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# 'Even at a collegial level, I drew strength from this journey': preschool teachers' development towards a creative-digital teaching approach

Anneli Bergnell and Lisbeth Åberg-Bengtsson

Department of Educational Work, University of Borås, Borås, Sweden

**ABSTRACT**

The present study investigates preschool educators' professional development towards strategies for creative use of digital technology in preschool education during a three-year Erasmus project. Teachers from 15 preschools in Italy, Portugal and Sweden participated in lectures and engaged in national and transnational study visits, discussions and activities. The analysis, using data from focus-group discussions about digital teaching and learning with participants from each of the preschools, focused on the categories past, future and present. The authors found that the teachers considered the collaborative, collegial project to have been beneficial for developing a creative-digital teaching approach. In addition, they had adopted a 'side-by-side perspective' that allowed for teacher agency and adequate, creative pedagogical choices among digital as well as analogue tools. Thus, the study contributes to a less researched sub-domain, namely how collective learning processes may promote teachers' development towards enhancing preschool children's creative use of digital learning tools.

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Preschool teachers' agency; digital and analogue tools; creative teaching approach; early years education; digital technology

## Introduction

Comfort in handling digital technology as a cultural tool has become a social necessity. Thus, the importance of supporting children's development as digital citizens is brought to the fore (e.g. Johnston, Highfield, and Hadley 2018; Palaiologou, 2016) and puts pressure on teachers and early childhood educators to introduce digital technology in educational settings (see e.g.Bourbour 2023; Council of Europe 2006, 2018; Lantz-Andersson et al. 2022; Moss and Jewitt 2010/2025). These new demands have often led to uncertainty about how and to what extent digital technology could be beneficially used for learning (see e.g. Jack and Higgins 2019; Selwyn 2010; Yelland 2018) and sometimes whether it should be used at all or whether early years education ought to ensure that traditional and more 'urgent' activities remain an essential part of young children's lives (cf. CCOC Commons 2018; Hernwall, 2016; Johnston, Highfield, and Hadley 2018, 2020; Lindahl and Folkesson

**CONTACT** Anneli Bergnell anneli.bergnell@hb.se Department of Educational Work, University of Borås, Anneli Bergnell, Högskolan I Borås, Allégatan 1, Borås SE-50190, Sweden

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2012; Mertala 2019; Palaiologou 2016; Sakr 2020). In addition, diverging arguments in public debate and visions imposed from the political level (e.g. The Swedish Government Offices 2025, The Swedish National Agency for Education 2010) add to conflicting attitudes regarding digital teaching and learning in early years education (see e.g. Hernwall 2016; Ljung-Djärf 2008). Other such factors include teachers' feelings of insufficiency due to lack of agency, knowledge, confidence, adaptability, or further training (e.g. Aldhafeeri, Palaiologou, and Folorunsho 2016; for a review, see Plumb and Kautz 2015). This article takes its point of departure here, in an educator-initiated, collaborative Erasmus project with participants from Italy, Portugal, and Sweden that aimed to support teachers' developmental processes towards enhancing preschool children's creative use of digital learning tools.

## *Theoretical assumptions*

Theoretically, the present study adopts a historical and sociocultural perspective in the Vygotskian tradition (see e.g. Greeno and Middle School Mathematics through Applications Project Group 1998). Hence, it acknowledges collaborative and co-constructive thinking between participants in social interaction as crucial for making of meaning, intellectual development (Säljö 2009; Vygotsky 1987; Wertsch 1998) and transformative agency (Stetsenko 2019), and the importance of shared ideas for strategies and solutions in joint activities that are beneficial for learning and development (Rogoff 1990). With regard to teachers' professional development, Voogt et al. (2015) emphasize the need 'to be concerned with social aspects of learning, distributed across individuals and events, and directly meaningful to teachers' practice' (260).

Emans et al. (2025) stress that agency is a situated act, strongly intertwined with the sociocultural contexts where it is enacted, 'as a situated and collectively formed ability of people' (Stetsenko 2019, 7). Also, Brevik et al. (2019) focus on situatedness and transformative agency, which 'goes beyond the individual in that it involves the collective practice in seeking change efforts, often found or needed in situations involving conflicts, contradictions and disturbances' (2). Haapasaari, Engeström, and Kerosuo (2016) quote Virkkunen's definition of transformative agency as 'breaking away from the given frame of action and taking the initiative to transform it' (49). Hence, transformative agency goes further than situational here-and-now actions as it evolves over time and may move from resistance into stepwise changing of the activity (Haapasaari, Engeström, and Kerosuo 2016). Building on Vygotsky's and Leontiev's assumptions, Stetsenko draws attention to methodology as well, emphasizing the centrality of transformative and creative activity as a:

