit.app' gives lectures at events. By mentioning the initiative in professional articles, the review panel contributes to making the initiative known.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

'lesenmit.app' has not been evaluated. Within the framework of the online seminars, the professionals were informally asked about content and the organisational framework conditions. This survey is used to plan future online seminars and workshops. The results of the informal survey indicate that there is a need for further training.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not yet available.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Not yet identified.

Germany (2)

Germany's Little Scientists' House foundation launched the **Discovering Computer Science - With or Without a Computer** programme (2017) to give young children their first practical and theoretical experiences in the field of computer science. The aim is to provide a basic understanding of computer science systems and related skills by developing materials and activities to be used in ECEC settings. The programme also provides teachers with online and in-person training opportunities. The activities incorporate mainly "unplugged" approaches and were developed by a working group of experts from the fields of computer science didactics and ECEC and primary school pedagogies.

Curriculum and pedagogy

Workforce development

Reference name: Case Study DEU_2

A. Policy goals and design

A.1. Vision and broad objectives

By establishing the subject-specific basis for early computer science education, the "Haus der kleinen Forscher" (Little Scientists' House) Foundation has ventured into new territory, since there are still hardly any research approaches or educational concepts on this topic in the German-speaking world. At the same time, the importance of computer science and the competencies associated with it is steadily growing – something that became even clearer with the Coronavirus pandemic.

However, just being able to use digital media is not enough. The aim of the programme is not to increase the use of digital media but to understand the underlying concepts, for example how information is stored and distributed, so that children can become responsible and competent technology users. Children can learn about algorithmic thinking in informatics systems hands on, thereby laying an important basis for reflective and competent use of these systems. For this reason, the "Haus der kleinen Forscher" Foundation focuses on the technological perspective of digital aspects in its educational offerings.

Computer science education is increasingly shifting into focus as a social task and should be an integral part of basic general education in the future. As a result, mastery of elementary methods and tools of computer science receives a similar status as writing, reading and arithmetic. All children should be given the opportunity to receive early education in this field. For the Foundation, this means giving children leeway to ask questions about digital media and the informatics systems on which they are based and to seek answers through exploration and inquiry.

A.2. Coverage and eligibility

Like most of the Foundation's offerings, the computer science programme is available for all teachers of child-care centres, primary school and after-school care programmes in schools and other institutions serving 3-to-10-year-olds. The proposed didactic activities can be implemented in all these educational settings. The teacher trainings and the implementation of the activities is not compulsory. But both of them have been designed to be flexible enough to adapt to the needs and interests of different professionals and of learners at different ages.

A.3. Policy tools

The "Haus der kleinen Forscher" Foundation addresses the challenges and aims to strengthen children's educational opportunities in a core area of digital education by providing further education and training for early childhood educators and teachers at child-care centres, after-school care centres and primary schools. While there are more and more initiatives on digital media use, with its programme "Discovering computer science - with or without a computer" the Foundation focuses on computer science education. The goal in this area of education is to give children their first experience in the field of computer science in order to foster a basic understanding of informatics systems and relevant competencies. The teacher trainings and the pedagogical resources, such as a thematic brochure and didactic cards, provide the corresponding background as well as numerous practical ideas.

To foster this basic understanding und competencies best, the Foundation has been advised to pursue primarily an "unplugged" approach, that is without digital devices but with everyday material like pen, paper, scissor and rope. The activities following this approach are easy to implement. Furthermore, they counteract possible reservations towards computer science education in the elementary and primary sector. Supplementary, the Foundation uses two other approaches to computer science that can be combined with unplugged activities: software-based and robotics.

In the "Discovering computer science - with or without a computer" programme, the Foundation pursues the goal of familiarising both children and early childhood educators/primary school teachers with the process-based approach of computer science. They are to get to know and apply cyclical approaches. The focus here is on teaching general thinking and problem-solving skills, which in turn means that computer science education is able to contribute to the children's general education. As part of the professional groundwork, the Foundation established a working group with experts from the fields of computer science didactics and primary school pedagogy. From 2015 to 2017, the working group developed an expert report in which they formulated theoretically-sound goal dimensions within the framework of computer science education for children in ECEC settings and primary schools as well for early childhood educators and primary school teachers. In addition, the working group examined also instruments for measuring and criteria for successfully achieving these goals, and thus for effective and efficient early computer education in practice. Based on the recommendations from the group, in 2017 the Foundation developed an initial offering in the area of computer science education and started further training for early childhood educators and primary school teachers.

A.4. Funding and resources

Like most of the programmes of the "Haus der kleinen Forscher" Foundation, the development of "Discovering computer science - with or without a computer" was funded by the German Ministry of Education. The allocated budget was approximately EUR 70 000 over one year. Additional resources for the implementation have included:

- personal resources and training costs for training local trainers all over Germany, so that they can reproduce the programme in their local networks
- personal resources and training costs for training educators in local networks all over Germany.

A.5. Stakeholder engagement

Like other offerings of the Foundation, the programme "Discovering computer science - with or without a computer" is promoted through various channels - press releases, newsletters, advertising through our partners, announcement on the Foundation's website and on the websites of its partners – in order to reach all stakeholders and potentially interested professionals.

Different stakeholders have been actively involved in the design of the programme. First, the Foundation invited a group of renowned experts in the field of computer science education. These experts discussed and defined aims and criteria for successful and effective early childhood education in the field of computer science and made recommendations for the design of the planned programme. The results were published in the 9th volume of the "Scientific Studies on the Work of the 'Haus der kleinen Forscher' Foundation". Second, during the development of the didactic activities and materials, the Foundation tested its ideas and draft materials with children and educators and adjusted them according to the results of these tests. Finally, the Foundation tested and evaluated the design of the one-day training activity with educators, and adapted it according to the results, too.

A.6. Future developments, sustainability and scalability

Several activities are currently underway in the Foundation to expand its offer.

- There is a project specifically for primary school teachers that uses a blended learning concept to address the topic of computer science at the primary level of education. The aim is to further develop the topic for the primary sector, with a special focus on developing lesson plans and materials.
- A new workshop on the subject of computer science and society is being developed.

B. Types and roles of digital technology

B.1. Digital resources

A very important finding is that the topic of computer science can be learned without actually using any digital tools. The aim is not to increase the use of digital media but to understand the underlying concepts. The focus is not on the use of the technologies, but on their functional principles. The use of digital devices can nonetheless supplement the transfer from theory to practice. It is then about making the results of programming digitally and physically tangible by dealing with how robots and software work, always in a playful way.

Thus, no specific devices and tools are required or promoted by the programme. The designed teacher trainings just offer optionally the space to explore different software and robotic systems that could foster further understanding of the principles that have been explored "unplugged". Examples of appropriate software for that are: Scratch and Scratch Junior, Awbie from Osmo and the Robot Roberta from the Foundation's children's website. Examples of appropriate robot systems are Beebot, Ozobot, or Cubetto.

After exploring these systems, educators can decide based on their interests and resources if and which devices they want to use in their educational practice.

B.2. Digital competencies

The programme does not require specific digital competencies from the ECEC professionals, but builds on their interest and motivation to deal with questions about computer science and the functioning of digital systems, through exploration and inquiry with the children. During the training, ECEC professionals get to know various practical ideas that encourage children to deal with digital concepts and promote their initiation of relevant skills. The ECEC professionals have the opportunity to expand their understanding of basic digital principles themselves. The focus on early digital literacy seeks to promote children's understanding and comprehension of basic digital principles, such as:

- Planning and strategic thinking

- Search and sort
- Connect and optimise
- Troubleshooting

B.3. Uses of digital technology

As described in B1.

B.4. Support systems

Does not apply.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

The Foundation's activities are continuously evaluated and accompanied by scientific research. The Foundation has carried out various pilots and surveys in connection with its development of offerings of computer science education. The newly developed ideas and materials regarding implementation were first tried out at pilot institutions to test their practical suitability before being made available to all institutions. The professional development workshops were also tested and evaluated in practice with early childhood educators and primary school teachers in order to assess their impact and allow improvements to be made.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

The participating early childhood educators and primary school teachers reported that their attitudes to computer science had changed as a result of attending the workshop. They perceive the importance of computer science in their own daily lives much more than before, which in turn provides them with multiple points of reference for early computer science education. The results also show that after participating in the professional development workshop, there is an increase in educators' motivation to continue engaging with the subject and they are looking forward to implementing computer science education with children. They also exhibit increased self-efficacy expectations in terms of implementing learning content in pedagogical practice, as well as higher levels of self-assessed knowledge and subject-specific didactic competence.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

The transfer of training content to pedagogical practice remains partly subject to obstacles deriving from the educational institution as a whole, in particular the structural and cultural framework conditions at the institution (e.g., the pedagogical principles). The support of the centre leader and a good team structure are reported to be important factors for successful implementation of computer science education at the ECEC centre. The leaders should be aware of the importance of educational content of computer science and contribute to structurally facilitating the implementation of new practices by means of internal communication measures. This includes enabling the necessary time, personnel or financial resources to successfully implement computer science education on a day-to-day basis at the early childhood education and care centre.

Additional information

About the foundation
Pedagogic vision
Programme and practice
Research: (The 9th volume of the scientific studies on computer science is expected to be available in English by end 2022).

Israel

Israel's **Physital Spaces** initiative (2019) aims to create learning spaces in ECEC centres that combine physical features and digital technologies, in which young children can play and develop both physical and digital skills and competencies. Funded by the Ministry of Education, the initiative includes the purchase of digital equipment for ECEC centres. Professional development opportunities for ECEC staff are also offered to encourage the take-up of physital spaces, including an online course on physital spaces, a techno-pedagogy course for ECEC leaders, and training and mentoring for teachers.

Curriculum and pedagogy

Workforce development

Equity and diversity

Reference name: Case study ISR

A. Policy goals and design

A.1. Vision and broad objectives

The central goal of the future ECEC centre is to provide 21st century children relevant quality education while enabling children and staff to continuously design, develop and create their unique centre. This ongoing creation would take into consideration the ever-changing reality and strive to achieve optimal interaction between all stakeholders and maximise diverse opportunities and environments – human, communal, physical and technological.

One of the main challenges facing ECEC staff in Israel today is how to impart knowledge, skills and values in a way that balances opportunities for physical experiences and play – which are rapidly decreasing in the urban-digital world in which many children grow up – with digital experiences and experimentation that are already an inseparable part of their lives. Exposure to digital technology in early childhood should be done responsibly and mindfully, in accordance with the developmental and psychological needs of Generation Alpha. Children should experience and experiment with digital technology in a safe environment, but without neglecting to allow them to operate in a physical space suitable for their developmental needs. The educational practice presented in this case study is creating physital spaces in the ECEC centre. Physital spaces combine physical and digital elements, thus providing children with opportunities for play and learning while promoting the acquisition of both physical and digital skills and competencies.

The educational practice of physital spaces aims at creating a balanced learning space that combines physical features and digital technologies. The physital space is a physical space inside the ECEC centre that synchronously combines digital content projected on a large screen or viewed on a computer screen with physical objects. The physital space provides opportunities to act and experiment in the physical space (e.g. by using furniture, building blocks, art supplies, etc.) in combination with experiencing the use of digital tools (such as search engines, smartphone camera, projector). Key outcomes are to promote early digital competencies and information literacy and to make play and learning in the ECEC centre more dynamic, innovative, relevant and engaging for 21st century children.

A.2. Coverage and eligibility

In 2022, ECEC centres received desktop computers and ECEC leaders were provided with laptop and internet bundles as part of an initiative led by the Minister of Education. The pre-primary education department offered all leaders a 30-hours professional development course on techno-pedagogy, as well as a written guide and an online course on physital spaces. The distribution of computers and the accessible professional development courses and training serve as an incentive to employ the practice of physital spaces. Another initiative is an annual grant to design and develop learning spaces. The implementation of physital spaces is taken into consideration by the Ministry when determining which centres would receive the grant.

A.3. Policy tools

The Ministry of Education has extensive experience in implementing learning practices in ECEC centres and making professional development more accessible is a significant factor in implementing physital spaces. Providing centres and centre leaders with computers is also expected to promote the desired objective of implementing the use of physital spaces, as lack of equipment was identified as a significant barrier to practicing this innovative approach in a survey conducted among ECEC centre leaders. Professional training for ECEC leaders, distribution of written training materials on the theory and research of techno-pedagogy, and support for ECEC leaders from regional ICT instructors are also expected to promote the implementation of physital spaces. The support network aims to assist all ECEC centre leaders participating in the initiative, including those who have little previous knowledge and experience.

A.4. Funding and resources

The funding allocated by the Ministry of Education for the initiative was NIS 60 million. 18 000 laptops were provided to ECEC centre leaders and approximately 4 600 desktop computers to ECEC centres. Professional development training courses (30 hours) are conducted by the professional development units in the regions. Training and mentoring of teachers are conducted by the pre-primary education department (90 hours over 3 years). ECEC centre supervisors and the regional ICT instructors are in charge of overseeing ECEC centres, including the proper use of the computers allocated to the centres.

A.5. Stakeholder engagement

The pre-primary education department published a compendium called *'Avenues to the future ECEC centre'*, which delineates the Ministry of Education's policy and vision in general and in digital-technological aspects in particular. The department will publish a guide on digital-combined instruction for all ECEC centre leaders and staff, alongside providing training tailored to

the needs and sensitivities of different populations and educational streams in Israel. Part of the training includes peer learning and experimentation with the technology based on the understanding that digital-combined instruction through phystial spaces can and should be different between centres according to the characteristics of the community, the leader's experience and knowledge and his/her work plan.

A.6. Future developments, sustainability and scalability

- Expanding the digital resources available in every ECEC centre (e.g. projectors, touch screens, tablets, internet connection). The expansion would be continuous and funded by the Ministry of Education.
- Allocating resources for available technical support.
- Allocating training days to the topic of techno-pedagogy in each region and providing tools for independent learning and professional development.

B. Types and roles of digital technology

B.1. Digital resources

Phystial spaces require available digital resources such as:
- Computer
- Projector and projection screen
- Sound system
- Internet connection (optional for conservative communities in the Ultra-orthodox sector)
- Digital databases, environments and programmes such as PowerPoint, Microsoft, Google Cloud

Phystial spaces do not require virtual learning environments. Children and staff can build an offline internal database for the centre using photographs provided by parents or taken by the staff. To make the database accessible the ECEC staff can arrange these images as a PPT file, in Google Cloud or however way they see fit.

B.2. Digital competencies

The setup and implementation of phystial spaces allow ECEC centre leaders and staff to support and direct children's choices, to develop skills related to creating videos and stills, and editing or adding text, to decrypting and creating text and graphic symbols, to sharing their outcomes, to respecting copyrights and to developing imagination and abstract skills. All these competencies are part of the Ministry of Education's ECEC milestones and the vision of the future ECEC centre.

B.3. Uses of digital technology

Example: Space flight and exploration
- Physical space: children were provided with diverse materials (cardboard, cloth, glue, adhesive tapes etc.) to build a 'spaceship' and to engage in activities related to space flight and the solar system.
- Digital space: creating a repository of clips, photographs, audio files and websites related to space and space flight (space shuttles taking off, different planets in the solar system, Google Earth) on the centre's computer and projecting them onto the projection screen.
- Children were given choice and the freedom to independently play clips and audio files and to project images, accompanied and supervised by ECEC staff. This was done in accordance with the nature of the game and the principles of phystial spaces in which leader and staff were trained.

B.4. Support systems

Centre leaders are given 30 hours of training and enrichment. They can also consult with regional ICT instructors and participate in online professional development days, and request assistance from regional ICT support. Leaders can also draw on rich online resources in the Ministry of Education website.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Evaluation components include
1. Number of ECEC leaders and staff who participated in the targeted professional development and training

2. Number of ECEC centres that mention use of physital spaces when applying for grants
3. Number of ECEC centres that use physital spaces in each region

The project will be accompanied by qualitative research to be carried out by Bar-Ilan University and the "DA-GAN" centre. The research will be conducted by the regional ICT instructors, who will observe how physital spaces are operated. They will observe how the ECEC leader combines the physital space in the activity and daily planning and how children operate within the space. The instructors will examine the success of the physital spaces using a questionnaire administered to the ECEC leader and staff, and qualitative observation-based research. The questionnaire will examine the leader's and staff's attitudes towards- and perception of- using digital technologies in the ECEC centre and combining techno-pedagogy in their instruction. The sample for the study will include 10 centres in each region (total N = 80 centres), ages 3-4 and 5-6. In each region 2 centres will be selected for a more in-depth qualitative research, in which the children's behaviours, interaction, collaboration, knowledge and skills (cognitive, social, physical, technological) will be analysed in a pre-post design (i.e. before and after the introduction of physital spaces). The observations will be complemented by interviews with children, leaders and staff.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not yet available.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Digital resources such as projectors are not equally distributed among ECEC centres, and internet infrastructure is sometimes lacking in periphery areas. There is also significant variation in technological-digital skills between ECEC centre leaders and staff, especially in the Arab-speaking and Ultra-orthodox sectors. To overcome this barrier each ECEC leader was provided with a laptop, low SES centres were provided with desktops, and all educational teams were given training and professional development courses at the national and regional levels. Specialised ICT instructors provide culturally adapted training and induction in Ultra-orthodox and Arab-speaking centres. The practice of physital spaces is modular and allows partial implementation if internet connection is unreliable or unavailable. The practice is presented as aiming to deepen the education experience not coming at the expense of traditional knowledge and physical skills.

Additional information

https://pop.education.gov.il/kindergarten/1emergency-learning-kindergarten/

Japan (1)

Online Exchanges for Collaboration (2020) is an initiative that emerged in the Minami-Matsuo-Hatsugano-Gakuen district of Japan, encouraging collaboration between ECEC facilities and elementary schools via digital tools. Regular online meetings have enabled ECEC leaders in different settings to discuss how to build connections between ECEC settings, children, parents and the wider community, as well as bringing together staff and children in ECEC settings and primary schools to facilitate the transition between education levels. These efforts first emerged during the context of the COVID-19 pandemic and have since expanded and diversified.

Curriculum and pedagogy

Family and community engagement

Reference name: Case study JPN_1

A. Policy goals and design

A.1. Vision and broad objectives

Vision

Create strong interconnections between institutions and actors within a district containing three modern and five historic towns to simplify the paths between them for children. This makes it preferable that collaborations between kindergartens/nursery schools and elementary schools in a single region exist to help create a town where children, parents and the wider community will feel safe and mutually supported. The use of ICT equipment is expected to be a major means of building such connections in the future.

Challenge

Circumstances where exchange events between headmasters of integrated centres for ECEC (Nintei-Kodomo-En) and nursery schools in a given district have become difficult due to time constraints and busy schedules caused by the COVID-19 pandemic.

Intended Outcomes

Conducting casual online exchanges among headmasters can provide opportunities to exchange information such as the challenges for children, parents and the wider community within school districts. Then, with reference to such information, some significant decisions can be made regarding school operation.

A.2. Coverage and eligibility

Headmasters' meeting

The online meeting has been held monthly since around the summer of 2020 to include municipal compulsory education school principals, headmasters of the private integrated centre for ECEC (Nintei-Kodomo-En) and vice-headmasters of private nursery schools. These three facilities are engaged in various educational activities through exchange of information regarding the use of ICT even during the COVID-19 pandemic.

Nursery school to kindergarten-elementary school training programmes

Schools offer training programmes for staff in kindergarten, nursery school and integrated centre for ECEC (Nintei-Kodomo-En) (public or private) from where the first-grade elementary school students graduated. The programme commenced in FY2021. In FY2021, 14 facilities (around 20 people) joined the programme from 26 invited facilities. In FY2022, 20 facilities (around 25 people) joined from 43 invited facilities.

A.3. Policy tools

Online Headmasters exchange meeting

Since FY2020, the online exchange meeting among the three facilities (i.e. an integrated centre for ECEC, a nursery school from the school district, and the school itself) was held. The relationship between these facilities is important as around a quarter of children in the first year the primary school come from these two preschools. However, even though they are close in proximity, it has been difficult for the three headmasters to meet, due to their busy schedules. Coordinating meeting times was also a challenge. Therefore, in FY2020, it was decided to hold the online headmasters exchange meeting with the aim of creating a no-pressure "connection of three facilities." The meeting began with informal aims. At first, the three headmasters were not familiar with online and other tools, so they were anxious to connect. However, when they saw each other's faces on the computer screen, they were relieved and began exchanging information naturally. Subjects included the statuses of children and their parents at each facility, current countermeasures for COVID-19, future events schedules, recent initiatives of interest and future challenges. They were able to speak freely and frankly. Such exchange meetings continued to be held for about 30 minutes, once a month. Gradually and organically, the occasions to discuss how to build connections among three facilities, children, parents, and wider community increased. These discussions led to more exchanges and educational activities, some of which are introduced below.
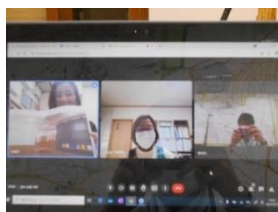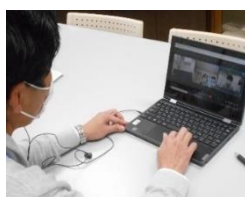
Online childcare training for junior high school students

So far, some third-year junior high school students visited two such facilities to implement childcare lessons. In the online headmasters meetings, whether this training can be implemented through online even during COVID-19 pandemic, was discussed. The 9th grade students also wanted to engage in the lessons. A large monitor was installed at the integrated centre for ECEC (Nintei-Kodomo-en) and the nursery school, and the 9th graders practiced and familiarised themselves with online operations many times before implementation. On the day of the lesson, junior high school students were divided into four groups, and asked two classes of five-year-old, 'can everyone hear me?' and 'how about in the hall?' Then, they implemented quizzes, picture-story shows, storytelling, and origami classes online to share with the preschoolers. Seeing the satisfied faces of the students and the happy expressions of the preschoolers after the event, we were happy to have done it. During the origami session, a pre-schooler who was unsure of how to fold a paper asked, "how do you make that pointy part?" This was another great learning experience the junior high school students obtained. So far, they had explained how to fold a paper only according to the script, but after that question, the students started to explain in their own words …'hmmm, can you understand this…?' They began discarding their scripts in their dialogues with preschoolers and then everybody moved closer to the monitor. In this online childcare lesson, it was inevitable that the preschoolers and junior high school students would feel separated. However, only one question from a pre-schooler brought to light the importance of close observation and communicating naturally with one's own words, even if online.

Full of Flowers Project

From the online childcare lesson, it was discovered that ICT can be used for casual exchanges among children. These types of exchanges began to emerge. In one such activity, third-grade students sent flowers they had grown to integrated centre for ECEC (Nintei-Kodomo-en), nursery schools and police stations to express their gratitude to the parts of the community that take care of them every day. The activity is called the "Full of Flowers Project." One day in March of 2020, during an online headmasters exchange meeting, one headmaster suddenly stated, "children have been working hard every day to water the flowers they received the other day. Recently, these children asked me: 'Headmaster, are these just weeds? Or do they bloom into flowers?' Another child answered, 'if it's a weed, it should be pulled out' and they showed me a picture. I immediately relayed this to the third-grade homeroom teachers, who showed the picture to their students and asked 'I got a question from the integrated centre for ECEC (Nintei-Kodomo-en). What would you do?' The third-grade students began researching with their friends during recess, discussing the picture and asking, 'is this different from grass?' Soon, this question /answer project spread. A few days later, a student representative was assigned to present the results of their research online to the integrated centre for ECEC (Nintei-Kodomo-en) during recess. The conclusion: 'It's not a weed, I think a flower called calendula will bloom soon. It is such a beautiful flower,' that third-grade student answered. 'Wow!' the preschoolers exclaimed in surprise. That was in March. The preschoolers were anxious about entering elementary school, so they began to ask questions: 'Will there be snack time in elementary school?' 'What kind of studies will we have?' 'Is it hard?' One after another they asked these questions, and the third-grade students answered each one.

Nursery school-kindergarten-elementary school training programme

In May 2021, the school sponsored an online training programme for a nursery school-kindergarten- elementary school collaboration by inviting all the 26 preschool facilities from which their new first-grade students had graduated. As the result, more than 20 staff including headmasters and childcare workers participated. They then had the opportunity to visit the classes of children one month after entering the school online. Since there are three classes in the first grade, each class was online for 15 minutes. One childcare worker who found the only one graduate from the facility in the total 98 students mentioned, "I was worried I would not be able to find him. However, I recognized him right away. I was relieved to see him calmly attending classes at the school". During the workshop following the visit, the head of the first grade of the school talked about the 'Start curriculum' that the children worked on for a week after entering the school and their progress since starting. This was followed by an exchange of views with the participating childcare workers. Childcare workers who have worked closely with children and their parents for years shared their views after visiting the children's classes. The content of the discussion was filled with so much information and learning. Later, we received many thank you emails from participants with comments such as: "It was

a relief to see how well the graduates did"; "I really appreciated that it was online, so it was easy to participate"; "I don't have the chance to connect with nearby nursery schools and kindergartens on a daily basis. I was glad to be able to exchange with so many childcare workers at this time"; "It was such a valuable training programme for me because I have very few chances to see school lessons"; "I was very happy to find that the lessons in our kindergarten were useful for graduates when I saw the 'Start curriculum'. I thought I would continue to do my best from now on".

Also in May of FY2022, an online training programme was made available to those participating in the nursery school-kindergarten-elementary school collaboration with invitations sent to all of the preschool facilities (43). A total of 125 graduates entered in the first grade of this school. On the day of the programme, participants from 20 of such preschool facilities, teachers from elementary schools in the city, as well as people from the Board of Education participated. They visited the lessons of the children online who entered the elementary school one month before. During the online workshop following the visit, the school explained that "the school has worked significantly toward sharing information among teachers" and "in all educational activities, it was always discussed that teachers should not give answers immediately but encourage students to think and draw from their previous experiences". After the program, we received emails from the participating childcare workers, such as: "I thought that in the elementary school, students were implementing independent, interactive, and deep learning. I was a little surprised to see that they were implementing it more than I expected and were collaborating and thinking with their friends during math class, as they did the other day. I could see that education is changing a lot"; "I was reminded of this when I saw the class. What childcare workers can do is to carefully involve children in their kindergarten life so that they can acquire 'the ability to adapt to a new environment', 'the ability to listen to what others say', and 'the ability to express their feelings in words' at their own pace. I was able to reflect on my own school's childcare from a new perspective. I am very grateful"; "I would like to try to implement 'less formal collaboration' at local elementary schools and preschools"; and also "I envy the online headmasters' exchange meetings where three facilities are implementing in a friendly manner".

A.4. Funding and resources

City Hall provides about JPY 100 000 to subsidise the training programme.

A.5. Stakeholder engagement

Our school's efforts are constantly reported to the city's Board of Education. In turn, the Board of Education provides information about them to elementary schools, nursery schools, integrated centre for ECEC (Nintei-Kodomo-en) and kindergartens in the city district. Parents are informed of our efforts through the school's newsletter and blog, as appropriate.

A.6. Future developments, sustainability and scalability

It is expected that those who participated in the collaborative training programmes among nursery schools, integrated centre for ECEC (Nintei-Kodomo-En) and elementary schools will voluntarily endeavour to expand such programmes in their own communities.

B. Types and roles of digital technology

B.1. Digital resources

Environment in which connections can be made online, using equipment such as tablets.

B.2. Digital competencies

Not specified.

B.3. Uses of digital technology

One of the main purposes of this programme is for elementary schools to make connections among newly enrolled children, parents, the wider community and the preschools from which they graduated. What we take note of, in terms of digital technology, are the disparities in the digital environment between childcare workers. Many preschools (especially public ones) did not prepare environments in which to participate in online training while others used personal equipment or visited nearby preschools to borrow ICT equipment. The environment for all preschools, public or private, should be prepared to allow online dialogue with the childcare workers and the children.

B.4. Support systems

Not available

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

This school's efforts include some items in which children are involved in educational activities, therefore occasionally their performances might be assessed with the school subjects, etc. However, there is no assessment setting for these activities.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not available.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

One success factors that we found, was due in large part to the elementary schools sending out messages such as, "why don't we hold online principal exchanges?" In our conversations with preschool headmasters, we heard that there was a high hurdle in talking with the elementary school principals. It seemed that unless there was some event to talk about, such as a sports festival, cultural festival, or graduation ceremony, there was no room for conversation. However, when elementary school principals have a problem, they would frequently call or otherwise feel free to ask for advice with questions such as "we are having trouble with the parental communication system, what do you do at your integrated centre for ECEC (Nintei-Kodomo-En)?" Then before long, the preschool headmasters also come to ask advice from the elementary school principals or invite them to the events. For example, "when we go on our next walking field trip, can we play in the school playground for a bit?" or "would you be interested in coming to see our concert?" In that sense, we don't feel any particular barrier, as long as we can have frank conversations at monthly online headmasters' exchange meeting.

Japan (2)

The **Quest for Soil Learning Activity** (2021) was a year-long learning-by-discovery programme for 5 year-olds run triggered by a simple statement from one of the children: "This soil is from old times". Through the programme, children tested this and various other hypotheses, participating in a variety of exploration activities to investigate the nature of soil and its different types and uses. Multiple digital technologies were used to complement and deepen the learning, including computers, tablets, electron microscopes, digital scales, and projectors. Digital tools were also used to communicate with parents and the wider community about the children's learning.

Curriculum and pedagogy

Workforce development

Family and community engagement

Monitoring and evaluation

Equity and diversity

Reference name: Case study JPN_2

A. Policy goals and design

A.1. Vision and broad objectives

1. We believe that children's interests and their proactive engagement develop their "power to learn." We value the children's motivation to discover something by themselves, their wonder and their desire to know something. In particular, we encourage children to have a broader conceptual perspective and engage in activities. We emphasise "thinking" and "exploring" more than "knowing" or knowledge. This allows them to develop the abilities to generalise what they have acquired through thinking, set up questions that have no definite answer, or derive hypotheses voluntarily. These abilities are required to solve global problems in the future.

2. Discovery by children ► Dialogue ► Actual experience ► Dialogue ► Thinking and exploration ► Actual experience ► Dialogue ► etc.
We are proceeding with a project by repeating "dialogue," "actual experience," and "thinking and exploration" for each theme. Creating a learning cycle in this way and thus learning things in a deeper and broader manner allows children to see and understand one thing from various perspectives.

3. Direct experience is deeply linked to sensations and emotions and is deepened through a combination of analogue and digital. Microscopes invite children into a subtle and creative world that is invisible to the naked eye, but the world they watch through the microscope would be meaningless without direct experience in the analogue world. Like crayons, pens, paper, magnifying glass, sieves and balances, digital tools, such as tablets, microscopes and electronic scales, are available as daily items. Children understand their characteristics and applications and use them as play and learning tools, which enriches their activities. In the future, childcare workers will be required to have the ability to combine analogue and digital tools comprehensively rather than separating them. In such an environment, children will be able to gain a multifaceted perspective that involves sensations and emotions.

4. Exploring one thing deeply from many sides allows children to better understand the nature and essence of things. One material of "soil" can be mud, sand, clay, or a bowl. They can understand that one thing can take various forms through their experience. When dealing with natural materials, in particular, we believe that "regeneration" and "circulation" are keywords. We incorporated them from as early as the planning stages for this programme.

The steps 1-4 are at the heart of this programme and promote a sense of value and direct experience that enable children to actively grasp social issues and realise a sustainable society. This programme can be described as "education for developing creators of a sustainable society" and is consistent with Education for Sustainable Development (ESD).

A.2. Coverage and eligibility

All certified early childhood education facilities are subject to any one of the National Curriculum Standard for Kindergartens, the National Curriculum Standard for Nursery Schools, and the National Curriculum Standard for integrated centre for ECEC (Nintei-Kodomo-En). The "attitudes that infants should acquire by the end of early childhood" and the importance of direct experiences in early childhood are common to all three of these guidelines. Depending on the type of facility, staff are required to have either or both of a kindergarten teacher license and childcare worker qualification.

- ECEC type implementing this programme: integrated centre for ECEC (Nintei-Kodomo-En) - nursery school
- ECEC staff: Childcare worker and atelierista
- Target: 23 people in the 5-year-old class
- Specific family group: None
- Participation requirements: Childcare worker qualification and kindergarten teacher license for homeroom teachers, art education experience and childcare worker qualification for atelieristas
- Obtained subsidies or additions: None
- Other prerequisites, requirements, and restrictions for programme implementation: None
-

* This programme, which is mainly targeted at children, focuses on a process that emphasises team collaboration and learning with each other, and is part of research undertaken by childcare workers. (Collaboration between childcare workers and atelierista)

A.3. Policy tools

 1. "Dialogue" and "Question"
The activities in this integrated centre for ECEC (Nintei-Kodomo-En) are deployed around the axes of "dialogue" and "questions." Childcare workers and atelieristas deliberately ask "questions" that encourage children to think, and the children engage in voluntary dialogue. Such dialogue deepens their thoughts and enhances their motivation for activities. This is exactly what education in early childhood should be, as defined in the National Curriculum Standards for Kindergartens, for Nursery Schools, and for Integrated centre for ECEC (Nintei-Kodomo-En). The ideal education in early childhood makes children proactively get involved in the environment around them, makes them aware of how they relate to the environment and its meaning, makes them try to incorporate the environment through trial and error, and makes them think about it. Childcare workers should create a childcare environment that can enhance such activities.
Children's attitudes of this nature lead to "voluntary, interactive and deep learning" as defined in the curriculum guidance. The children are deeply interested in the material "soil," and are proceeding with multifaceted learning persistently with a goal. The axes are the "dialogue" and "questions" mentioned above. The attitude of deepening their thoughts through exchanging opinions and updating their activities is truly active learning. The active learning is a process of asking questions many times. In the process, the children dialogue with things (soil in this case).