> Methodological tool for meaningfully dealing with any aspect of the world, including the activity of theoretical understanding as a situated and collectively formed ability of people pointed out the necessity of a collective base of transformative agency. (Stetsenko 2005, 71)

When adopting a historical and sociocultural approach, we acknowledge teachers' professional development as 'social aspects of learning, distributed across individuals and events, and directly meaningful to teachers' practice' (Voogt et al. 2015, 260). This led to a focus upon transformation and agency as units of analysis across time in relation to past,

future, and present action (cf. Emirbayer and Mische 1998), which we elaborate on in later sections.

## Previous research

There is a significant body of research on the use of digital technology in early years education (see e.g. Hsin, Li, and Tsai 2014; Undheim 2022, for reviews). However, investigations focusing on preschool teachers' professional development are less frequent, and instances of their use of digital technology to foster children's learning, creativity, and curiosity are even more sparse. Below, a brief account of functional and attitudinal learning in general is followed by two subheadings referring to (1) teachers' professional development in digital technology in early years education and (2) preschool teachers' learning to promote creativity and digital technology, respectively.

With reference to Day (2017), Pires Pereira, Christo Parente, and Vieira da Silva (2023) maintain that effective professional development combines two aspects. There is, on the one hand, functional learning, related to professionalism and the upgrading of pedagogical content knowledge, and, on the other hand, attitudinal learning, which concerns 'a focus on building, revisiting and renewing teachers' commitment, positive sense of professional identity, and capacities for emotional resilience' (291). In line with suggestions by Day, these researchers argue that functional learning is not enough. Instead, it is important to combine functional and attitudinal dimensions in professional development also in early childhood education in digital settings.

### Teachers' professional development in digital technology in early years education

A study by Lantz-Andersson et al. (2022) on transformative agency involved collaborative work as well as reflective discussions. The researchers state that the participating teachers made changes in their teaching, questioned taken-for-granted teaching approaches, and discussed their previous experiences to develop their present teaching activities, hence highlighting the significance of time and space for reflection about how to best integrate the technology and engage the children. Grape (2023), Vidal-Hall, Flewitt, and Wyse (2020), and Kewalramani and Havu-Nuutinen (2019) make similar arguments to this. Johnston, Hadley, and Waniganayake (2020) point out other mechanisms as essential for shaping professional learning strategies among preschool teachers, such as interpersonal activities and participatory appropriation of each educator.

It has been argued that the importance of teachers' collective agency becomes apparent in investigations adopting situated perspectives (Stetsenko 2019). Grape (2023) stresses that digitalization and play in preschool is not an either-or perspective when it comes to digital and analogue, and that it is important that teachers make a pedagogical choice about when the digital is beneficial for play and learning and when it is not (cf. Nilsen and Kjällander 2023).

### Preschool teachers' learning to promote creativity and digital technology

In the wake of demands for digital technology in contemporary society, an abundance of commercial products have been directly produced for educational settings. As a reaction to this, digital technology has, on the one hand, been pointed out as a threat to traditionally valued learning strategies in preschool contexts and to

children's free/imaginary play and creative activities (see e.g. Hernwall 2016; Lindahl and Folkesson 2012; Mertala 2019). On the other hand, there is an increasing body of research focusing upon the extent to which digital devices in the education of young children can promote learning. This research deals largely with (often commercial) learning materials, applications (e.g. Behnamnia, Kamsin, and Ismail 2020; Kjällander and Moinian 2014; Marsh et al. 2018; Murcia et al. 2020; Samuelsson, Price, and Jewitt 2024), creative white boards (e.g. Brečka and Červeňanská 2016; Kearney et al. 2018), or particular domains such as mathematics, literacy, or music (e.g. Al-Hazza 2017; Charalambidou and Mygdanis 2024; Magnusson 2023; McGlynn-Stewart et al. 2017; Nikolopoulou 2020). Less often, investigations focus upon preschool educators' professional development in the use of digital technology to foster children's learning, creativity, and curiosity.