2. Documentation and publication
In order to proceed with this Programme, not only children's "dialogue" but also "dialogue" between childcare workers is necessary. The childcare workers "dialogue" with each other to exchange their thoughts and perspectives, and further incorporate the perspective of atelieristas, who are not childcare workers, to give children the best environment and "questions." We use documentation (visualised learning process) as one of the important tools for child-to-child dialogue, adult-to-adult dialogue, and dialogue with communities.
At the end of the program, we summarise the children's activities and learning trails into a booklet (publication) and share it with their parents and local communities.

* The tools, such as "dialogue" and "question"/documentation and publication are related to the educational approach "Reggio Emilia Approach" initiated in the Italian region of Reggio Emilia. Inspired by this educational approach, we incorporate those elements into the programme.

A.4. Funding and resources

Source of funding: We implemented the plan within the scope of normal operations, without special funding.
For additional resources, we used the ward's support budget to which the law is not applied.
Budget: JPY 63 250
Period: The activity period is from June 2021 to March 2022 (9 months). Additional resources are for about a month.
Additional resources to support implementation: Ceramic art experience within the Japan Ceramic Art Club (community support)

A.5. Stakeholder engagement

Parents: Communicate the daily life of children with daily journals/share children's learning and growth with documentation/share information at parent-teacher association meetings/share information through a communication notebook (ICT app).

Local communities:
- We planned a "flowerbed that connects life" (*) with Yoyogi Park Management Centre. In this initiative, the children made soil and mulch. Through this collaboration, they understand that soil has various types and each type has its own role and they feel that living things in nature return to the soil. The community was actively involved in this initiative, in fact, the initiative plan was created in collaboration with the community.
- We are engaged in rice cultivation with a local rice mill. In this initiative, we made soil for rice planting. The owner of the mill, who has the rice master qualification, indirectly contributed to this programme by providing us with his knowledge.
- This is a project in which children plant and grow flowers in a flowerbed in Yoyogi Park. We have been working on this project with the Yoyogi Park Management Center since the spring of 2021. The name "flowerbed that connects life" reflects children's wish to make flowers bloom so that seeds produce the next-generation seeds.

- When children became interested in clay, we asked a local ceramic art class for cooperation and made a bowl. This gave them an opportunity to experience that the soil is changed into a familiar tool.
- Communication strategy to related parties: At the end of the fiscal year, we summarised the outline of the programme and a series of activities and documentation (pieces of work) produced by children into a booklet (publication), and sent it to the parents, the local communities, local kindergartens, nursery schools and integrated centres for ECEC (nintei-kodomo-ens), and other related parties.

* Existence of community coordinator
We have successfully achieved this plan thanks to the cooperation of local communities. We have systematically promoted activities, such as soil preparation for flowerbeds and for rice planting and making bowls, in collaboration with them. We believe that community involvement has further encouraged children's understanding of "soil".
The community coordinator has played a major role in connecting children's activities with the communities. The community coordinator is our unique staffing requirement; we have one assigned community coordinator.

A.6. Future developments, sustainability and scalability

This Programme was implemented for children in the 5-year-old class. They have already been engaged in various exploration activities for as long as nine months, and we will end the Project when they graduate. On the other hand, the "Flowerbed Initiative" and "Rice Cultivation Initiative" that have been implemented with the communities as "soil-related projects" are reflected in the integrated centre for ECEC (nintei-kodomo-en)'s business plan for the next fiscal year and will continue. The basic idea of this Programme will be redesigned and continued under a different theme based on new discoveries and awareness of children of the next year onwards.

B. Types and roles of digital technology

B.1. Digital resources

A variety of digital tools are available in the class environment on a daily basis. We provide these tools with an intention for children to use them repeatedly in their play and exploration activities as a means of learning - like paper and crayons. We expect these digital tools to serve as a connector between activities and expression.
Digital infrastructure used by children includes PCs, tablets, applications, electron microscopes, microscopes, scales, overhead projectors, and projectors, which are installed in the environment as needed. We also utilise applications, videos, tablets, web conference systems, etc. as connectors that connect children's learning at the integrated centre for ECEC (nintei-kodomo-en) to parents and communities. We have an internet environment throughout the facility, and each class has a PC and tablets installed for use by childcare workers.

B.2. Digital competencies

Today's children have been surrounded by digital technologies since they began to understand things. At times, they can handle tablets without any hesitation. In this programme, children actually connect an electron microscope to a PC or tablet and operate it by themselves. The purpose of this Programme is not to get them accustomed to using digital devices, but to deepen their learning by repeating the process of watching what is invisible to the naked eye or facts in invisible worlds and inflating their imagination. Digital tools allow children to more reliably prove human senses, understand finer things, and confirm things by watching them over again, and thus can play a major role in connecting children to various worlds.
We do not intend to promote digital literacy, just as it is more important for children to be exposed to words than to write the Japanese alphabets in early childhood. Our aim is to expose children to digital technology to motivate them to learn through discoveries, surprises, and emotions.

B.3. Uses of digital technology

Digital technology is used by both adults and children as needed in the environment inside and outside the nursery room.
"Developing the ability to engage in various surrounding environments with curiosity and inquisitiveness and incorporate them into our lives" is shown as an activity related to the "environment" of the five areas stipulated in the curriculum guidance. We believe that digital technology is a tool for connecting non-digital activities to deeper learning. Rather than separating non-digital activities from digital activities, we should develop both types of activities while they relate with each other. In other words, we recognise that digital exists as part of our environment. For example, when we go out for a walk, we sometimes carry a microscope, a tablet, a sketchbook and a pen with us. Which tool to use at the destination is decided based on the discoveries and interests of children at that time.

B.4. Support systems

The community coordinator within our organisation supports digital installation, technology, and management and also plays the role of connecting us to external experts or engineers as needed.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

We visualise children's learning in the form of documentation. We perform self-evaluation using the "10 attitudes that children should acquire by the end of early childhood" described in the curriculum guidance or guidelines as one evaluation axis. This Programme is included in our business plan and report and is evaluated by the parties concerned. It is also evaluated by parents and local communities through the distribution of our publications.
These assessments are also submitted for third-party evaluation, which is conducted every three years.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

This Programme is taken up as one case in the following book, summarised from the perspective of trainees, and released to the public.
"Enrich childcare with ICT - 28 practices that connect and spread excitement"
Written and edited by Kiyomi Akita, Mariko Miyata, Shoko Nozawa, 2022, Chuohoki.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

At a parent-teacher association meeting, a parent said, "Did you do that so deeply?" and "Not only results but also process is important for learning".
The local community to which we distributed our publications highly evaluated children's lively facial expressions and attitude and our tenacious activities by saying "Facing nature leads to the solution of global issues".
The researcher also highly evaluated the case introduced in the book in C.2.by saying "I have never thought it possible for infants to conduct an initiative that should be conducted at elementary schools".

Japan (3)

In Nanatsumatsu Yochien, Japan, the **ICT to Expand Children's Learning Experiences** initiative (2019) illustrates the ways in which one ECEC setting is supporting 0-5 year-olds learn through direct experiences via a balance of digital and non-digital activities. As part of the initiative, children have access to a range of digital tools within their ECEC setting and teachers have access to related guidance material. Staff also regularly use digital tools to communicate with parents, other kindergartens and universities, to disseminate information and gain feedback and advice on ICT-based activities in the local area.

Curriculum and pedagogy

Workforce development

Family and community engagement

Equity and diversity

Reference name: Case study JPN_3

A. Policy goals and design

A.1. Vision and broad objectives

The OECD Learning Compass 2030 shows the "Core Foundations " that form the prerequisites for further learning across the curriculum. Unfortunately, practices that foster data and digital literacy are rarely performed in early childhood education, which is a current issue. In the future digital society, early childhood education using ICT will foster children's abilities to obtain correct information, think critically, and work creatively.

The National Curriculum Standard for Kindergartens shows Social Participation as one of the attitudes that infants should acquire by the end of early childhood. Social Participation is defined as follows: in a variety of environments both inside and outside kindergartens, infants learn to act using information, for example, they take in information necessary for play and life, make decisions based on the information, communicate information, and utilise it. It is important for them to collect information and utilise it, for example, to interact with people or explore something based on the collected information. In doing so, they will acquire the attitude of Social Participation. Even in the case where direct dialogue is prohibited to prevent the COVID-19 infection, ICT allows children to dialogue online. In other words, the use of ICT complements infant experiences.

The role of teachers is also crucial for ICT practices. Through practice, teachers should improve their ICT skills required for Japanese-style school education in the Reiwa era.

A.2. Coverage and eligibility

All certified early childhood education facilities are subject to any of the National Curriculum Standard for Kindergartens, the National Curriculum Standard for Nursery Schools, and the National Curriculum Standard for Nintei-Kodomo-En (Integrated centre for ECEC). The "attitudes that infants should acquire by the end of early childhood " and the importance of direct experiences in early childhood are common to all three guidelines. Depending on the type of facility, staff are required to have either or both of a kindergarten teacher license and a childcare worker qualification.

This programme is comprehensive and not targeted at enrolled children. All staff who are in charge of children aged 0 to 5 years can access resources. It is designed to be flexible enough to adapt to the different needs of children aged 0-5 years.

We use subsidies provided by the national and local governments to purchase ICT equipment.

With reference to the WHO guidelines, we do not allow infants aged 2 to 5 years to continuously engage in ICT-based activities for more than 30 minutes. For 0-year-olds and 1-year-olds, we place a greater emphasis on direct experiences and limit ICT-based activities to prevent them from engaging in ICT-based activities too much.

Implementing this programme requires us to have tablet terminals and a WiFi environment in place. We have set up kindergarten-specific security when accessing the outside or introducing new applications. This allows us to impose restrictions flexibly.

A.3. Policy tools

We prepared an ICT implementation report on how each teacher practices ICT, and also prepared an ICT equipment operation manual. Teachers looked back on their ICT-based activities and shared better practices.

Regarding the training, we invited a university teacher who is familiar with ICT-based activities by infants to give a lecture, and received advice, instead of conducting training among the kindergarten staff.

In particular, we keep the following in mind when implementing the training.

- Teachers reflected on ICT-based activities that are difficult to create direct experiences from and changed them. We exchanged information with other kindergartens on SNS about the ICT-based activities although such information exchange was limited to members.
- We opened our childcare to the public online (open childcare) so that our practices can be seen by teachers in other kindergartens. After the open childcare, we exchanged opinions with the viewers so that we could learn from other kindergarten activities. We also refer to presentations at academic conferences. More specifically, they include cases introduced at presentation or symposiums at the Japan Society of Research on Early Childhood Care and Education, and the Japanese Society for the Education of Young Children, and an international symposium "Digital in early childhood education: its role and potentiality" co-sponsored by the Centre for Early Childhood Development, Education, and Policy Research and the All Japan Private Kindergarten Association.

A.4. Funding and resources

The Ministry of Education, Culture, Sports, Science and Technology commissions research and study projects among school networks and local governments. This school network applied for this research and study project and was approved. The cost of this research project accounts for most of our funds. When we need a large amount of money to purchase or maintain equipment, we use subsidies for emergency environment maintenance projects for early childhood education.

Japan is working to provide each child in elementary schools and junior high schools with one device. This has increased the demand for tablets, but unfortunately, semiconductors were in short supply. Under these circumstances, it sometimes took us about two months to procure tablets. To establish the WiFi environment in the kindergarten building(s), we had discussions with experts in advance, and had a contractor carry out construction work and made subsequent adjustments. It took about three months to set up a stable WiFi environment.

Regarding the training of staff, we repeated practice and reflection. This allows our staff to successfully use ICT devices in the WiFi environment. We did not have a specific time for implementing the programme and it did not take much time.

In ECEC in Japan, ICT has been introduced to free teachers up from the work necessary to operate kindergartens and reduce their workload. Once the workload has been reduced through the introduction of ICT, they should secure more time to study teaching materials for ICT-based activities by infants in their daily work.

A.5. Stakeholder engagement

We inform parents of the Programme and related matters through letters from the kindergarten, blogs on our website, emails, videos, newspaper articles or books that introduce our activities, and our SNS.

We also inform the community (universities, private companies, foundations), other kindergartens, elementary schools, and governments of our practices by creating videos introducing our ICT-based activities and widely disseminating newspaper articles or books containing ICT-based activities. We also actively accept requests from interested parties to visit us.

We conduct activities using video or video conferencing systems on a daily basis. In order to realise a smooth transition from early childhood education to elementary school education, we have children watch a school introduction DVD sent from elementary schools. We also use the video conference system to interact with parents, other kindergartens and universities.

At workshops organised by the Sony Education Foundation and learning opportunities on SNS limited to members, we actively disseminate information and actively interact with other kindergartens.

A.6. Future developments, sustainability and scalability

In order to further develop this Programme, we need to continually learn about practices from hub organisations or members, such as Sony Education Foundation, the UNESCO Associated Schools Network (ASPnet), and deepen our practices. We were selected as a Candidate School in the UNESCO Associated Schools Network in September 2022 (link).

We also plan to have a connection with public kindergartens that aim to carry out similar activities in order to learn from each other in a workshop format. We believe that this is an effective initiative.

To ensure the sustainability of activities, it is important for infants to be able to use ICT naturally in their daily kindergarten life. We do not force direct experiences to be associated with ICT-based activities. Infants should use ICT as a learning material, just as they use paper, glue, and scissors. We prevent ICT-based activities from becoming unilateral teaching activities by teachers.

In order to expand these efforts, kindergartens and local communities (including parents, communities, other kindergartens, elementary, junior high and high schools, universities, business establishments, private companies, and governments) should be engaged with through practice, which is important from the perspective of Education for Sustainable Development. In other words, kindergartens and communities need to get connected easily via networks established with the community using ICT, just as they normally do by making a phone call.

B. Types and roles of digital technology

B.1. Digital resources

This Programme promotes the deepening of children's learning through using ICT. Our infrastructure to facilitate learning includes tablets, digital cameras, digital microscopes, projectors, LCD TVs, applications and programming robots. We have a WiFi environment in place so that these devices can be operated in a connected manner. We use not only tablets but also Google for Education (cloud service) to record children's learning activities. This also facilitates data management and information sharing. For free applications installed on tablets, we regulate the display of ads to prevent children from being exposed to stimulating ones.

B.2. Digital competencies

Teachers need to ensure that ICT-based activities do not end up with indirect experiences in which infants merely use digital equipment, which are not tied to direct experiences.

Following the World Health Organization (WHO) guidelines of "connecting digital experiences to direct experiences", we do not allow infants to engage in ICT-based activities for long periods of time (for example, for more than 30 minutes), allow them to use it when needed and encourage them to finish it in a short time. It is a teacher's primary responsibility to prevent infants

from seeing inappropriate images or overly stimulating information, that is, to protect infants from them. The teachers are also required to have the ability to comply with basic laws and regulations, such as portrait rights and copyrights.

B.3. Uses of digital technology

In implementing this Programme, we consider how ICT practices relate to infant experiences so that they can complement their kindergarten life by giving them experiences that are hard to obtain there. The ICT practices eliminate temporal and spatial constraints.

Technology that eliminates temporal constraints

Temporal constraints can be eliminated by saving information in various forms using applications, such as photos, videos, and browser search. Video applications include, for example, time-lapse and slow-motion videos. Capturing and recording the growth and movement of animals, plants, etc. using these functions allows learners, i.e. children, to observe them in a short time. Teachers can collect information in a short time according to the interests of children and use the information collected to interact with them or explore something else, for example. Such information can be used repeatedly.

Relationship with non-digital activities

When utilising digital information in non-digital activities, children transform the digital information into creative and concrete pieces of work using products, handmade picture books, photographs, etc. In this process, children can become aware of the diversity of selected digital and non-digital information and deepen or expand their learning. When handling this information, teachers do not always edit everything using digital techniques and use it for learning. An application is available that allows children to edit photos and videos. Children can create things like slideshows and puppet shows and present them to other children on a large screen. They can be used repeatedly. Children who see this presentation can understand the procedure, understand the situation, predict danger, understand natural events and changes in animals and plants based on the information, and carry out activities from different perspectives.

Technology that eliminates spatial constraints

Spatial constraints can be eliminated by using applications, such as microscopes, map applications, and video conference systems. Activities using a microscope allow children to magnify and see natural and artificial objects that are difficult to see with the naked eye, and notice colour diversity and fractal structures. Tablets allow them to store what they see on the spot. Activities using the map applications allow them to see three-dimensional images of local and national buildings and the natural environment that they cannot visit alone. Activities using the video conference system allow them to remotely meet adults that they cannot meet in their daily lives, remotely exchange with children in other kindergartens, or see places that they cannot access or places to go on excursions. Unlike on-demand video viewing, activities using this video conference system allow them to gather information based on real-time dialogue and allow conference participants to be more responsive to the questions and learning of the children. The video conference system also allows videos to be recorded and edited, making it possible to deepen and expand learning by using them repeatedly.

Digital literacy

In these activities, learners, that is, children, use a lot of data and digital techniques, which help them develop data and digital literacy together with teachers. However, teachers need to support younger children more to develop data literacy. Repeating this process enhances data and digital literacy of learners, allowing them to obtain correct information, think critically, and work creatively. Teachers also need to be flexible about this combination of digital and non-digital activities, depending on each child's actual state. Teachers should sometimes consider how to obtain cooperation from parents, communities and distant professional adults, improve their own data and digital skills, foster their data and digital literacy, and build a curriculum.

Balance with non-digital activities

Digital technology has a great impact on children's five senses, including visual and audio senses so teachers need to pay attention to the length of time they engage with digital media. Of the five senses of human beings, touch, taste and smell are crucial for infant development. However, stimulating these senses and children's long-term memory is difficult. So, when exposing children to digital techniques, teachers need to supplement their digital activities with non-digital activities that stimulate these senses by giving them direct experiences, such as touching, tasting, and smelling before and after learning using digital techniques. Regarding the combination and balance of digital and non-digital activities at a certain age, the proportion of digital activities may be higher than that of non-digital ones for children around the age of 5. For younger children, the proportion of non-digital activities should be higher.

B.4. Support systems

Institutions that support us include the Centre for Early Childhood Development, Education, and Policy Research, Hyogo University of Teacher Education, Gakushuin University, Kansai University of International Studies, and Sonoda Women's University. Many of these institutions train kindergarten teachers. The members of the Sony Education Foundation can consult with communities on SNS, but the number of consultations is limited.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Regarding activities using ICT, we select some practices from monthly activities and prepare a practice report on them. This report records the practices and how children react. Teachers look back on the recorded content and evaluate their activities. We prepare a photographic document on how children reacted or behaved in the practices. The evaluation of their reaction or behaviour is partially described in the guidance record. Of the "attitudes that infants should acquire by the end of early childhood" described in the National Curriculum Standard for Kindergartens, whether or not children have acquired "Social Participation" or "Fostering Thinking Abilities" or "Cooperation", etc. can be evaluated by teachers who closely observe their behaviour.

We open our childcare to the public so that parents and other school officials can evaluate us.

There are some ICT-related items in the Early Childhood Environment Rating Scale (ECERS), but we found that some did not correspond to the practices covered by this report.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

We summarise the ICT-based activities in this Programme in a report of the research and study commissioned by the Ministry of Education, Culture, Sports, Science and Technology, a research paper, and a book (see additional information section).

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

In order to expand and link infant experiences, setting up an online WiFi environment and procuring ICT equipment, such as tablets, are crucial in this Programme.

The existence of teachers who have the skills to operate ICT equipment, the director of a kindergarten who leads this Programme, and the mid-career teachers who play the role of middle leaders are important. Training in the kindergarten is also important to create an atmosphere in which the entire organisation works on the Programme and teachers share ideas. In order to work on ICT throughout the kindergarten, having a cooperative relationship with parents and the community is also crucial.

On the other hand, challenges include complicated device operations, unfamiliarity with device operations, difficulty in understanding how to use various applications, and the possibility of increased workload due to the need for data management. In order to deepen children's learning so that ICT-based activities do not end up as indirect experiences, we need to fully understand/review the National Curriculum Standard for Kindergartens.

However, there are few training opportunities to mitigate such issues, and even schools that train kindergarten teachers do not provide a curriculum on ICT-based childcare practices. On the whole, little practical training on ICT is currently available.

Additional information

o Kiyomi Akita, Shoko Nozawa, Yukari Hotta, Yoko Wakabayashi. Literature Review of Research on Digital Media for Early Childhood Education and Care Bulletin of the Graduate School of Education, The University of Tokyo, Vol. 59, 2019 (link).

o Hideo Kameyama. Initiative Not to Stop Learning in Covid-19 Catastrophe and Creating an Environment that Supports it. Monthly Elementary Education Material, March 2021, 86

o Hideo Kameyama [Case] Utilization of ICT Equipment that Leads to Voluntary Learning by Infants. Monthly Elementary Education Material, December 2021, 096

o Hideo Kameyama, Chieko Shikata, Chieko Satake. Practice Reports on and Issues of Interactive Online Training for Childcare Workers - Measures to Use ICT to Prevent the Spread of COVID-19 Infection. Infancy Education WEB Journal 04 (link).

- o Hideo Kameyama. Minervashobo, Development 170: Development of Non-cognitive Abilities and Childcare/Education. Non-cognitive Abilities Fostered in Nursery Schools: From the Perspective of Devising Environment in Kindergarten and Utilizing ICT (link).
- o Tomoko Nasukawa, Osamu Fujii, Motoaki Hagiwara, Ayuko Fujisaki, Hideo Kameyama, Masako Yoshizu, Keiko Yamamura (2022), How and What Should ESD/SDGs Aim at in Infancy? - Using OMP ESD Rating Scale as a Clue – A collection of papers presented at the 75th Annual Meeting of the Japan Society of Research on Early Childhood Care and Education, J43-J44.
- o Edited by Kiyomi Akita, Mariko Miyata, Shoko Nozawa. Chuohoki Publishing, Enrich childcare with ICT. 28 practices that connect and spread excitement (link).
- o School corporation Nanatsumatsu Gakuen. 2020: Research and Study on Enhancement of Teaching Methods, etc. for Addressing Issues of Early Childhood Education. Practice of Early Childhood Education that Connects Infants, Parents, and Teachers Using ICT. Early Childhood Education Using ICT during the COVID-19 Pandemic (leaflet) (link).
- o School corporation Nanatsumatsu Gakuen. 2021: Research and Study on Enhancement of Teaching Methods, etc. for Addressing Issues of Early Childhood Education. Utilization of ICT in Early Childhood Education (leaflet). Casebook on ICT Practices that Enrich Infant Experiences (leaflet). Research and Study on Enhancement of Childcare Content Using ICT and Sharing Inside and Outside Kindergarten (link).
- o Report on Improving the Attractiveness of Childcare Sites and the Profession of Childcare Workers (2020), prepared by the Ministry of Health, Labour and Welfare (link).

Korea

Korea has introduced **Online Programmes to Support the Implementation** of the child-centred and play-based revised **Nuri curriculum**. Various teaching and learning materials were developed for this purpose and provided in the form of online learning during the COVID-19 pandemic. The i-Nuri portal was established to consolidate government-developed materials and share good practices. The portal is available to teachers and parents as well as to the general public and experts interested in the revised Nuri curriculum.

Standards and governance

Curriculum and pedagogy

Workforce development

Family and community engagement

Monitoring and evaluation

Equity and diversity

Reference name: Case study KOR

A. Policy goals and design

A.1. Vision and broad objectives

A "Plan for Educational Information and Communication Technology" has been developed every 5 years since 1996 by Ministry of Education in Korea. Currently, the 6th Plan (2019-23) is under implementation with an emphasis on realising a human-centred and future-oriented smart educational environment. While experiencing and recovering from the COVID-19 pandemic, the Korean government announced a series of digital policies to transform the educational system into this future-oriented vision. In particular, 'Cultivating a Million-Strong Digital Talent' is one of the 100 National Tasks of the new government and aims at producing highly-skilled, digital-savvy workers from 2022 to 2026, in a bid to expand opportunities of digital education for all the Korean people (Ministry of Education, 2022, p.1). This policy initiative involves: a) strengthening digital competency from the early years and throughout the lifespan to reduce digital gaps; b) developing software and Artificial Intelligence (AI) competencies in teachers; and, c) building infrastructures to cultivate digital talents, such as smart schools.

Nonetheless, digital literacy and competency in early childhood is not clearly defined and stated in the national Nuri curriculum and online learning programmes and digital tools are supplementary to support children's play. With a high priority on children's agency and free play, the 2019 Revised Nuri Curriculum has been implemented in all Korean kindergartens and childcare centres for children aged 3 to 5 since March 2020. With recent policy developments on technology and AI, there is a need to define digital literacy and competency for young children in Korea's contexts, to clarify the roles of teachers and parents in supporting children's digital skills and play, and to align with digital literacy in later phases of life.

A.2. Coverage and eligibility

The online programmes support the implementation of the Nuri Curriculum, which covers the entire ECEC sector (children, teachers and parents) for children at age 3 to 5. As part of the Top 10 Policy Priorities for Future Educational Transformation (2020) and the Plan for future-oriented curriculum (2021), kindergartens overseen by Ministry of Education are the main focus of this initiative due to the current split ECEC system in Korea.

A.3. Policy tools

Local offices of education developed several resource materials as follows:

Resource materials for teachers
- *AI in kindergartens*
- *Digital literacy in early childhood*
- *Digitalized play environment*

The Ministry of Education established the i-Nuri portal in order to disseminate resource materials developed by central and local governments for play-based Nuri Curriculum. The Portal consists of five domains: *1) Nuri for Learning* (disseminating materials developed at national level); *2) Nuri for Sharing* (sharing materials for practices by themes); *3) Nuri for Supporting* (providing up-to-date trends on play and materials to respond to the situation of the COVID-19 pandemic); *4) Nuri for Communication* (online community among users, such as experts, teachers, parents, etc.); and, *5) Nuri for Parents* (providing materials for parents). There are more than 2,700 resource materials including distance learning contents, video clippings, forms for observational records, and more (link).

A.4. Funding and resources

In general, local offices of education provide funding annually for the development of resource materials and programmes, digital devices and platforms, and staff training to support the implementation of the Nuri Curriculum and the *Plan for the Future-oriented Curriculum* (2021). Local offices of education develop support plans and guidelines, oversee the plan/ programme implementation and report about it to the Ministry of Education.

A.5. Stakeholder engagement

In order to plan and disseminate digital policies and related materials, central and local governments hold a range of consultation meetings with multiple stakeholder groups, such as digital experts, ECEC professors and researchers, officials of support centres, ECEC teachers and directors, and representatives from parent associations.

Video clippings, card news, mobile applications, and the *i-Nuri* portal have been used to inform about policies and programmes to teachers and parents through individual ECEC settings.

Teacher training and parental education are provided by Early Childhood Education Promotion Centres (under local offices of education) and Comprehensive Childcare Support Centres (under municipal authorities).

A.6. Future developments, sustainability and scalability

Local offices of education continue to develop digital contents appropriate for young children and resource materials for teaching and teacher trainings. From 2023, it is expected to conduct surveys regularly to understand the current status of digital practices and, thereby, to establish more concrete digital support plans for parents, teachers, and children, as well as to provide a safe digital learning environment for young children (*Plan of Early Childhood Education 2023-27*)

In primary and secondary schools, AI-based learning system tailored to individual students will be supported from 2024, and digital textbooks and content (including AR, VR, Metaverse) will continuously be distributed. A digital-based integrated platform of teaching and learning and *My Portfolio* (digital badge) will be established from early childhood to secondary schools, and smart schools will be built in the period 2022-26 (*Plan for Cultivation of a Million-Strong Digital Talent*, 2022, p.6).

B. Types and roles of digital technology

B.1. Digital resources

For online learning in kindergartens, digital devices (laptops or computers, beam projectors, TV, tablets) and videoconferencing services (e.g. Zoom) for interactive learning are prepared. In addition, digital platforms such as Classting, Band, Kids Note, etc. are used to communicate with families.

The main types of apps and platforms developed in public and private sectors for teaching and learning in kindergartens, and used by teachers in Korea are as follows:

Name of platform	Targets	Providing methods	Services
i-Nuri	Teachers, parents, the public	Internet website	- Teaching and learning - Observation and evaluation - Professional Learning Communities (teachers)
EBS Kindergarten at home	Children	Internet website/ TV, YouTube	- Teaching and learning
Play ON	Teachers, parents in Gyeonggi Do Office of Education	Internet website	- Teaching and learning - Professional Learning Communities (teachers)
Play School	Teacher, parents, public	Internet website	- Teaching and learning
Observational Documentation	Teachers, Sejong Office of Education	PC programme	- Observation and evaluation
App for play documentation	Teachers in Gwangwon Do Office of Education	Mobile app	-Observation and evaluation
Kids Note	Teachers, parents	Mobile app, Internet website	- Observation and evaluation - Communication
Classting	Teachers, parents, children	Mobile app, Internet website	

B.2. Digital competencies

Teachers need to use digital tools for content production and real-time interactive communication, as well as platforms for content application to teaching and learning activities, and VR, AR, Metaverse technology for field trips. They also have be familiar with safety protocols, copyright and personal information protection, as well as to develop digital skills for non-real-time communication and administration and management.

Local offices of education and Early Childhood Education Promotion Centres provide teacher training opportunities free of change to promote digital skills to support children's play.

Digital media, such as robots for teaching and learning (R-learning in 2010), have been used in Korea in early childhood education before the COVID-19 pandemic. Although early digital literacy is not manifested in the national Nuri curriculum, there are a range of online/distance learning materials for children's digital literacy and digital ethics (e.g. how to use digital media properly) developed since the COVID-19 and accelerated by recent digital policy initiatives which take a lifelong approach and advocate digital citizenship.

B.3. Uses of digital technology

In Korea, digital tools are mainly used to support children's play since the revised Nuri Curriculum emphasized children's play. Accordingly, online learning programmes and resource materials were developed for teachers and parents to support children's play.

Play packages, delivered to children's homes during the COVID-19 period, were used in combination with online teaching and learning materials. Parents supported their children's virtual communications with teachers and peers.

B.4. Support systems

In early 2020, the Korean government established the *i-Nuri* portal to distribute various materials from the Ministry of Education, local offices of education and public institutes to support the implementation of the play-based Nuri Curriculum in kindergartens and childcare centres.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Online/distance learning programmes unfold in three stages: Plan-Do-Evaluate. After completing each session, teachers gather information from parents and teacher observations of children in real time during online learning. Teachers communicate with parents regarding their child's participation and interests in play and promote parental understandings of processes and products of play uploaded on platforms. The use of padlets allows to see how individual children progress over time. Surveys on parental satisfaction with online learning are conducted.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Surveys and research projects by the Korea Institute of Child Care and Education (www.kicce.re.kr/eng) and academia provide some data on the current status of use of digital contents and tools, teacher perceptions, and challenges.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Success factors
- High aspiration of the government to promote digital competency in all citizens from the early years
- Existing digital infrastructure in society and in homes

Barriers and challenges

Teachers
- Gaps in digital competency and efficacy (especially different age groups of teachers, and regional gaps)
- Securing time for continuous professional development on digital skills

Digital contents and tools
- Scattered digital contents for children and need to consolidate in a single platform
- Limited development of digital technologies for nature-friendly, real objects, and play-based activities
- Lack of specific teaching strategies to support disadvantaged children and their families

Protection, safety and rights
- Protecting and ensuring children's emotional and physical development with technology use
- Lack of monitoring of the quality, cost-effectiveness, and outcomes of online learning
- Privacy rights of children and teachers

Additional information

- Plan for Cultivation of a Million-Strong Digital Talent 2022-2026 (August 2022) [link]
- Safe Use of AI in Education The First-Ever AI Ethical Principles Developed (August, 2022) [link]
- Plan for Protection of Children and Youth Personal Information (July 2022) [link]
- Comprehensive Plan of Strengthening Digital Media Communication Competency (August 2020)
- *Plan for Future – oriented Curriculum* (2021)
- *Green Smart School for Future* (2021)
- *The Top 10 Policy Priorities for Future Educational Transformation* (2020)
- 6th Plan for *Educational Information and Communication Technology (2019-2023)*

Lithuania

The **Innovations in Kindergarten** project (2018-22) in Lithuania aims to support ECEC practitioners in using digital technologies to include sustainable development, creative competencies, information technology and STEAM (i.e. Science, Technology, Engineering, the Arts and Mathematics) in preschool and pre-primary education. To this end, sets of recommendations and tools were developed by ECEC specialists. Experienced ECEC professionals across the country were selected to participate in training on how to use these materials and to then train other colleagues in their ECEC settings as needed. Initiated by the Ministry of Education, Science and Sport, the project was implemented by the National Agency for Education and financed by the European Social Fund.