Hernwall (2016) reported a pronounced need from teachers to develop their own individual digital competence to be able to integrate digital technology and creative processes in early years education in supportive and innovative ways. Fielding and Murcia (2022), in a review of studies linking digital technologies to young children's creativity, give examples of educators' uncertainty about how to recognize, provide opportunities for, and develop children's creativity. Štemberger and Čotar Konrad (2022) did not focus on digital technology per se but still emphasized preschool teachers needing support and assistance on how to promote creativity in preschool education through continuous professional development programmes (cf. Bereczki and Kárpáti's 2018 compilation of teachers' beliefs about creativity and its nature as well as Cheung and Leung 2013).

## The aims of the present study

As demonstrated above, studies of teachers' development towards acknowledging and promoting children's creative use of digital devices are sparse. Thus, our study contributes to a less researched sub-domain, namely how collective learning processes may promote teachers' development in using digital learning tools in ways that enhance children's creativity. In this, it goes beyond the individual and includes situatedness and transformative agency, when involving collective practice.

Our overall objective is to give an account of how the Erasmus project affected the teachers' perspectives on and creative use of digital technology in preschool teaching, as they come to the fore in national focus-group discussions and the preschools' contributions to a handbook produced by the participating organizations (Handbook 2025).

The analysis is directed towards the following research questions:

(a) What preconceived challenges and attitudes towards use of digital learning tools do the teachers identify with respect to children's creativity?
(b) How do they meet these challenges and attitudes during the project?
(c) What development (if any) do they see in their roles as teachers using digital tools in preschool activities?

Thus, our study concerns preschool teachers, when benefitting from colleagues in a situated professional co-developmental endeavour with opportunities to discover new possibilities for children's creative use of digital learning tools. In this, we use the

concept of creativity in line with Murcia et al.'s (2020) suggested innovative framework, which proposes five 'characteristic clusters of creativity, including agency, being curious, connecting, daring and experimenting' (1395).

## Method

The methodological stance taken in the present study is inspired by, and comes close to, designs used in action research in collaborative educational settings, in that it follows a situated, iterative approach including a problem to address, actions to meet this problem, and reflections on the result (see e.g. McNiff 2017). The process does not end with these first reflections, however, but restarts and is repeated in cycles, often described as spirals to indicate progression in situated collaborative professional development and the idea of 'the teacher as researcher' (Stenhouse 1975). Similarly to Stenhouse, this means that we employed a school-based, collaborative approach to professional learning and curriculum development, where teachers learned together over time to improve practice through peer-driven, contextualized learning that linked directly to student outcomes within a collective culture of shared expertise.

The chosen method brings the importance of teacher agency to the fore in the research process and in curriculum improvement and development. Glenn (2026) emphasizes that Stenhouse's legacy has been 'strengthened over the decades by influencing various approaches to action research' (280). Elliott (2024) highlights Stenhouse's argument for the importance of 'research in education organized around problems that are educationally significant in the context of professional practice' (711). This fits well with the design of the Erasmus project, which deals with educators' own wishes to develop their use of digital tools in preschool education.

### *Setting the stage*

To meet political demands from education authorities related to the increased use of digital tools and media in preschool, requests for further training were raised by several preschool educators and their principals in a medium-sized Swedish city. This led to the application for the Erasmus project Digital C.U.L.T.U.R.E by the municipal administrative department responsible for tasks concerning preschools and pedagogical care in the city in question. Among the aims of this Erasmus project were to strengthen the teachers' personal and collective digital competence in using technology in creative ways, and to enhance awareness of the risks and possibilities for children in today's digital world.

#### *The conduct of the Erasmus project*

An Erasmus project requires partnership between European countries. The partners of the present project were selected to meet variation in cultural and pedagogical contexts and socio-economic variables. The Portuguese organization was the smallest and participated with one preschool, whereas five preschools from each of two Italian organizations were involved. From the Swedish organization four preschools participated, and the authors' university was also involved to contribute with input to the teachers' training and to disseminate the results in a scientific research study. The participating organizations were

to share their experiences by contributing to a common handbook meant to inspire other teachers.

The project was conducted over three years and included a wide range of national and transnational activities. Transnational project meetings, digital as well as physical, were held between the project leaders from each of the participating countries. The authors' university provided three teacher training sessions with lectures on creativity, digital/analogue border crossing, and politics behind digital technology in early years education. Thereafter, every preschool was supposed to implement these experiences in its own cultural and educational environment.

Transnational meetings in Italy, Sweden, and Portugal for representatives from the different organizations involved study visits and discussions. During these visits, the participants were supposed to exchange experiences and become familiar with each other's educational environments and equipment. The intention was, among other things, to stimulate the teachers to take an external view of their own practice and thereby reach a meta-level of collegial reflection. Local final multiplier events were held IRL and online in the three participating countries. Thus, the project was supposed to contribute to higher quality of early childhood education by developing teaching skills beneficial for preschool children.