Curriculum and
pedagogy

Workforce
development

Family and community
engagement
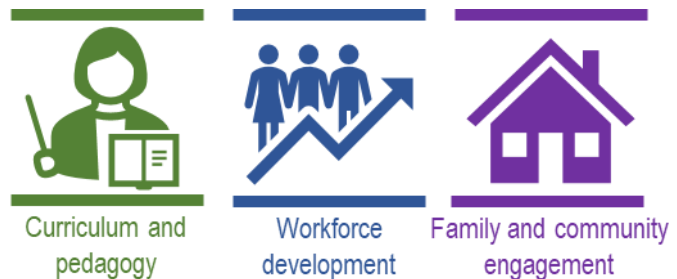
Reference name: Case study LTU

A. Policy goals and design

A.1. Vision and broad objectives

Vision: to improve the practice of ECEC (including the practical use of information technology) by promoting changes in the activities of educational institutions.

Problems:

1) ECEC practitioners in the country lack the necessary innovative methodological tools and competencies to practically implement high quality ECEC programmes. In addition, according to the research "Analysis of the quality of pre-school and pre-primary education content and its implementation" (2009), practitioners should be more guided by experiential education and apply more meaningful, innovative activities for children in their daily education activities.

2) According to the research "Advanced pedagogical practices and pedagogical innovations in Lithuanian kindergartens" (2018), all kindergartens use technology but not at the same level of uptake. The study showed that ECEC practitioners would like training and methodological tools for the application of technology at various stages of the educational process. ICT tools (e-mail, apps, social networks) are often used to communicate with parents. The study also showed that practitioners lack the ability to use these tools creatively, creating targeted activities for children's education. It has been noticed that ECEC practitioners still sometimes do not see the benefits of these technologies and fear that this will not bring clear and constructive work to the groups but will introduce wastage and imbalance.

Results:

1) Prepared, tested and released 2 sets of pre-school education methodological materials for implementing the pre-school education programme titled "Play and discoveries";

2) Prepared, tested and released 2 sets of pre-primary education methodological materials for implementing the pre-primary education programme titled "Experience spaces";

3) ECEC practitioners were trained how to use these prepared sets of the materials in the education process.

Policy alignment.

The purpose and results of the project respond to:

1) The change initiative envisaged in the State Progress Strategy "Lithuanian Progress Strategy "Lithuania 2030" - to create an effective system of lifelong learning, effectively adapting the possibilities of information communication technologies, ensuring the acquisition and improvement of knowledge and skills necessary for a dynamic society;

2) The essential abilities of informational thinking specified in the Outline of the General Programme of Informatics for pre-primary and primary education (2018): 1. Get to know the variety of digital content; 2. Understand the importance of an algorithm, a programme for solving problems; 3. Skilfully and creatively use digital technologies to develop competencies; 4. Understand the purpose and benefits of processing data and information using digital technologies; 5. Understand the purpose and importance of virtual communication; 6. Protect personal data.

A.2. Coverage and eligibility

There were no eligibility criteria to participate in the training. Institutional teams consisting of ECEC practitioners, the deputy headteacher for education and the headteacher, participated in the project training. A total of 475 ECEC practitioners participated.

Since the budget of the project did not allow for the training of all ECEC practitioners in the country, 89 lecturers were trained during the implementation of the project, who are currently conducting training for their colleagues as needed. The eligibility criteria to choose the right lecturers were as follows: a person who has been working for the last 5 (or 3) years in an educational institution, has a higher education in social sciences pedagogy, has at least a senior teacher qualification, has at least 4 years of pedagogical work with 5-7 year-olds, has at least 20 academic hours experience in adult training (on the effective implementation of the general programme of ECEC education: methods, inclusive education, application or creation of innovations - information technologies, STEAM, etc.), has participated in projects related to preschool education, has experience in preparing methodical tools (methodological recommendations, publications, etc.) and/or methodical reports for ECEC practitioners.

A.3. Policy tools

The goal of the project was achieved through the implementation of the following project activities:

1. Research: Advanced pedagogical practice and pedagogical innovations in Lithuanian kindergartens.
2. Preparation and implementation of sets of methodological materials for pre-school and pre-primary education.

Since 1st September 2015, the Description of the achievements of preschool children and the updated General programme of Pre-primary education are being implemented in the country's ECEC groups.

The purpose of the first activity was to conduct a study to find out what innovative educational tools and educational methods are used by ECEC practitioners and what tools are most lacking in the implementation of preschool and pre-primary education programmes. The results of the research were used in the preparation of the recommendations "Play and discoveries" and "Experience spaces".

The second activity was aimed at providing ECEC practitioners with the necessary tools, innovative methodological tools and competencies to implement preschool and pre-primary education programmes in practice. A new model of project activities was selected.

A.4. Funding and resources

The project was initiated by the Ministry of Education, Science and Sport of the Republic of Lithuania. The project was implemented by the National Agency for Education. It was financed by the European Social Fund.

Project budget – EUR 1 579 122. Duration - 48 months. No additional funds were foreseen.

A.5. Stakeholder engagement

All municipalities and state educational institutions implementing pre-school and/or pre-school education programmes are provided with the recommendations "Play and discoveries" and "Experience spaces". The digital versions of these are placed in an electronic space accessible to all, including those working in the private sector.

Recommendations on informational thinking abilities, STEAM, sustainable development, and creativity in ECEC programmes were prepared by 16 specialists (scientists and practitioners) from various fields across the country, based on best international practices and the context and needs of Lithuanian kindergartens.

The recommendations were tested and proposals for their improvement were made by the practitioners of educational institutions implementing ECEC programmes who participated in the training sessions held during the project.

Continuous professional development for ECEC practitioners is ongoing. The training is conducted by lecturers who were trained during the implementation of the project.

A.6. Future developments, sustainability and scalability

A new project "ECEC curriculum change"" is ready to start at the end of 2022, where prepared methodological materials for ECEC practitioners will become an integrated part of new curriculum guidelines. Digital tools for assessing children's achievements and progress, together with artificial intelligence and digital literacy will be included.

B. Types and roles of digital technology

B.1. Digital resources

In the training sessions, the participants had the opportunity to practically test the ideas proposed in the recommendations for ECEC practitioners by working with various digital technologies and other STEAM tools.

For example, pedagogues tested the computer programmes offered in the recommendations (e.g., "studio.course", "ScratchJr" and others) with tablet computers during training. With computers they learned to create virtual exhibitions of digital work (e.g. the "Padlet" app and others). With educational robots (BEE BOT, BLUE BOT, Photon, LEGO STEAM park, Lego Education Coding Express and others) they learned programming. With projectors they explored light reflections, shadows, studied geometric figures, colours, etc. with light tables.

The virtual learning environment "Moodle" was used for the training. All the training materials were uploaded there and the participants of the training placed their completed tasks in this environment. In the "Moodle" environment, lecturers constantly advised training participants on the practical implementation of the ideas presented in the recommendations.

Project participant surveys were conducted using Google Forms survey forms.

B.2. Digital competencies

The purpose of the recommendations developed during the project and the subsequent training sessions is to help educators to include various digital technologies in their teaching so that children can familiarise themselves with all their functions and

their safe use. This includes tablets, computer programmes, computers, cameras, mobile phones, data transfer media, and STEAM technologies (laboratories, etc.), which children use together with ECEC practitioners. Continuous professional development (CPD) is an ongoing process, even after the project has finished.

B.3. Uses of digital technology

The recommendations "Play and discoveries" and "Experience spaces" are used by ECEC practitioners. In the recommendations they find practical advice on how to interestingly and meaningfully use traditional and innovative educational tools and digital technologies when organising daily educational activities with early-age children. For example, in the "Play and Discoveries" booklet of the recommendations, "Play of Realities" there are ideas for activities that encourage learning how to digital technologies, to understand how they work, to get acquainted with the basics of programming, to acquire the basics of informational thinking and to develop imagination using not only digital technologies but also traditional means of education.

The booklet describes the activity "Cube Creation", in which children are given the chance to create their own "magical" cubes with the help of a teacher, which they can take home, show to their parents and friends. Each wall of the cube encodes a reference to different activities the child undertakes. The child is filmed and photographed as he/she performs 6 different activities (for example, it can be playing with traditional musical instruments, singing songs, or other activities). Filming and photography is done by the ECEC practitioner with the participation and help of the children. The practitioner publishes the filmed (photographed) material on the Internet (e.g. Google Drive or a similar file-sharing service can be used). After uploading the material, links to share it are obtained. The ECEC practitioner together with the children creates coloured QR codes for each link and makes the code cube.

The recommendations "Play and discoveries" and "Experience spaces" are full of QR codes where ECEC practitioners and parents can find additional digital information. For example, links to videos and other educational materials, early childhood computer programmes Paint, TuxPaint, Kids Paint Free, Doodle Buddy, Octagon studio Humanoid 4D+, Octagon studio Space 4D+, ScratchJr, Code.org and others that not only ECEC practitioners but also parents can try with their children at home.

Photography, animation creation, digital drawing, combining photography and drawing, augmented reality - all these are realities with which modern digital technologies enable children to "play": create, combine real and virtual world objects and their images.

The recommendations for ECEC practitioners provide ideas on how the development of informatics (informatics thinking and digital literacy) skills can be integrated into all areas of education such as environmental awareness, artistic expression, spoken language and others.

Early childhood education policy encourages the skilful, creative, and safe use of digital technologies by integrating them with other educational tools.

B.4. Support systems

Ministry of Education, Science and Sport supports institutions implementing ECEC programmes and allocates funds for digital tools acquisition. Education centres located in municipalities organise training for ECEC practitioners on improving digital competence.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

No.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not yet.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

A survey was given to project participants after the training on how to use ICT technologies in ECEC. The content and training itself were evaluated as "Very good" by almost all participants.

Luxembourg

Luxembourg's **Media Compass** (2020) is a national reference guide for media education, to help teachers to promote media literacy at all educational levels (for children aged 3-18). Based on the European Digital Competence Framework for Citizens, the guide covers both digital and non-digital media literacy. It is also accompanied by a set of practical tools and a common platform for advice, inspiration, teacher training, and collaboration with other educational institutions. All educational settings and staff can access the resources, and teachers of children aged 4 to 12 can also benefit from the help of specialised support staff in implementing the Media Compass in their classrooms.

Curriculum and pedagogy

Workforce development

Reference name: Case study LUX

A. Policy goals and design

A.1. Vision and broad objectives

Vision:
Media education should help people to find their way as self-determined personalities in a constantly changing society-both in non-digital and digital worlds. Media literacy covers the safe, critical, creative and responsible use of and interaction with media and digital technologies.

Challenge:
Balancing the potential benefits and risks offered by new technologies through strong and comprehensive education that empowers children to thrive and have agency in a constantly evolving society. Adequately supporting teachers to integrate media and digital literacy in their teaching, confidently.
Intended outcomes: Teachers of all subjects, across all ages, will integrate the development of students' media and digital literacy into their teaching and learning by promoting education about and through media.

Policy alignment:
Media Compass is one of four pillars of Luxembourg's national digital education strategy: "Simply digital – future-oriented competencies for strong children" [*einfach digital - Zukunftskompetenze fir staark Kanner / digital, tout simplement- les compétences du futur pour des enfants forts*] (2020). The strategy aims to strengthen five key 21st Century skills (Critical thinking, Creativity, Communication, Collaboration, Coding) in schools and other education settings.

Media Compass builds on the following initiatives previously introduced in Luxembourg:
- An initial reference framework for medial literacy published by the Ministry of Education (2008);
- A law proposal « Éducation aux médias » submitted to Parliament (2010);
- The curriculum for basic education (Plan d'Études : École Fondamentale) (2011) which defines media competencies across 5 areas and offers examples of student outcomes. It also states that media competencies should be developed throughout basic education and across all subject areas.

Media Compass builds on the following initiatives previously introduced at European level:
- European Digital Competence Framework for Citizens 2013, 2.0 in 2018, 2.2 in 2022).
- Digital Competence Framework for Educators - DigCompEdu.
- European Framework for Digitally Competent Educational Organisations - DigCompOrg.

A.2. Coverage and eligibility

The policy is comprehensive, not targeted. At ISCED 02 level (ages 3-6), all educational settings and staff can access the resources. These have been designed to be flexible enough to adapt to the needs of different professionals and learners. The policy does not apply to children younger than 3, nor those in non-formal ECEC settings.
Policy adoption is not compulsory and there are no specific measures to incentivise uptake/engagement.
However, school development plans (PDS), obligatory since 2017/18 do require schools to self-evaluate and consider development actions in the area of integration of ICTs as one of six compulsory areas of school life.

A.3. Policy tools

Media Compass is accompanied by a range of tools to support teachers to embed media and digital literacies in their teaching.
   1. **Reference guide for media literacy: Teaching and learning to build media literacy**
The Reference guide, based on the European frameworks cited above with adaptations for the Luxembourgish context, acts as the key document to be used by teachers to adapt their teaching and learning. It provides:
- an overview of research into media and digital literacies, and of the relevant European frameworks;
- a breakdown of 15 identified competencies across 5 domains: information and data; communication and collaboration; content creation; privacy and security and digital world. For each competence, the guide contains a description and illustrative examples of their application in digital environments;
- an explanation of different approaches to integrating the competencies into teaching and learning (e.g. by competence, by subject theme, by medium/tool, by education level and subject). This allows teachers to choose an approach that best suits them, their subject and their learners;
- practical examples of relevant teaching activities for different age groups.

2. **The Media Passport** (Medienpass)

Adapted for each cycle of basic education (1-4), this document can be used to record learners' progress in their acquisition of media competencies. It takes the form of a paper booklet with « I can… » statements linked to each of the 15 competencies, and short activities and relevant games to personalise the booklet. The updated Media Passport, to be published in October 2022, contains detailed competence descriptions of the type "I can...", "I am aware of ..." for each competence and specific for each cycle.

3. **Lesson ideas**

Teachers can access various example lesson ideas and materials designed for use at different levels of education and in different subject themes. These include guidelines related to resource and time requirements. There are currently over 50 lesson ideas available to teachers. Teachers can also upload their own lesson ideas and examples to the database, which are then reviewed by a team from the Ministry of education. For cycle 1 specifically, as of September 2022, there were 10 lesson ideas, including using the app Olefa Storyboard to document different learning activities in the home and a lesson teaching children different options to troubleshoot technical problems.

4. **eduMedia website**

This website centralises the various resources related to Media Compass including the reference guide, the media passports and the lesson ideas. It also presents news items on related projects at national and international level that teachers can get involved in or take inspiration from.

5. **eduMedia newsletter**

Educators can sign up to a monthly newsletter which offers information about different programmes, projects, tools and other examples of the media compass in action, as well as related international initiatives. 2 500 subscribers in 2021.

6. **Professional development opportunities**

In collaboration with the IFEN (*Institut de Formation de l'Éducation Nationale*) various professional development opportunities related to the Media Compass are available to teachers. These can have a technical focus on using a certain digital tool in the classroom or a pedagogical focus on suggested methods for strengthening different areas of media and digital literacies. IFEN's catalogue of training opportunities includes various related programmes for Cycle 1 teachers. These include online learning, seminars, events and coaching formats. In the first half of 2022, one programme was available to Cycle 1 teachers: an e-learning module on internet safety. Previous opportunities have included action-oriented support for media projects in elementary school through coaching and workshops on using Lego bricks for teaching and learning. Professional development is also offered by the I-CN (see below).

7. **Collaboration with partners outside formal education**

Teachers and schools can organise expert visits, workshops or school trips with partners involved in the media and digital worlds through the kodeieren platform.

8. **Self-evaluation tools**

Luxembourg recommends various evaluation tools, designed at European or international level, to support teachers and settings to evaluate their own level of media competence. This includes SELFIE (Self-reflection on Effective Learning by Fostering Innovation through Educational Technologies), PIX and TET-SAT. The Reference Guide is heavily based on European frameworks, with adaptations to the Luxembourgish context. The self-evaluation tools available to teachers have been designed at European level.

A.4. Funding and resources

The policy is implemented under the responsibility of SCRIPT (Service for the Coordination of Educational and Technological Research and Innovation) an entity of the Ministry of Education, Children and Youth.

Funding: SCRIPT. Budget: EUR 45 000 (estimated). Additional resources: no.

A.5. Stakeholder engagement

Communication strategy:

- The eduMedia website acts as a one-stop-shop for information about the policy.
- The newsletter provides updated information every month to subscribers.

- A launch event, organised by SCRIPT, was held in March 2020 and attended by more than 650 primary and secondary education teachers with presentations from experts on digital and media literacies as well as potential partnership organisations (e.g. National library of Luxembourg, Luxembourg city film festival).
- An eduMedia day was planned for March 2020 with workshops on the different components of the Reference Guide for teachers.

Policy design:
1. Phase 1 (2017/18) – preparatory meetings took place between representatives of the Ministries of Education of Luxembourg, France, Belgium and Germany for the adaptation and application of the European competence framework (DIGICOMP 2.1).
2. Phase 2 (2018/19) – a first draft of the reference guide was commented on by representatives from the civil service and education profession.
3. The eduMedia day 2019 was organised under the theme "A framework of competencies for a better integration of media education". Around 30 related workshops were organised as well as a conference with media education experts.

Implementation:
- Examples of good and interesting practice are shared on the eduMedia website.
- Educators can contribute relevant lesson ideas to the bank of resources on the eduMedia website.
- The I-CN teachers (see below) collaborate at regional and national level to share good practice and experiences of working with children aged from 4 to 12.

A.6. Future developments, sustainability and scalability

In 2022, in recognition of the fast pace of development in the digital world, specifically in the areas of artificial intelligence (AI) and data management, the European Union published an updated version of the Digital Competence Framework (DigiComp2.2). As a result, Luxembourg has launched an addendum in April 2022 and re-published the Reference Guide in October 2022 to ensure continued alignment. Specifically, this includes the integration of concrete statements that aim to support learners to interact with AI systems in a critical, autonomous and responsible way. Prior to this, Luxembourg published a report informing educators of the coming changes, as well as the rationale for them.

B. Types and roles of digital technology

B.1. Digital resources

Media Compass aims to support teachers to embed a variety of digital technologies across their teaching so that learners may be exposed to the full range of technologies across their education, either learning about them and/or through them. This includes tablets, applications, computers, and paper and pen. The 2022 update ensures that AI technologies are also included.

B.2. Digital competencies

The policy defines media and digital literacy through 15 competencies across 5 domains: information and data; communication and collaboration; creation of content; data protection and security; digital environment. The 2022 update will integrate AI and data literacies. Teachers across the system are expected to embed them in their teaching. Professional development opportunities and exemplar lesson resources clearly indicate which cycle of education they are relevant for. The latest update of the reference guide proposes more guidance as to what is expected at each cycle of basic education for each competence.

B.3. Uses of digital technology

No specific uses are promoted, rather the policy aims to support teachers to integrate various uses of technology into the classroom as befits their subject. However, a range of uses are described and suggested to teachers through the example lesson plans and the reference guide.

The policy description promotes the use of technology for inclusive purposes (i.e. to overcome certain special needs such as visual impairment, hearing etc.) but no specific measures are currently in place for this.

The policy targets staff (including those of the youngest learners), with the intention that their use of technology will ultimately shape the use of technology by learners.

The policy adopts a fully integrated approach to using digital technologies by promoting their application to teaching and learning across the curriculum so that they complement non-digital activities and tools rather than replace.

A BeeSecure initiative to reduce screen time is aimed at parents of students, especially the youngest students.

B.4. Support systems

A cohort of specialised teachers (Digital competence teachers [*Instituteurs spécialisés en competences numériques*, I-CN)], was established in 2021 to support teachers to apply the Media Compass in classrooms and schools. They all support children aged from 4 to 12. In Luxembourg, primary schools are divided into 15 regional directorates and each directorate has an I-CN assigned to it. They support, advise and assist teaching staff as well as other actors in the school community. This includes consulting with staff to determine training needs, visiting classrooms, developing teaching resources and collaborating at regional and national level.

Implementation is under the responsibility of SCRIPT. Two divisions support implementation: the Division for pedagogical and technological innovation and the Division for School development.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

A survey among the working groups developing the learning programme/subject curricula was carried out in 2021 (secondary education). It shows a very diverse picture of the implementation of media and digital literacy into the different curricula. In general, there are some notions of it but we will start a structured dialogue with the working groups to identify and together define possible synergies between subject matters and digital / media literacy.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Not yet.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Not yet identified.

Norway

Norway's **Online Competence Packages for Digital Practice in ECEC** (2017) are free online course modules for ECEC staff working with children aged 0-5. The professional development packages relating to digital practice at the ECEC level currently on offer include: digital judgement in kindergartens (with leadership support); digital practice; and data protection in kindergartens. Funded by the Ministry of Education, competence packages are developed in collaboration with kindergarten staff covering a variety of roles. ECEC staff working in all types of settings can freely access the competence packages.

Curriculum and pedagogy

Workforce development

Reference name: Case study NOR

A. Policy goals and design

A.1. Vision and broad objectives

Vision: To improve digital competence in ECEC personnel to enable them to fulfil the expectations in the Framework Plan for Kindergartens (2017) (including a chapter about digital practice).

Challenge: Kindergarten staff have expressed a need for more support in digital practice in kindergartens. There is limited time for professional development in kindergartens, and each kindergarten may need to follow a program/workshop at their own pace.

Intended outcomes: Intended outcomes include giving children a more diverse learning and play environment that includes digital practice, increasing pedagogic use of digital tools, and protecting children's digital privacy. Other outcomes include increasing kindergarten staff's interest and competence in digital practice, while supporting their confidence in using digital tools in pedagogic work.

Policy alignment:
The Framework Plan for Kindergartens (2017) has a section about "Digital Practices":
> "Digital practices in kindergarten shall encourage the children to play, be creative and learn. The use of digital tools must support the children's learning processes and help implement the principles of the Framework Plan on creating a rich and varied learning environment for all children. Staff shall be actively involved with the children when using digital tools. Digital tools must be used with care and not become a dominant practice. Kindergartens shall exercise sound digital judgement and help the children develop an early ethical understanding of digital media.

Staff shall:
- exercise sound digital judgement with regard to searching for information, be conscious of copyright issues, critically analyse sources and safeguard the children's privacy
- enable the children to explore, play, learn and create using digital forms of expression
- evaluate relevance and suitability and participate in the children's media usage
- explore the creative and inventive use of digital tools together with the children"

A.2. Coverage and eligibility

The online competence packages are intended to be used by a wide variety of users. They are available to be used by ECEC staff across the entire country, at their own pace (e.g.: there is no time requirement). Staff working in all types of settings (private and public) and with all age groups (spanning 0-5 years) can enrol in the competence packages by creating a username (based on an email address).

A.3. Policy tools

The online competence packages are policy tools to help enable and support the vision and broad objectives outlined in A.1.

A.4. Funding and resources

Funding comes from the Ministry of Education. The cost of developing each competence package ranges from 1 5000 000 NOK to 5 000 000 (approximately EUR 150 000–500 000), which includes internal costs from the Norwegian Directorate for Education and Training, support from researchers/universities to develop the competence packages, and costs related to the digital platform use and maintenance.

The competence packages are completely voluntary to use, but there is no direct extra funding offered to centres to cover the time that is required to complete them (e.g.: to cover substitutes). This means that staff must use their already-scheduled planning time in order to complete the competence packages. Advisors from the Norwegian Directorate for Education and Training monitor use as well as feedback from participants.

A.5. Stakeholder engagement

Competence packages are developed in close collaboration with a reference group consisting of kindergarten staff covering a variety of roles. Feedback from these stakeholders/targeted users is crucial to ensure that the competence packages meet the intended goals.

Advisors from the Norwegian Directorate for Education and Training also travel around the country, speaking at regional conferences for "Digital Arenas in Kindergarten", and presenting about topics in digital practice in ECEC, as well as advertising about these online competence packages specifically. Digital Arenas in Kindergarten conferences are well-attended by kindergarten leaders and teachers.

A.6. Future developments, sustainability and scalability

There are plans to release another competence package about "play in the kindergarten" in December 2022; this package will include a module about digital play.

Further developments also include improving and further developing the competence packages that already exist, according to feedback from users and the needs of the sector. It is also being considered whether to update the competence package for "digital practice" in collaboration with a university.

Other plans include continuing to spread awareness about these competence packages and increase use. There are also plans considering whether it is possible to utilize a well-known online login platform (Feide) in order to improve the registration/user account experience.

B. Types and roles of digital technology

B.1. Digital resources

The competence packages emphasise that staff should use the digital devices/tools they already have in their kindergarten and become comfortable with these, before acquiring more. Examples of tools include: tablets, smart phones, computers, digital microscopes, digital cameras, document cameras, web cameras, video cameras, projectors, GPS, copy machines, printers, scanners, audio recorders, tools/apps about programming (Bee-bot, Blue-bot, Sphero, PlayOsmo, ScratchJr, RunMarco).

Kindergartens need to have a computer or tablet with internet access in order to participate in a competence package. Recent surveys have shown that almost all kindergartens in Norway have this minimum of devices/connectivity, but there are a few kindergartens who do not, and there are also a few kindergartens where devices must be shared among several staff members.

B.2. Digital competencies

These three competence packages focus on the following topics:
1. Digital practice
2. Digital judgement (with leadership support)
3. Privacy in the kindergarten

The "digital practice" package includes a section about "pedagogic use of digital tools", where it describes how staff can use a variety of different tools in a pedagogic way to help children explore, play, learn, and create using digital forms of expression. It also provides examples of such pedagogic activities, while emphasising that the focus should be on the pedagogy and not on the equipment. There is a common goal to increase young children's early digital literacy by enabling children to be active users, and that the use of digital tools should support the children's learning processes and implement other principles in the Framework Plan. Staff should act as role models in demonstrating digital judgement and shall also help children develop early ethical understandings of digital media and privacy.

B.3. Uses of digital technology

This policy seeks to shape how ECEC staff use technology, both by themselves, and in their interaction with children. Digital practice must be complemented by all the other core values, objectives, working methods, and learning areas described in the Framework Plan for Kindergartens. Thus, digital practice is seen as an equally important part of practice in kindergartens, and as a method that should be used alongside other practices.

B.4. Support systems

The Norwegian Directorate for Education and Training has a Digital Services Department, with advisors who work to support and advise kindergartens in how to use digital tools in pedagogic ways.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

At the end of each competence package, users are able to take a survey and provide feedback. Examples of questions in these surveys are:

- After completing the competence package, do you have a better understanding of what digital judgment in the kindergarten entails?
- To what extent has this new insight related to information searches in the kindergarten changed your own practice?
- To what extent have you increased your focus on privacy in your kindergarten after completing the competence package?
- To what extent has this competence package contributed to having increased competence in digital judgement**?**

Advisors from the Norwegian Directorate for Education and Training monitor and review answers to these evaluations to understand how competence packages are used and what needs kindergarten personnel have. They also use responses to further develop and improve the competence packages

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Recent results from the course evaluation for the digital judgement course described in section C.1 include:

- 98% of respondents felt that after completing the course, they have a "much better" or "somewhat better" understanding of what digital judgement in the kindergarten is
- 93% of respondents agreed that they had "to a large extent" or "to some extent" increased their focus on privacy in their kindergarten after completing the course
- 97% of respondents felt that the competence package contributed to increasing competence about digital judgement "to a large extent" or "to some extent"

The research report series "Questions to Kindergarten-Norway" has recently contained a section asking kindergarten leaders about their experience with digital practice in both the 2021 and 2022 reports, surveying leaders in 2020 and 2021 (respectively). Questions about digital practice will also be included in a survey to centre leaders in the fall of 2022.

Findings from the 2020 survey (Naper et al 2021) include:

- Centre leaders consider staff competence about maintaining children's right to privacy to be very high, although they consider that the area where staff competence is lowest is in using digital tools in creative activities together with children
- 90% of kindergartens report using digital tools daily or weekly for documenting pedagogic work, and more than 90% of centre leaders report using digital tools daily or weekly to communicate with parents. This use has increased since 2018.

Findings from the 2021 survey (Naper et al 2022) include:

- Fewer than 2 of 10 centre leaders report that their staff has used the competence package "Digital judgement" during the past year. However, more than 8 of 10 kindergartens have established routines for secure handling of pictures, for informing parents about the use of pictures they themselves take of children in kindergarten, and for which situations children can be photographed in kindergarten. Routines for children approving pictures taken of themselves are less common.
- An overwhelming amount of centre leaders report that their centre has increased the frequency of using digital tools in the past year in the areas of contact with centre owners, centre leaders, their own staff, and with children's homes.

In the first progress report in the project "Evaluation of the Implementation of the Framework Plan for Kindergartens" (Homme et al 2021), a number of staff reported that the area of "digital practice" felt like a new and challenging area to work with (especially with the youngest children). This reinforces that there is a need in the sector for workforce development and support in this field.

References:

  o Homme, H., Danielsen, A. & Ludvigsen, K. (2021). Implementering av rammeplan for barnehagen. Underveisrapport fra prosjektet Evaluering av implementering av rammeplan for barnehagen. Norce Norwegian Research Center AS report 37/2020 [link].

  o Naper, L.R., Myhr, A., Janninger, L., & Løe, I. (2021). Spørsmål til Barnehage-Norge 2020: Analyse og resultater fra Utdanningsdirektoratets spørreundersøkelse til barnehagesektoren (2021:00076). SINTEF [link].

  o Naper, L.R., Myhr, A., & Haugset, A.S. (2022). Spørsmål til Barnehage-Norge 2021: Analyse og resultater fra Utdanningsdirektoratets spørreundersøkelse til barnehagesektoren (2021:01438). SINTEF [link].

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Success factors include that those who have completed the competence packages report overwhelmingly positive feedback.

Some identified barriers so far include that many kindergarten staff do not yet know about these competence packages or may not see the value in using them. There is limited common time for professional development, and kindergartens may have other competing priority areas.

Additional information

The library of all online competence packages that are offered (in Norwegian) is available at: https://kompetanse.udir.no

Please note that there are currently over 40 competence packages offered to the entire sector (both kindergarten, primary school, and secondary school staff). There are currently 4 competence packages focused towards kindergarten personnel; of these, 3 competence packages focus on topics related to digital practice.

The presentation shared at the ECEC Network meeting in spring 2022 may also be a useful resource, as it provides even more information and screenshots from the competence package about digital judgement. A copy of the presentation is attached.

The website www.dubestemmer.no is developed and run together by The Norwegian Directorate for Education and Training and the Data Protection Agency; this also can be a helpful resource specifically related to issues around digital judgement.

Slovenia (1)

In Slovenia, the **Remote Peer Observation** initiative (2020-21) developed in one ECEC setting illustrates how digital technologies can facilitate the development of professional learning communities among staff. As part of the project, video recordings are taken of preschool teachers and assistants working in pairs with groups of children (1-6 year-olds). These are then shared with all educational staff in the centre and discussed at meetings. The Step-by-Step methodology and a questionnaire are used alongside quality indicators by staff to analyse what constitutes quality practice. Funds for the project came partly from the kindergarten's planned funds, and partly from the Ministry of Education, and a European Union project.

Curriculum and pedagogy

Workforce development

Monitoring and evaluation

Reference name: Case study SVN_1

A. Policy goals and design

A.1. Vision and broad objectives

VISION

Nowadays, the use of digital technologies in education has become an indispensable part of the educational process. Through digitalisation, we promote the use of creative and innovative teaching methods, the professional and personal development of preschool teachers and preschool teacher assistants, and the development of staff networking. The main goal is to provide children with an engaging learning environment where they may develop their critical, creative and logical thinking.

CHALLENGE

Remote peer observations are a challenge for educational staff. There may be more stress and fear of negative criticism, not being able to explain their actions on the spot. At the same time, it is difficult to capture the whole situation and all the participants at the same time through the camera. An additional challenge of remote peer observation is the use of online tools and computers for older preschool teachers that have not acquired basic computer skills yet and have had to learn basic computer skills and overcome their fear in order to actively participate and take part in the remote peer observation.

INTENDED OUTCOMES

At the level of the institution (and beyond), we want to identify and introduce good practices in the pedagogical work with children, and to use digital technology to support the discussions and development of the educational staff. We want also to strengthen the intrinsic motivation of preschool teachers to record their work with children in the group in order to recognise the benefits and advantages of in-depth self-reflection and reflective discussion with colleagues after the peer observation.

EDUCATION POLICY DEVELOPMENT

The National Education Institute of Slovenia's Guidelines for the use of ICT in kindergarten (2021) place special emphasis on the contribution of adults to the introduction of emerging digital literacy in the preschool years. The preschool teacher should provide children with a variety of challenges in handling and using various ICT resources in a deliberate and meaningful way. As a result, the professional staff should be empowered and familiar with the opportunities provided by information technology (e.g. finding sources of information, self-education, communication etc).

This is aligned with the Slovenia's National Digital Education Action Plan 2021-2027 and with the project React-EU – IKT for educational institutions which served as main funding source for the purchase of ICT equipment for kindergartens and schools.

A.2. Coverage and eligibility

In Kindergarten Litija, we have been performing peer observations in addition to other professional meetings for many years now with the goal of fostering professional discussions to reflect our practice. During their required work practice at the kindergarten, all of the kindergarten's educational staff, upper-secondary students, and pedagogical faculty members may participate.

A.3. Policy tools

At Kindergarten Litija, we seek to create learning communities where preschool teachers and preschool teachers' assistants work together and actively participate. Critical reflection influences both the professional growth and the learning of the educational staff and the learning of the children. One way in which educational staff come together for the purpose of shared critical reflection is through peer observation. These take the form of a group of 5-10 preschool teachers and preschool teachers' assistants who directly observe the educational activities of a pair of kindergarten staff. The observation always ends with a reflective discussion in which common understandings of quality practice are developed. The recording of the observation can be viewed by the remaining educational staff (within the professional group or at their own request via the e-room where the recording is accessible to all preschool staff of the kindergarten).