During the project, three local focus-group discussions (cf., Seidman, 2006, on interviews) addressing several set questions were arranged with participants from each of the 15 preschools and moderated by the four team leaders. On the initial occasion, which took place at the beginning of the project, the questions concerned what digital tools the preschools had at their disposal, how they were used, which ones the teachers preferred, what meaning they attributed to creativity, and whether they thought digital tools contributed to creativity or not. The next focus-group occasion was carried out during the second project year and concerned the teachers' changed attitudes (if any) with respect to the digital learning tools and how to use them creatively together with the children. The final discussion within the focus groups took place towards the end of the project (see Figure 1). The questions brought to the fore then had to do with the teachers' perceived changes, due to the project: in attitudes and acting as educators, changes in the way they discuss, plan, and reflect on digitality and creativity with their colleagues, as well as changes in how the children talk about and act with digital tools.

## Methodological considerations

A substantial part of our data originates from the three focus-group discussions. In such discussions 'the moderator will propose a discussion topic and will wait for the answer to that topic to generate from the discussion group' and from a dynamic of opinions (Acocella 2012, 1129). Stewart, Shamdasani, and Rook (2007) emphasized that because members of groups influence and are influenced by each other, group outcomes are consequences of individual positions and actions, and relatively homogenous groups are regarded as preferable, therefore, to avoid situations that may cause inhibition and discourage discussion. However, both Acocella and Stewart et al. also state that a certain amount of heterogeneity may promote conversation dynamics and enrich the results by ensuring enough diversity to expose opposing viewpoints and ideas (cf. Wibeck 2010). Discussions in focus groups in which participants interact and exchange viewpoints

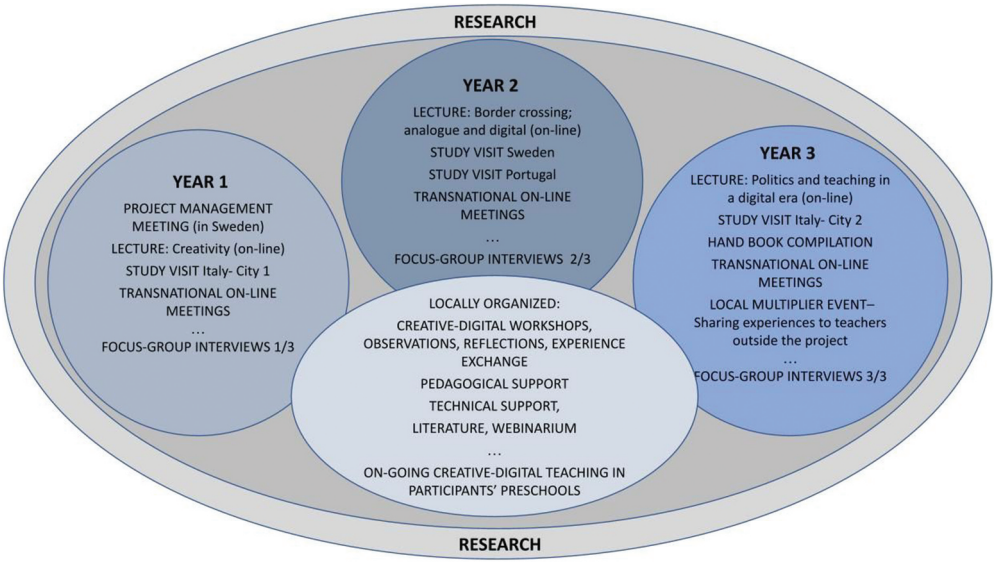


**Figure 1.** An illustration of the design of the Erasmus project.

and ideas tend to generate data of higher ecological validity than data where individuals express their opinions in interview settings (cf. Acocella 2012).

In our case, the focus groups were made up of teachers from the same preschool with a common interest in further training in digitality and creativity for educational purposes. The focus groups were naturally created and relatively homogenous, whereas there was obviously a certain risk of a lack of enough heterogeneity. However, since each focus group met on three occasions, there were rich opportunities for different opinions and perspectives to be expressed. The present study benefits from some other, built-in conditions, as well. Interest and familiarity with the research topic, pointed out by Acocella (2012), as important to guarantee detailed and relevant information, were natural qualities of the current Erasmus project initiated by the Swedish teachers themselves and readily adopted by their colleagues in Italy and Portugal. Moreover, the focus groups in this project were neither ad hoc nor temporary and thus not at risk of lacking group cohesiveness, which is otherwise regarded both pending and non-trivial (Acocella 2012; Stewart, Shamdasani, and Rook 2007).

The focus-group discussions were documented through audio recordings, transcribed, translated into English, and sent to the authors of the present article for analysis. These transcriptions were the main source of data in addition to spontaneous field notes from the first author's participation in the project. To enhance the credibility of the study, we systematically scrutinized and used information about the teachers' experiences from the common handbook in a complementary way. The first author of the present article replaced the main academic resource and project leader during the last two thirds of the project. She participated in transnational study group visits, monitored the second and third focus-group discussions in Sweden, and thus benefitted from personal experiences of data collection sessions.

### *Analysis*

Our analysis is guided by Emirbayer and Mische's (1998) notion of agency as being a 'temporally embedded process of social engagement' (962). In particular, their three analytically categories (past, future, present) and their reconceptualization of human agency as 'situated in the flow of time' (963) provided us with a valuable analytical tool. By analysing such an agentic orientation, there is a possible 'crucial analytical leverage for charting varying degrees of manoeuvrability, inventiveness, and reflective choice shown by social actors in relation to the constraining and enabling contexts of action' (964). Thus, we acknowledge the dynamic interplay among these dimensions and the importance of the temporal aspects of agency in the studied events.

The two authors read the transcripts from the discussions several times. The first author did the initial analysis and suggested a preliminary grouping of utterances and statements in accordance with the analytical categories of past, future, and present. After this, both authors compared their impressions in relation to the categories and their contents. The focus was on instances of teachers' reflections and attitudes towards children's creative use of analogue and digital tools. This co-judgement process was iterated in several cycles to gradually refine the categories until a final version was agreed upon from which to select representative instances for the presentation of the results.

### *Ethical considerations*

Throughout the project, the Swedish Research Council's (2024) ethical guidelines were taken into the utmost account. Participating teachers gave their written consent to take part in the study and for the release of data material included in the analyses and in the publication of the results. The focus-group discussions were translated into English without using personal names. Special consideration was taken to ensure that participants were comfortable sharing their views.

## Results

The results follow under three subheadings: *Preconceived attitudes towards digital learning and creativity*, which relates agency to aspects of (*past*) habitual patterns; *Meeting challenges and attitudes towards digital learning tools and creativity*, which relates agency to an ability to orient towards upcoming (*future*) challenges and solutions; and *Developing a creative use of digital tools*, which relates agency to the capacity to transform past experiences and future challenges for the eventualities of the (*present*) moment. Quotes presented in the results originate from focus-group discussions, and occasionally observations from the common handbook and the first researcher's field notes as signified.

### *Preconceived attitudes towards digital learning and creativity*

Initially, the teachers expressed generally positive attitudes towards digital technology as increased opportunities for children to explore and discover the world, themselves, and others. Even so, they voiced uncertainties related to both technical and pedagogical aspects and described that usage heavily depended on habits, perceived requirements,

and/or technical skills. Yet another concern was whether digital tools can support children's creativity at all.

> You need basic knowledge of the tool. If you don't know how to use it, if you don't know its potential, well then it's difficult to include it in the planning. It takes time to get to know them.

> There was a bit of uncertainty at the beginning. What is the *right* way to use them? 'Cos you should always use them the best way. And because of that, you didn't dare to use them.

> It is still very hard for me to see both together. I still struggle with finding ways to make digital tools creative or in a way they can help children to develop their creativity.

The project's design, with early exchange of experiences, enabled participating teachers to benefit from each other's pedagogical and digital competencies. It allowed them to confront their preconceptions in critical discussions with fellow project colleagues relating to habits and perceived shortcomings in how to handle and adopt selective attitudes towards the use of digital tools for children's learning. The teacher considered these collegial discussions a challenging but 'a good driving force to deepen our knowledge of digital tools and resources that can offer learning contexts' (Handbook 2025, 4).

### *Meeting challenges and attitudes towards digital learning tools and creativity*

Early in the project, statements about digital technology as preferable and necessary for children were prominent in the focus-group discussions. Teachers emphasized the importance of preparing the children for contemporary and future society and the implications of using technology of different kinds.

> And even if you are not or if you haven't been, you must be [interested in technology] in your professional role, in order to give the children what they need for life.

> The children should be able to take part in the society now and in future and then it would be unwise to slow down the [digital] progression, but then you really have to consider – how can you use it in a creative way instead. One way is not better than the other. So, maybe they [the digital and the analogue] are needed together.