In 2021-2022, peer observation was conducted remotely with the use of video technology. We filmed five peer observations of pedagogical work in various age groups of children. The educational staff watched the videos, and afterwards, in groups of five inside the peer groups, a reflective discussion was held. The educational staff received a questionnaire with a link to the movie that focused on quality indicators and was given to them. The educational staff identified and evaluated the indicators which corresponded to four areas of quality. This format has proven to be very effective and beneficial given the various advantages of remote peer observation. As a result, we have decided to keep using this combined format of professional training in the future.

A.4. Funding and resources

In order to conduct peer observations, it was necessary to offer access to video technology to all preschool teachers and preschool teacher's assistants. Some of the laptops were financed from the funds planned in the financial plan in the cost of the kindergarten programme. However, through the Ministry of Education of the Republic of Slovenia and the European project "ReactEU - ICT for HEIs" (project duration 2021-2022), we have acquired the necessary additional computers, cameras and video projectors, amounting to 100% of the allocated funds.

A.5. Stakeholder engagement

In addition to sharing examples of good practice, the purpose of the peer observation and expert discussions is to build a common understanding of quality practice, to learn from each other and make improvements. This is also enshrined in the Kindergarten Annual Work Plan for each year and the Kindergarten Development Plan, which covers a period of five years, and both are presented to the Parents' Council and the Kindergarten's Council.

The format of the remote peer observation was chosen by the kindergarten management also due to the epidemiological situation. The peer observation is prepared by the preschool teacher, with the support and assistance of the preschool teacher's assistant. The responsibility for the recording lies with the preschool teacher and both the preschool teacher and the assistant in the children's group are involved in the implementation.

The kindergarten staff highlighted the advantages of the remote peer observation format as increased accessibility, flexibility and adaptability of the observation (depending on the available time of the preschool teacher), increased involvement, the possibility of multiple viewings and the possibility of in-depth self-reflection. The findings on the positive effects of the modified observation format are based both on the joint discussions with the kindergarten staff and on the data collected in the interviews with the preschool teachers who prepared the observation. Remote peer observation can thus enable all kindergarten staff to combine their previous experience and expertise with new examples of good practice, professional discussions and the opportunity to learn professionally from each other. We will also involve children in a planned way, by inviting them to watch the video and encouraging them to reflect on what they have seen. Based on this reflection, we will also systematically involve them in the planning of new video content in which children could be active participants.

A.6. Future developments, sustainability and scalability

Our goal is to continue, improve and combine this peer observation format with the familiar form of group peer observation. The project was already presented at the IX. Scientific Consultation on Leadership in Education (National Education Institute of Slovenia, 6 April 2022) and thus promoted its wider usage in other educational institutions in Slovenia.

B. Types and roles of digital technology

B.1. Digital resources

In the Kindergarten Litija we modify the digital infrastructure to meet our demands. The management is continuously involved in learning and passing on basic knowledge. We also have the help of a computer technician who sets up connections, helps us with the supply of computer equipment, etc. The computer technician is an external employee. The mutual support, assistance and cooperation of the kindergarten staff enable as many individuals as possible to use digital technology and web applications. Staff members received in-service training on using Arnes applications such as uploading a video, captioning a video, etc.

B.2. Digital competencies

The transition to a combined or digitalised form of education and training also requires computer-literate educational staff with at least basic ICT skills to do their job. In order to successfully carry out the remote peer observations, it was necessary to upgrade foundational computer skills (using a video camera, using a smartphones, uploading videos, using of the Arnes Zoom application). The management provided written technical instructions to the kindergarten staff, accompanied by a pictorial illustration of the individual steps. The kindergarten management provided computer support to the assistants for the remote training (with the assistants) through one-to-one counselling, live workshops and an online Zoom workshop to teach the fundamentals of using web applications. Digitalisation certainly includes an opportunity for professional development. Professionals learnt how to connect, how to use apps to start an online meeting, post a video to the web, participate in online discussion in small groups etc. All the newly acquired digital skills have been and continue to be used by the professionals in their work with parents (e-group board, WEB Kindergarten app for parents) and in their direct work with children, resulting in innovative methods, strategies and improvements. We are noticing that the preschool teachers in our kindergarten are more

digitally literate and confident (participation at various professional meetings, on-line in-service trainings, Kindergarten's council, Parents' Council).

The thoughtful and professionally justified use of ICT resources also enables children to take on new challenges, to learn from one another, to overcome obstacles and to develop and strengthen their motivation to learn. It also enables greater inclusion of children with special needs. In any case, when working directly with children, preschool teachers can promote digital literacy in pre-school children by using a computer or tablet to reinforce a topic with educational content from the Internet, which is linked to the observation or the educational content chosen.

B.3. Uses of digital technology

Within the framework of remote peer observation, we prepared the video recordings and the evaluation discussions. The discussions took place remotely, via Zoom. We partially involved the children, mainly in a way that they watch the video too and reflect on their activities. We include them in the reflection according to their level of understanding. The combination of video recording and live observation is the best way we include all preschool teachers and preschool teachers' assistants and distribute the number of attendees in a reasonable way (too many people involved in a live peer observation has been proven to be a weakness).

B.4. Support systems

- Support for financing the equipment - cameras, computers - through tenders of the Ministry of Education (ME).
- Professional support from ME and the National Education Institute of Slovenia (NEIS) - recognition of this form of work as high-quality, and expansion of this form of work to other institutions is also encouraged.
- Professional support from the Pedagogical Institute, the work for monitoring the peer observation was tied to indicators according to the Step-by-Step methodology.
- ICT support by qualified staff: the technical support is provided by an external contractor

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

The evaluation includes an anonymous questionnaire for the educational staff. The participants answer the following questions:

- What are the key insights gained during the discussion after the peer observation?
- What do they rate as very good?
- What did they miss?
- What will they include in their practice?

The second form of evaluation takes place through interviews with the preschool teachers who carried out the peer observation. The interview questions are:

- How did you feel before, during and after the observation?
- Evaluate the advantages and disadvantages of remote peer observation.
- Does the observation affect your professional development? What did you gain or learned?
- Which contents (according to the applied methodology) did you take into account when planning the peer observation?

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

After the peer observation and its critical evaluation, the educational staff may change their practice, e.g. reorganisation of time and space regarding the implementation of the activities, raising expectations in younger groups regarding children's independence, taking into account individual differences in children's development and learning etc.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Advantages perceived by the kindergarten staff:

- All preschool teachers of the kindergarten take part in the peer observation (some preschool teachers are present in the group, the others watch the recording via video technology during their professional meetings. The recording is also available on the e-room of the kindergarten, so that it is available to other professional workers.).
- Fewer preschool teachers are present in a group of children during the observation which is less disturbing for the children.

- The professional worker can adjust the viewing of the video according to his/her time and accessibility, which allows greater flexibility.
- The video offers multiple viewings, which makes it possible to see various situations thus enriching the discussion on quality, etc.
- The preschool teacher who prepares the observation sees himself/herself in a different perspective, which enables in-depth self-reflection.
- Several people can view the recording on one computer at the same time, which is an advantage of remote peer observation.

Additional information

In the last European Social Fund period the Ministry of Education has co-financed projects which stimulate supportive environment for the development of innovative learning environments. Professional trainings from preschool to upper-secondary level will be offered within the framework of the Recovery and Resilience Program. Peer observation is also anticipated among the mentioned professional trainings.

Since 2021, it is possible to employ a computer technician in a kindergarten, based on the [Rules on standards to conduct pre-school education activities (Article 15 a.)](#)

References are listed in the text.

Slovenia (2)

Slovenia's **DIGICHILD** (Developing Teachers' Skills to Educate Pre-School Children with and through Digital Technologies) project (2021-23) is an Erasmus initiative for children aged 3-6 in public kindergartens. It focuses on building the digital competence of pre-service and in-service preschool teachers for scaffolding the development of computational thinking among children. DIGICHILD builds on the European Framework for the Digital Competence of Educators (DigCompEdu) and the concept of computing without computers. The training offer has been developed based on findings from surveys with preschool teachers regarding attitudes towards the use of digital tools in ECEC and include a pre-service bachelor's elective, an in-service professional development course, and an open-source MOOC.

Curriculum and
pedagogy

Workforce
development

Reference name: Case study SVN_2

A. Policy goals and design

A.1. Vision and broad objectives

Vison: The digitalisation of education has been conquering the world for years. Despite its rapid diffusion and convenience, it should not be assumed that children can intuitively develop their digital skills and become active online learners just because they were born in the Internet era. The DIGICHILD project aims to challenge this assumption starting with ECEC. Therefore, DIGICHILD should help preschool teachers to change attitudes towards and support the use of digital tools in public kindergartens in Slovenia. DIGICHILD also covers the integration of digital tools in the field of (i) professional development of the preschool teacher, (ii) in the planning, implementation and evaluation of activities for preschool children.

Challenge: Addressing adverse attitudes towards the use of digital tools, balancing the potential benefits and risks offered by digital tools in education through strong and comprehensive education that empower firstly, preschool teachers and consequently, preschool children for safe and critical use of digital tools.

Intended outcomes: Preschool teachers in Slovenia will develop favourable and informed attitudes towards the meaningful, critical and safe use of digital tools in the workplace: (i) they will be empowered to use digital tools meaningfully and creatively in their own professional work and development; (ii) they will understand the meaningful and supportive use of digital tools for the purposes of planning, implementing and evaluating children's learning; (iii) they will be able to support children in the safe and meaningful use of digital tools for learning.

Policy alignment: DIGICHILD could be one of the pilot projects and pillars of Slovene's National digital education strategy since it has been built on and follows the EU and National strategies and documents and the background document for the modernisation of the kindergarten curriculum (adopted in February 2022 by the Council of experts of the Republic of Slovenia for general education).

DIGICHILD builds on the following initiatives previously introduced in Slovenia:
- Guidelines for the use of ICT in kindergarten (2021):
- Brodnik, Andrej et al. (2022), The framework of computing and informatics from kindergarten to secondary school [Electronic source]: report of the expert working group of the Ministry of Education and Culture for the analysis of the presence of computer and informatics content in primary and secondary school programmes and for the preparation of a study on possible changes (RINOS) (link)

DIGICHILD follows and supplements the following initiatives previously introduced at European level (only some are stated):
- Council Recommendation of 22 May 2019 on High-Quality Early Childhood Education and Care Systems (link)– document proposes to "enhance the development of early years' curricula in order to follow children's interests, nurture their wellbeing and meet the unique needs and potential of each individual child, including those with special needs or in a vulnerable or disadvantaged situation. Approaches supporting holistic learning and children's development could include: … (f) offering guidance for providers on the age-appropriate use of digital tools and emerging new technologies";
- Digital Education plan (2021 – 2027)
- European Commission, Directorate-General for Education, Youth, Sport and Culture, Van Laere, K., Sharmahd, N., Lazzari, A., et al., Governing quality early childhood education and care in a global crisis : first lessons learned from the COVID-19 pandemic : analytical report, Publications Office, 2021.

A.2. Coverage and eligibility

The initiative is implemented in public ECEC settings, Vrtec Koper (Kindergarten Koper) and at the University of Primorska, Faculty of Education, in Slovenia. When the project ends, all preschool teachers, in public and private kindergartens will be able to access the resources for flexible and professional use of digital tools in ECEC. The knowledge developed through the project will be incorporated into elective and compulsory courses within the undergraduate higher education programme – Early Childhood Education and Care at the University of Primorska, Faculty of Education.

The initiative applies to children from 3-6 years old. At the moment, policy adoption is not compulsory, but considering the fact that Slovenia is in the process of ECEC curricula renewal, the findings could be considered as a strong starting point for self-evaluation and action development in the area of the integration of digital tools in ECEC and in supporting the development of computational thinking. At the national, level special attention should be given to the vertical continuity (developmental and pedagogical) of content in this area.

A.3. Policy tools

DIGICHILD is comprised of tools and strategies (i) to address the attitudes of preschool teachers (pre-service and in-service) towards the use of digital tools in ECEC; self-reflection on available and missing digital competencies; (ii) to support the use of digital tools in the teaching of preschool children and development of computational thinking in ECEC (for example computing without computers).

1. Measures to address the attitudes of preschool teachers towards the use of digital tools in ECEC and measures for self-reflection on available and missing skills and abilities of preschool teachers and preschool children when dealing with digital tools:
    a. Survey: analysis and interpretation of current state of attitude towards use of digital tools in ECEC for students, teachers and parents of preschool children (example of survey for preschool teachers) – designed in cooperation between partners (Slovenia, Germany, Latvia and Estonia) but with adaptation to sociocultural context for each country
    b. SELFIE for teachers: a self-reflection tool for teachers in the project used by students (pre-service preschool teachers)

2. Strategies to support the use of digital tools in teaching for preschool teachers:
    a. Development and piloting of elective BA course for pre-service teachers
    b. Development of professional development course for in-service training
        Based on experience and preservice preschool teacher's feedback on pilot of BA course and in-service preschool teachers' feedback - to be implemented in autumn 2022:
    c. Development of an open-source MOOC for current and future preschool teachers.

A.4. Funding and resources

Funding: Erasmus +
Budget: EUR 250 000 (estimated) over 2 years – Slovene part of funds EUR 47 171 for 2 years
Additional resources: no

A.5. Stakeholder engagement

Communication strategy:
- DIGICHILD Dropbox acts as a source of information open to all project partners (universities and kindergartens)
- Management meetings provide an updated communication between partners
- LTT meetings sources of meeting between preschool teachers and digital tools experts

Policy design:
1. Phase: March 2021 – December 2021 – survey development and implementation
2. Phase: November 2021 – June 2022 – BA course development and pilot implementation in Slovenia
3. Phase: June 2022 – October 2022 – Professional training course development and MOOC development
4. Phase: November 2022 – January 2023 – Professional training course implementation and MOOC implementation
5. Phase: February 2023 – evaluation of the DIGICHILD project

Implementation:
- Multiplier event will cover up to 20 people from each country (preschool teachers)
- BA pilot course in Slovenia covered 120 students and 120 mentors – in-service preschool teachers
- Collaboration with experts on national and international level (conferences with preschool teachers as participants)

A.6. Future developments, sustainability and scalability

Planned steps for further development of this policy:
- accreditation of elective BA course at the University of Primorska, Faculty of Education in order to continuously develop the content for students and ensure continuous evaluation of the content (feedback from students and kindergartens involved in pedagogical practice in kindergarten);
- dissemination of the project's results and in-service preschool teacher trainings in order to influence changes in preschool teachers' attitudes, which is crucial for the use of digital tools in kindergartens;
- cooperation with various stakeholders (e.g. the National Education Institute - renovation of the Kindergarten curriculum, in-service trainings, Ministry of Education - planning and implementation of system-level measures etc.);

- the MOOC remains online for at least the next five years after the end of the project, making it an open possibility for preschool teachers and students to learn.

B. Types and roles of digital technology

B.1. Digital resources

The implementation of digital tools took place gradually and was coordinated with the goals of the kindergarten's activities. As previously mentioned we worked in two directions:
1. Implementation of digital tools in the field of professional activities of students: the students became active managers (before only passive participants) of the Moodle classroom: they could upload materials, actively design materials and, above all, during the pilot implementation of content of the elective subject simultaneously and all members of the group simultaneously completed the e-Portfolio, etc.
2. Integrating digital tools into the planning, implementation and evaluation of kindergarten activities in the teaching and learning of preschool children. The process was adapted to the psychological, developmental and pedagogical characteristics of preschool children's learning.

B.2. Digital competencies

We rely on the digital competencies that are part of DigiCompEdu and on the knowledge and understanding of computational thinking. This programme involves professional development opportunities (see below) and its result also helps to promote children's early digital literacy.

Professional development opportunities:
Before the DIGICHILD project, both students and preschool teachers did not know the aforementioned digital tools and how to integrate digital tools into the learning and teaching of preschool children. Based on feedback from students and preschool teachers who encountered the DIGICHILD project during and after its implementation, we find the following:
- there has been a change in attitudes and understanding about the use of digital tools in learning and teaching;
- students and preschool teachers (compared to the extreme reluctance towards the project itself) are much more in favour of the introduction of digital tools at the preschool level and are eager to learn much more in this field to see examples of activities and possibilities for creative use of digital tools;
- acceptance and understanding of the need to develop their own digital competencies (based on the DigCompEdu model) in ECEC;
- preschool teachers and students independently explore and learn about other digital tools;
- they want systemic support for their professional development in ECEC as well as for the use of digital tools and the development of computational thinking for preschool children.

B.3. Uses of digital technology

The use of the digital tools addresses both the ECEC staff and the children.

Example A: promoting algorithmic thinking in children with Blubots
- Step 1: Activity with children moving physically /moving across the grid (link).
- Step 2: Repeat the activity using the first step several times until the child masters the concept of moving in a grid (forward movements, left/right turn).
- Step 3: Planning, implementing and evaluating the activity using the Bluebot with the group of students.
- Step 4: Planning, implementing and evaluating the activities of children's choice with the creative use of Bluebots.