Even though the teachers admitted that children need to learn with and about digital devices, they also had concerns about the possible dangers involved and stressed that preschool children should learn caution and risk avoidance. They tended to return to this dilemma of a tension between the right to gain digital competence to take part fully in society versus the right to be protected and expressed uncertainty about when to trust the internet.

> It scares us adults who understand [the internet]. But the children . . . they can't really tell what's true. I think it's really scary now that we're talking about it, because how are you supposed to explain to the children, is this true or . . . you barely know yourself. That's where source criticism comes in, but as I said, it becomes difficult for us too, when you don't know yourself.

> And also teach about the basics, about going online. What you can find out there, so children understand that it is open and free and that you have to know what you're looking for and that anything can come up. They don't know what they're going to see there and what's true.

Gradually, the teachers questioned the assumption of digital technology as the most important learning tool for the future and instead emphasized selective use with a clear pedagogical purpose and a need to draw children's attention to the varied range of both analogue and digital options.

> It's been a learning process for us. Now we've landed in the fact that it [the digital] must be adequate, it must fit a purpose, be in a context. What does it add? Does it add something, that's the point! We've become more restrictive with digital tools.

> Bringing them to the classroom has led to the children having a closer relationship with technology, being more interested and engage in the project theme and even more willing to take time to think of different solutions or creative approaches to solve issues or problems.

A pronounced challenge of the present project was the notion of digital and creative aspects as something incompatible. However, rather soon the discussions were directed from learning about the digital tools as such, towards how the children can be creative in their use of these tools. This, in turn, led to, an extended focus on the teaching and learning content as well as on appropriate materials for children's explorations regardless of whether these were analogue or digital. The transnational discussions strengthened the teachers' self-confidence in choosing appropriate tools.

> Now I think they can be combined. To mix the digital and the analogue and challenge [children] by doing so. It is not black-or-white like we can only use one thing at a time, but instead we combine them now.

The next section deals with how the participants met their beliefs about digital learning devices in the past and the future, when handling the challenge of a digital, creative, learning environment in the present.

### *Developing a creative use of digital tools*

The participants continued their journey of challenging past habits and attitudes and perceived future demands when merging their collective learning into creative digital teaching. In the handbook as well as in the group discussions, teachers testified to how the use of digital tools (often in combination with other educational tools) had led to enriched learning and creative moments that inspired children's imagination or new ways of looking at the world:

> The possibility of enlarging the image offers new suggestions, opening the imagination. From the amplified observation of the red bugs, seen so large on the screen, the thought can go further . . . the drawings [i.e. the pattern] on the bugs recall the features of the face, they look, someone said, like African masks. (Handbook 2025, 33)

Similar observations appear in field notes from study visits:

> When seeing ants and the enlarged anthill, the children discovered how much that is small. The children saw that an anthill is made up of many rooms and streets and they started to make up their own stories. These tools that enlarged and showed the details helped the children to invent stories about aspects that they usually don't see because they are very small. They went into detail when they made up things about ants, for example that 'the red one is mischievous'.

> Seeing the potential that digital creates in children's explorations stimulated me. Digital opens the perspective to 360 degrees. Digital is very close to our idea of creativity. In a field of poppies, the children experience it live and then, afterwards under the microscope, they can go right inside the poppy! It changes our perspective!
>
> Not only do the possibilities for children change, but our role changes. Seeing the amazement in the children's eyes at seeing something enlarged.

In the group discussions, the teachers described how focusing upon managing digital technology and devices per se became less important. Instead, they emphasized that implementing an extended learning environment demands a different teaching approach. When involving digital tools, they recognized how children posed different kinds of questions, how an altered perspective challenged stereotypes, and how interaction and learning patterns changed. This led to a pronounced need to plan and to be prepared in new ways:

> Outdoor there are some limitations, but still it requires you to plan differently. In the digital, you have to plan for something with no boundaries. You need to move differently as a teacher when the children know that 'all the answers' are out there.
>
> An interesting element is the role of the adult. How does the teacher decide to set up [when digital technique is involved]? What does she or he decide to make happen? Digital is an opportunity to overcome stereotypes like an image of the flower found in the floodplain.

During the recurring (local and international) reflection sessions, the teachers could share teaching experiences and discuss their role in relation to children's creative digital explorations. In the quote below, a teacher described how they collectively developed increased awareness as to when adding digital details to activities was beneficial to children's creativity or not:

> You observe what they are playing and think: Now I can add something to this environment, and then I project a jungle. And then they lose focus because they become more interested in the projection than in the play in which they actually had imaginings and were creative. So, it kind of ruins the play. They become inhibited and then it's not that creative.

In several focus-group discussions, teachers reported this kind of impact on both learning and interactional processes, when using digital technology. They pointed out risks, not only related to source criticism or disinformation, but also related to pedagogical issues such as unwanted influences from digital devices. For instance, when children have discovered that answers are easily searchable and accessible in the digital world and therefore dismiss 'slower' learning processes as unnecessary or even uninteresting. Thus, participation in the Erasmus project developed both the teachers' vigilance against pitfalls with the new technology and their readiness to continue challenging children's ways of learning regardless of what kind of tools were included.

> For example, if I plan on the use of maps and the children ask me to use the digital app Maps, the learning pattern changes, because with Maps I enter the name of a destination and then the app tells me which roads I can take to get to that destination or a possibility of choosing which one to take. However, if I work with [analogue] maps, I build a route myself through some reference points that I find along the way.

> Now, before using Google lens straight away, I ask the children 'what question do we ask Google?' We [teachers] say: 'let's go and look in a picture book, let's look for other resources like the dictionary'. We don't use the digital straight away and even if the children say 'let's use Google', we ask if there are other alternatives and possibilities. Maybe it is also the maturity that Erasmus has given us, thanks to the visits and the comparisons between us.

At the end of the project period, the teachers confirmed that collegial exchange and support had helped them to adopt a view of learning tools and materials without separating 'the analogue' and 'the digital'. This preconception had gradually been replaced by a 'side-by-side' perspective that allows digital and analogue aspects to merge into one creative approach:

> I think now, you have knowledge of how to combine analogue and digital. And how to be creative with the digital. Before this project, I didn't know that you could be creative with the digital. I hadn't thought about it like that. I am very impressed by the other teachers who were so creative. [with the digital]

> For me *now*, creativity can be digital or analogical.

> I would recommend moving things forward at the same pace, analogue and digital. I would buy a digital microscope but also three illustrated books. They [the children] grow up on equal terms with both.

Throughout the teachers' statements, the advantages and utmost importance of being able to share experiences and shortcomings with a group of like-minded colleagues without any prestige stand to the fore. The positive and permissive climate among the participants of the project was highlighted in all focus-group discussions as a foundation which allowed teachers to develop both professional competence and a shared approach to digital tools, based on their own and other participants' experiences.

> Getting to know how other schools use the digital tools and develop the children's creativity helped me to challenge myself to look for different ways to implement and combine digital tools and creativity in to challenge the children and create a more engaging learning environment.

> I realized that it was a journey, it took time, it was defined along the Erasmus project. This journey helped me to orient myself in how to propose them [digital tools] and supporting the children.

> Even at a collegial level, I drew strength from this journey. When reporting experiences seen, it became material for discussions, it was no longer just my personal opinion or my vision of digital, but *ours*.

## *Summary*

The project's design enabled teachers to develop both professional competence and a mutual approach to digital tools collectively, based on their proven experiences. There were recurrent instances when teachers described how the opportunity to participate with like-minded colleagues in the project and to jointly focus upon and learn about digital creativity over a period of three years, changed their attitudes towards and their teaching with digital technology in preschool. They stressed how participating in the project provided them with opportunities to discuss previous, often uncertain, attempts

to include digital tools in preschool teaching. Group reflections challenged both the assumption of digital technology being valued as the most important learning tool for the future and the notion that digital and creative aspects are incompatible.

Together and step-by-step, the teachers developed a more selective attitude where creativity and suitability determined which digital tools (if any) were appropriate. Stated differently, they distanced themselves from an 'either-orperspective' and began to use digital tools and develop creative aspects side by side as a natural part of contemporary society. The detection that children's questions, interactions, attitudes, and learning processes changed in digital contexts, resulted in the teachers' seeing a need for planning and preparing in different ways depending on the choice of learning tools.

## Discussion

Contemporary public debate and political conclusions on the use value of digital technology for preschool education tend to ignore the issue of teacher agency. The Erasmus project engaged with preschool educators' own initiatives and genuine desire to find constructive uses for digital learning tools in ways that did not hamper but instead promoted children's creativity. This situated bottom-up design made it possible for the participants to view the use of digital technology in preschools critically in general and to develop their own teaching practices in particular in a manner that takes the importance of teachers' agency into account and contributes to the promotion of collective agency (cf. Stetsenko 2019).

The teachers express their appreciation of the collaborative, national and transnational activities providing support from and exchange of experiences, observations, and conclusions with their colleagues. The possibilities of taking an external view of their own practice and thus forming a deeper understanding of the effects of their chosen educational tools and methods evidently brought about professional developmental processes (cf. Johnston, Hadley, and Waniganayake 2020). According to Lantz-Andersson et al. (2022), such 'temporal shifts in the reflections can analytically be understood as teachers envisioned or enacted transformative agency' (1).

Initially, teachers were unsure how to handle the technology to encourage creativity, which draws attention to Nilsen and Kjällander's (2023) highlighting of challenges implied by integrating new technology in a meaningful and functional way. Other researchers have emphasized that competence developmental processes with digital technology may take time and should provide opportunities for reflection (e.g. Grape 2023; Hernwall 2016; Vidal-Hall, Flewitt, and Wyse 2020). This is in line with the length and design of the present project that provided rich opportunities for good transformative conditions in this respect. The initial focus on practical use and coming to grips with digital educational tools of different kinds (i.e. functional learning) changed into a focus upon possibilities to choose tools selectively. In other words, they reached an understanding in line with Grape's (2023) claims that digitalization and play in preschool should not be regarded as an either-or position concerning digital and analogue educational tools (i.e. attitudinal development). Evidently, in the teachers' journey towards a creative-digital teaching approach, they developed strategies for using digital technology in ways that promote children's creativity, including agency, curiosity, and experimenting (cf. Murcia et al. 2020).

### *Final reflections*

In contemporary debate, digital tools in preschools are often merely regarded as 'screens' and dangerous barriers to language development and learning. Strongly influenced by this debate, the Swedish government decided to restrict the use of digital tools in preschool and to re-revise its curriculum (The Swedish Government Offices 2025; The Swedish National Agency for Education 2025) where digital tools are specified no longer. The question can be posed, if a risked, direct consequence will be that principals and educators in Sweden will 'throw the baby out with the bathwater' and feel compelled to distance themselves from digital learning tools as such. The present study also indicates that the use of digital tools in preschool education requires reoccurring training to enable teachers to make adequate pedagogical choices between different learning tools and how to use digital resources selectively. Our results show that the teachers discovered that digital tools, when offered to children, could entail an abundance of opportunities for agency, curiosity, and creativity as well as support for imaginative narratives. However, it is evident that such processes require time and reflection (cf. Haapasaari, Engeström, and Kerosuo 2016).

The results emanate from investigations that followed in detail a number of preschool teachers' transformative agency in a developmental process from different educational settings in three countries. Obviously, our study has certain limitations. For instance, due to organizational considerations individual interviews were not an option, the focus-group sessions were only audio-recorded, and data collected from Italian and Portuguese participants were analysed in English translations. Nevertheless, the study benefits from several focus-group discussions held on three occasions, which rendered a sufficient number of transcripts for a scrupulous analysis. The first author also took part in national as well as transnational activities and moderated Swedish focus groups and thus had good insight into what took place. With this, we are accordingly producing something more reliable and valuable than simple everyday generalizations. Something that reaches beyond the unproblematized notions of theory that mark out what is supposed to be special about academic research products. Educational case studies should be judged by what they offer to professional understanding and teaching: namely, exemplary knowledge (Thomas 2011).

The study points out the advantages of moving away from regarding digital technology as an either-orchoice and instead adopting a view on digital tools as complementary to other multimodal educational resources (cf. Yelland 2018). In addition, our results contribute to a less researched sub-domain, namely that of preschool teachers' taking agency in their professional development in supporting children's creative use of digital technology.

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## Notes on contributors

*Anneli Bergnell* is a Senior Lecturer in Pedagogical Work at the Department of Educational Work, University of Borås, Sweden. Her research interest is mainly directed towards preschool science education with a particular interest in multimodal illustrations where references to the body, or the body as such, are used to explain scientific phenomena, processes or concepts.

*Lisbeth Åberg-Bengtsson* is Professor Emerita at the Department of Educational Work, University of Borås, Sweden. One of her research areas aims at dimensionality in large-scale tests. In another, she focuses on students' understanding of graphical representations such as graphs, diagrams and cartograms, as well as illustrations in the form of explanatory pictures and models in teaching materials.

## ORCID

Anneli Bergnell http://orcid.org/0000-0003-1373-8429
Lisbeth Åberg-Bengtsson http://orcid.org/0000-0002-2691-9731

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