Example B:
- identical implementation of step 1 and step 2;
- Step 3: Planning, implementing and evaluating the activity using tablets and the StopMotion application. The application works by the principle that children experienced in steps 1 and 2. It is about understanding the sequences and the steps which lead to the solution of the problem.
- Step 4: Planning, implementing and evaluating the activities on any topic with active, independent creation by children using the free Stop motion video application.

Example C: Repeat the steps described above. - digital tool: planning, implementing and evaluating the activities with recordable talking pads.

B.4. Support systems

Currently, in Slovenia, there is no system support for the development or distribution of digital resources or content at the preschool level of education, but there is an e-school bag project, which is ongoing. The e-school bag project aims to create a digital shelf with resources and materials in electronic form for basic schools (primary and lower-secondary level of education) and upper-secondary schools. So far, this project does not take into account the preschool level of education, but it could serve as a starting point for supporting the meaningful use and integration of digital tools in preschool learning and teaching.

We propose:
- the adaptation of the DigCompEdu model to the specificities of the ECEC;
- to adapt the existing SELFIE self-reflection tool to the ECEC;
- at national level, a systematic and long-term solution for the continuous training of preschool teachers in the field of developing digital competencies of preschool teachers, the development of computational thinking for preschool children, etc.;
- at national level, systemic funding for kindergartens to purchase materials and equipment to support the meaningful use of digital tools.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Yes, within the project DIGICHILD itself.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Partially, as a result of the implementation of developed initiatives, but the project will end in February 2023.

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

The project runs until February 2023. We could identify success factors and barriers once the project is completed.

Additional information

In the new perspective of the European Social Fund 2021-2027, trainings and materials will be prepared for professional staff in kindergartens and schools.

Introduction of the renewal of pedagogical study programmes (financed through resources from the Recovery and Resilience Plan).

Spain

Spain's **School of Computational Thinking and Artificial Intelligence** (2018) offers teachers at all educational levels training and open educational resources to support them in integrating computational thinking and coding in their teaching. Projects developed by teachers to foster digital competencies in their own classes are monitored, and research is conducted on student learning and teaching practice. This initiative was set up by the Ministry of Education and Vocational Training with regional educational administrations, which select schools for participation in teacher training. At ECEC level, staff working with children over 2 can access online courses and resources created for the programme, as well as research.

Curriculum and pedagogy

Workforce development

Reference name: Case study ESP

A. Policy goals and design

A.1. Vision and broad objectives

Vision: Computational thinking and AI are essential for the obvious advantages and job opportunities they offer to students who develop these skills, but also because of their role in guaranteeing the full participation of citizens in the increasingly digital society to which we are heading.

Challenge: Balancing the potential benefits and risks offered by new technologies through strong and comprehensive education that empowers children to thrive and have agency in a constantly evolving society. Adequately supporting teachers to integrate computational thinking and coding in their teaching.

Intended outcomes: This project is structured in three different stages, each of which is associated to particular outcomes:
- Phase 1: Teacher Training: The outcome of this phase has been more than 464 teachers trained during the past academic year. Each participant had to pass 4 training modules from an offer of 35 modules (10 hours effort each) organised thematically around 5 main areas of knowledge: Unplugged Computational Thinking, Programming with blocks, Programming languages: Python, Robotics, and Artificial Intelligence. Teachers freely selected areas and modules so that they adapted to their preferences and level of competence. This resulted in the personalisation of their own training. The modules included training for the creation of practical pedagogical activities. Since the start of the project, more than 1 500 teachers have been trained.
- Phase 2: School implementation: The outcome of this phase has been 426 projects implemented in schools with students during the edition 2021-22. Each project lasts for 5 hours minimum. Since the start of the project, more than 1 000 projects have been implemented.
- Phase 3: Research. In each of the 3 editions of the project, a university team has conducted an investigation focused on the impact of the project on teaching practices and student learning. The resulting reports are public: Edition 2018-2019 - The School of Computational Thinking and its impact on learning [*La Escuela de pensamiento computacional y su impacto en el aprendizaje*]; Edition 2019/2020 (cancelled because of the pandemic); Edition 2020-2021 - The School of Computational Thinking and Artificial Intelligence 20/21: Approaches and Proposals for classroom application – Research results [*La Escuela de Pensamiento Computacional e Inteligencia Artificial 20/21: Enfoques y propuestas para su aplicación en el aula - Resultados de la investigación*]; Edition 2021-2022 (to be published in November 2022)

Policy alignment:
The latest research in this field shows that incorporating coding and robotics experiences in the early years of education has a positive impact on girls' motivation in relation to STEM subjects and, on the other hand, that students from disadvantaged social backgrounds are those who benefit most when coding and robotics are integrated into the different subjects of Pre-primary and Primary Education. A more detailed analysis indicates that the "School of Computational thinking and AI" will contribute to achieving the following objectives of the 2030 Agenda for Sustainable Development: Quality Education (4.4), Gender Equality (5.6), Decent Work and economic growth (8.2). and Reduce inequality within and between countries (10.2).

Moreover, the School of Computational Thinking and Artificial Intelligence aligns with the Digital Education Action Plan (2021-2027) of the European Commission, which sets out a vision of high-quality, inclusive and accessible digital education in Europe. In the second strategic priority, this plan sets up the importance of developing advanced digital skills in teachers and students, including skills related to artificial intelligence. Along the same lines, the Digital Europe Programme includes these advanced digital skills, understood as "specialized skills, that is, skills in the design, development, administration and deployment of technologies such as high-performance computing, artificial intelligence and cybersecurity" – COM (2018) 434 final - 2018/0227.

A.2. Coverage and eligibility

The initiative is for all ages (3-20) and teachers from all grades can access the resources. This initiative does not apply to children younger than 3, nor those in non-formal ECEC settings.
The initiative is for selected schools across country, the different regional administrations select a number of schools that will have to develop this programme.
The specific incentives are the specific training that is offer to teachers and the opportunity that their students have to receive this learning.

A.3. Policy tools

The School is accompanied by a range of tools to support teachers to embed computational thinking and coding in their daily teaching:

1. Free resources:

Teachers can access different resources designed for use at different levels of education. These include guidelines related to resource and time requirements.

2. Examples of Lesson Ideas:

Teachers can access different lessons designed for use at different levels of education

3. Reports:

Teachers can access the different reports that analyse the initiative. These reports analyse qualitative and quantitative studies of the impact on student learning and educational practices of activities related to computational thinking and artificial intelligence: Activities without a Computer, for Early Childhood Education (3-5 years), 1st, 2nd and 3rd. ° of Primary; Artificial Intelligence with Scratch, from 4th grade(Primary) to 2nd grade (Secondary); and Artificial Intelligence with App Inventor from 3rd grade to 5th -6th grade in Secondary and VET.

4. Teacher training (ECEC-level I):

All teachers selected to participate in the "School", will receive training for 40 hours, through a Moodle platform: In the editions of the project for the academic years 2018-19 and 2020-21 the training was structured depending on the educational stages.

- Pre-Primary and Primary teachers were introduced to the concept of computational thinking and its main dimensions, such as sequencing and algorithmic notions, logical thinking, abstraction and decomposition, parallelism and synchronisation through events and representation of the information.
- In the second part, several unplugged activities were presented, each of them contributing to promoting the development of different dimensions of computational thinking. The activities studied included the following: "Divide and conquer", "Programming robots...humans!", "Dancing in a loop", "My own remote control", "Logical cards" and "Variable packs". As an example of content, that allows students to know the concepts of events, messages and synchronisation to time who recites poems or riddles in a choral way.
- In the third part, teachers learned to analyse unplugged activities, assessing their didactic potential. Specifically, the activity Cody & Roby1, a "do it yourself" game, is analysed in which Roby, who is a robot, executes instructions provided by Cody, the programmer.
- Finally, in the last edition of the project for the year 2021-22, teachers could select training modules from a catalogue of modules with different difficulty levels and topics (unplugged, scratch, robotics, artificial intelligence and programming languages.

5. Professional development opportunities

The Ministry of Education offers teacher training courses. Since 2018, when this initiative started, the Ministry has offered different opportunities to all grade teacher to receive online training in computational thinking, coding, robotics and AI. The following links show the different courses that are still open and available to all teachers:

- https://enlinea.intef.es/courses/course-v1:INTEF+DisenaScratch+2022_ED1/about
- https://enlinea.intef.es/courses/course-v1:NOOC-INTEF+JuegaScratch+2018_ED2/about
- https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+VRMooc+2018_ED3/about
- https://enlinea.intef.es/courses/course-v1:INTEF+SomosCodeEU+2019_ED2/about
- https://enlinea.intef.es/courses/INTEF/INTEF159/2015_ED1/about
- https://enlinea.intef.es/courses/course-v1:INTEF+PCDesconectado+2021_ED1/about
- https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+INTEF1714+2017_ED1/about

The implementation of this project is based on the evidence that from the European Commission that computational thinking is considered to be a fundamental skill for life in the 21st Century, not only from the point of view of the obvious job opportunities it offers students who develop it from an early age, but also from the point of view of the perspective of full participation in the increasingly digital society to which we are heading. The School of Computational Thinking is considered to contribute to achieving the following goals of the 2030 Agenda for Sustainable Development:

- Quality of Education
- Gender Equality
- Decent work and economic growth
- Reduce inequality within and amongst countries

A.4. Funding

The initiative is implemented under the responsibility of INTEF (National Institute of Educational Technologies and Teacher Training.

Budget: EUR 80 000 euros for one year, including cost for the creation of learning materials, tutoring the learning process, mentoring the implementation of projects, maintenance of the learning platform and research.

A.5. Stakeholder engagement

Communication strategy:
- The EPCIA website is the main page for the project and all the teacher resources, ideas and reports are collated there. General information is also provided on the main website of INTEF
- Learning platform for teachers involved in the initiative
- Social Media dissemination

Initiative design:

During the 2017-18 school year, INTEF planned and designed this initiative in collaboration with all Spanish Educational Regions (17 regions in total, plus two autonomous cities).

Creation of the EPCIA section in the code.intef website

Implementation:

Year 1: (2018-2019): More than 700 teachers were involved and trained

Year 2: (2019-2020): More than 1000 teachers were involved and trained

Year 3: (2020-2021): More than 1000 teachers were involved and trained

Year 4: (2021-2022): More than 1000 teachers were involved and trained

Assessing the impact:

Through surveys, tests and interviews with teachers. The reports resulting from this research are published:

2018-2019 - The School of Computational thinking and its impact on learning (*La Escuela de pensamiento computacional y su impacto en el aprendizaje*)

2019/2020 (No report as the project was cancelled because of the pandemic, in the middle of the academic year)

2020-2021 The School of Computational Thinking and Artificial Intelligence: Approaches and proposals for classroom application - Research results (*Escuela de Pensamiento Computacional e Inteligencia Artificial 20/21: Enfoques y propuestas para su aplicación en el aula. Resultados de la investigación*)

2021-2022 (Report to be published in November 2022)

A.6. Future developments, sustainability and scalability

In the coming years, INTEF will design teacher training courses about computational thinking, robotics and AI. Now the EPCIA has finished, the different Spanish regions are responsible for scaling up this initiative to reach more schools, more teachers and more students.

B. Types and roles of digital technology

B.1. Digital resources

EPCIA targets mainly Computational Thinking, robotics and Artificial Intelligence. The main software for ECEC and Primary Education teachers uses Cody and Roby cards, Scratch 3.0 and Machine Learning for Kids.

B.2. Digital competencies

EPCIA promotes digital competence through all the areas of the DigCompEdu framework: Professional Engagement, Digital Resources, Teaching and Learning, Empowering Learners and Assessment.
This initiative definitely promotes young children´s early digital literacy through digital and non-digital activities.
Professional development is provided through the Moodle online training to all teachers involved.

B.3. Uses of digital technology

Some of the examples (lessons and resources) of this initiative are described in the reports on the website but EPCIA aims to target all subject of the curriculum.

EPCIA targets staff (including those working with the youngest learners), with the intention that their use of technology will ultimately shape the use of technology by learners.

EPCIA in ECEC adopts a fully integrated approach to using non-digital technologies by promoting different kind of activities. One example of disconnected activities is the use of the Cody & Roby cards.

B.4. Support systems

In Spain, education is structured in 17 regions. The regional education authorities in collaboration with INTEF designed some of the teacher training that is offered to enhance digital competence. INTEF also disseminates some of the teacher training and digital initiatives through the different regions involved.

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component?

Survey, tests and interviews for the teachers involved.

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

Yes. All teachers involved in EPCIA designed projects to be delivered over at least 5 sessions in their curriculum. They consider that their students were highly motivated by these sessions, and they feel that their students have developed their computational thinking and learned coding [Full report]

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

Success factors are the motivation that appears in students when using digital and non-digital activities in EPCIA. Another success factor is the training before the implementation in the classroom.

Some barriers described by some teachers include outdated computer equipment in some schools.

Annex A. Case study template

Introduction
Name of the policy initiative/programme that is the subject of this case study:
What does this policy initiative/programme consist in (please describe in two to four sentences)?:
Year when this policy initiative/programme was introduced:
Policy levers that this policy initiative/programme is connected to:

Curriculum and pedagogy ☐   Workforce development ☐   Family and community engagement ☐

Monitoring and evaluation ☐   Governance and standards ☐   Equity and diversity ☐

Other:_____   ☐

Setting/context of policy implementation related to this case study:

A. Policy goals and design
A.1. Vision and broad objectives
What is the vision (aspirational situation) that guides this policy initiative/programme? What is the main problem or challenge that this policy initiative/programme seeks to address? What are its key intended outcomes? How does it align with broader policy developments in the ECEC sector or education system in your country/jurisdiction?
[Please describe]
A.2. Coverage and eligibility
Does this policy initiative/programme cover the entire ECEC sector in your country/jurisdiction, or does it target specific groups of ECEC settings/ECEC staff/children/families? Are there any eligibility criteria for ECEC settings/ECEC staff to participate? Are there specific incentives for ECEC settings/ECEC staff to adopt this policy?
[Please describe]
A.3. Policy tools
What are the different actions or levers that are being/will be used to reach the desired policy objectives? What specific measures are being/will be implemented to translate policy objectives into concrete changes? Is the choice of these tools based on a specific model or an existing body of evidence, or informed by a previous policy initiative/programme?
[Please describe]
A.4. Funding and resources
How is this policy funded, and from what sources? What is the allocated budget, and over what period of time? Are there additional resources (e.g. equipment and facilities; staff's time) available for supporting implementation? Who leads and oversees policy implementation at national, regional and/or setting level?
[Please describe]
A.5. Stakeholder engagement
Is there a clear communication strategy to convey the main messages pertaining to this policy initiative/programme to different groups of stakeholders? Have different stakeholders been actively involved in the policy design? How is the implementation of this policy making use of stakeholders' knowledge and experience?

[Please describe]

A.6. Future developments, sustainability and scalability

Are there any planned steps for further developing this policy initiative/programme, for its sustainability over time, or for scaling it up?

[Please describe]

B. Types and roles of digital technology

B.1. Digital resources

What types of digital technologies does this policy address/target/promote? What kind of digital infrastructure will its implementation require? What kind of digital devices, tools or content will be regulated/targeted/promoted?

[Please describe]

B.2. Digital competencies

What types of digital competencies does this policy initiative/programme require from or try to promote among ECEC professionals? Does it involve professional development opportunities? Does the policy aim to promote young children's early digital literacy?

[Please describe]

B.3. Uses of digital technology *(if it applies)*

What are examples of the uses of technology addressed/targeted/promoted by this policy initiative/programme? Does the policy seek to shape uses of technology by ECEC staff/adults mainly, by young children mainly, or by both? How will these uses of digital technologies combine/balance with non-digital activities and tools?

[Please describe]

B.4. Support systems *(if it applies)*

What support systems exist for the intended uses of digital technology (e.g. support for the development or distribution of digital content/resources, technical support with infrastructure, management of digital information)? And from what actors (e.g. local education authorities, ministries, private sector, community organisations, external facilitators)?

[Please describe]

C. Evaluation

C.1. Does this policy initiative/programme include an evaluation component (e.g. strategy for evaluating/measuring success?)

[Please describe]

C.2. Is there any available evidence on outcomes and impact, generated by either internal or external evaluations/research?

[Please describe]

C.3. What success factors and barriers have been identified with regard to the implementation of this policy, and from what sources (e.g. evaluation reports, stakeholder feedback, research studies, etc.)?

[Please describe]

Additional information

Please provide any other information considered relevant to the case study, including additional documentation, references or links.

Contact for follow-up

Contact details for follow-up (name, job title, email):

Please list the agencies/organisations involved or consulted in the preparation of this case study: