ADEQUATE DIGITAL COMPETENCE IN EARLY CHILDHOOD EDUCATION

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Abstract

The key questions this study seeks to answer is what adequate digital competence is and how preschool teachers characterise young children's adequate digital competence. A variety of frameworks and models have been developed to exemplify and characterise teacher's digital competences. However, to date, there is hardly any study examining young children's digital competencies in early childhood education. The data were collected through semi-structured interviews with 13 preschool teachers at seven preschools in the centre of Sweden and analysed using qualitative content analysis. The findings of the study show that children's digital competence in early education is an increasingly complex notion which can be characterised by seven key aspects: *To get better understanding and be familiar with digital technologies, To use digital technologies, To have a critical approach toward digital technologies, To have ethical media competences, To have problem-solving skills, To be producers, not just consumers, of digital technologies, and* To *dare trying digital technologies.* This study, further, portrayed the digitally competent preschool teacher's qualifications in order to fulfil preschool teachers' complex task (i.e. educare) in children's learning and development.

Keywords:

Adequate digital competence, young children, early childhood education, preschool teachers, digital technologies

Introduction

The key questions this study seeks to answer is what constitute young children's adequate digital competence in early childhood education. The Swedish national curriculum for preschools addressing the importance of using digital technologies to support children's learning emphasizes that early childhood education should:

> *give children the opportunity to develop adequate digital skills by enabling them to develop an understanding of the digitalization they encounter in everyday life. Children should be given the opportunity to develop a critical, responsible attitude towards digital technology, so that eventually they can see opportunities and understand risks, and also be able to evaluate information (The Swedish National Agency for Education, 2018, p. 10).*

The preschools in Sweden are, accordingly, obliged to develop children's digital competences in an adequate level (The Swedish national curriculum for preschools, 2018). However, there are significant variations in defining what constitutes digital competence in early education. The notion of developing children's "digital competence" in a "adequate" level is rather vague (Olofsson, Fransson, & Lindberg, 2020). The teacher's professional digital competence and its many dimensions have been addressed in a large number of studies and frameworks (see for intance European, Joint Research, Redecker, & Punie, 2017; International Society for Technology in Education (ISTE), 2017; Koehler, Mishra, Akcaoglu, & Rosenberg, 2013; UNESCO, 2018). However, as far as we are aware, there is hardly any framework or study examining young children's digital competences in early childhood education.

Thus, developing children's digital competences mainly depends on preschool teachers' agency (Bourbour, 2020; Johnston, Hadley, & Waniganayake, 2020; Lund, Furberg, & Gudmundsdottir, 2019; Stephen & Plowman, 2008) and the ways they translate the curriculum's educational goals into practices including developing children's digital competences in adequate level, as indicated in Swedish national strategy for the digitalisation, (Government decision 1:1, 2017; Government decision, 2022).

In the same line of thoughts, UNICEF report shows that unskilled and unmotivated preschool teachers are the main barrier in developing children's digital competences (Nascimbeni & Vosloo, 2019). It may signify that the

preschool teacher's digital competence and the way they understand and conceptualize the value of technologies in early education inform if and how the children's "adequate digital competence" can be developed. There have been increasing calls, as results, for developing preschool teachers' digital competences (Forsling, 2023; Vidal-Hall, Flewitt, & Wyse, 2020).

The ways preschool teachers integrate digital technologies in their educational practices to develop children's adequate digital competence, further, can be informed by different factors such as policy-makers, technology companies, content providers, and parents (Selwyn, 2011). These actors' diverse expectations and interpretation from digitalization in early childhood education and "adequate digital competence" can add to the complexity of characterising what adequate digital competence is in early education and then conceptualising how preschool teachers professional digital competences can be developed as part of a preschool's digitalisation process (Forsling, 2023). This study addressing a grand challenge in early childhood education, aims to explore how preschool teachers characterise young children's adequate digital competence in early childhood education.

Contextualisation: Adequate digital competence in Swedish early child education

The Swedish preschool is based on a model that internationally labelled as *educare* (education and care). In this model care and teaching are embedded with each other and childhood is not merely regarded as a time of preparation for adulthood but has value in itself (Masoumi, 2021). Informed by socio-cultural perspective, the preschool learning environment mostly structured to actively engage children in the learning activities, to construct and create their own knowledge through interaction with others in a social context (Bourbour, 2020).

The Swedish National Agency for Education (2020) addresses children's digital competence in four focus areas including a) understanding the impact of digitization on society; b) getting familiar and use of digital tools and media; c) having a critical and responsible approach; d) solve problems and turn ideas into action. These focus areas map a continuum of digital competences which can be seen as a part of the notion of digital *Bildung* in Nordics countries in term of "how knowledge, competencies, skills, and attitudes make it possible for us to function as citizens in an increasingly complex society" (Amdam, Kobberstad, & Tikkanen, 2022, p. 18).

Developing children's digital competences, accordingly, seen as ongoing process which goes beyond the children's seemingly use of digital tools (please see Government decision 1:1, 2017; Government decision, 2022). The expression of "adequate digital competence" is therefore used in these documents to highlight that, digital competence as a continuously changing capability that is shaped based on the societies needs and circumstances that children's is located in. This approach also contributes to an understanding of how policy is interpreted, transformed, and enacted (Olofsson et al., 2020).

Data-collection and analysis

A qualitative approach was adopted, and empirical data was collected through Semi-structured interviews with preschool teachers in Gavleborg County, Sweden. To locate preschool teachers, convenience sampling was employed where the participants were chosen because they were belonging to a group of preschool teachers working with digitalization issues in preschools and "known" for their advanced use of digital technology in preschool. The participants in the interviews were recruited by the preschool principles.

The interview guide consisted of 6 open ended questions designed to address what constitute young children's adequate digital competence, how it can be characterised in early education. The interviewed preschool teachers were encouraged providing concrete examples illustrate their answers to the questions. To ensure the credibility and dependability of the study, the developed interview questions were expert-piloted by four experienced teachers. The interviews were conducted by the authors, lasting approximately 45 minutes. Thirteen semi-structured interviews were conducted with preschool teachers. All interviews were recorded and transcribed verbatim.

The transcripts were then analysed through a grounded-theory methods to explore preschool teachers' tacit meanings. An iterative (constant comparative) method was used to identify themes in the interview data (Glaser & Strauss, 1999). In this iterative process, the collected data was analyzed. A thorough analysis of the transcribed interviews initially were conducted inductively and individually by the authors where all meaning units related to characterizing young children's digital competences practices in early childhood education. A brief description or keywords for each theme were created. The initial list of codes was reduced into a set of 13 overarching themes. Through constant comparison, the similar themes merged into categories according to the study's research question. The analysis was facilitated by ATLAS.ti 9 qualitative data analysis software, which helped to ensure a systematic scrutiny of all collected data. The ethical issues were carried out in accordance

with Swedish ethical regulations for research (Quennerstedt, Harcourt, & Sargeant, 2014; Vetenskapsrådet, 2011).

Preliminary results

The preschool teachers considered the integration of digital technologies as an artifact that not only mediate their educational practices in preschool but as means to promote equality of educational opportunities among children. All preschool teachers underline the importance of developing children's digital competences as well as the role that using digital technologies can play in learning and developing young children.
A number of the preschool teachers addressing their confusion, put forward that the notion of adequate digital competences is vague. Some addressing the increasing advances in digital technologies, put forwards that "it is hard to define what adequate digital skills is". Such confusions, according to the preschool teachers, have led to discussions in working teams about how they should develop children's digital competence in an adequate level. One of the preschool teachers, addressing such challenges states that "Based on what adequate digital competence is today, we try to update our skills, and maybe what we have today won't be relevant tomorrow…" (Sofia).
Analysis of the collected empirical data reveals seven different facts that characterise young children's digital competences in early childhood education.

- To get better understandings and be familiar with digital technologies,
- To use digital technologies (to operate/use digital technologies in effective way)
- To have a critical approach toward digital technologies
- To have ethical media competences
- To have problem-solving skills
- To be producers, not just consumers, of digital technologies
- To dare trying digital technologies.

*To have a critical and responsible approach to DT (*preliminary results*)*

Developing children's critical understanding about the potential of digital technologies and how these technologies can be used in different means and for different purposes was one of the issues which underlined in the data collected as key part of adequate digital competence. One of the preschool teachers, Mona, put it as "we should develop children's critical and responsibility approach to the digital technologies". Preschool teachers state that children encounter a lot of information in their everyday lives, movies and fantasies. They, thus, underline developing children's skills to critically and responsibly evaluate and use provided information.

> *Children should be provided opportunities to develop understanding of the digitization they encounter in everyday life and where they can have critical and responsible approach to digital technologies (Mona)*

Having a critical approach in early childhood education may means to think about what is genuine and manipulated on the screen. One of the preschool teachers, Annika, addressing this notion notes that:

> *Children can't believe everything either…That's one of the hardest parts, I think…[for instance in a teaching situation] We manipulate pictures that couldn't be true. In a teaching situation I showed a picture showing I stood in the hand of my colleague. In realty, I sat behind her with a certain distance and then the picture is taken. We showed the picture to four years old children saying look how strong I am. It's hard for the children to understand that we miniplate the picture. ….*

As indicated in the excerpt the preschool teachers try to develop children's critical approach to digital technologies through, manipulating of pictures and letting children to explore that what they are seeing on the screen may not be true. By taking examples, the teacher notes that this abstract issue is hard for young children

to understand, thus, they need to concretize and exemplify different objects, to create space for children to discover what is true and what is false.

To concretise this issue and to develop children's critical and responsible approach to digital technologies, a majority of the preschool teachers note that they use green screen where they can create and manipulate images and videos. A preschool teacher puts it this way:" … the children can understand that one can't fly and jump high tower buildings like Superman in reality but they can create such pictures/movies using applications like green screen". Preschool teacher addressing the importance of developing children critical approach to technologies argues that they can discuss with older children about what is sensible or no-sensible on the internet, while with the younger children you need to concertize and exemplify how the pictures and movies can be manipulated.

Discussion (an outline)

The study explores how preschool teachers characterise adequate digital competence in early childhood education. Seven dimensions have been constructed that maps children's digital competence in early educations. Five of the identified dimensions including the "To get better understandings and be familiar with digital technologies, To use digital technologies, To have a critical approach toward digital technologies, To have ethical media competences, and To have problem-solving skills" are aligned with the addressed four areas of digital competence in the Swedish National Agency for Education (2020). The empirical findings, further, identifies three other dimensions including, To be producers, not just consumers of digital technologies, and To dare trying digital technologies.

Preschool teacher's characterisation of children's adequate digital competence shows that the notion of 'adequate' covers a wide spectrum from getting to know to have critical approach to digital technologies. The findings further reflect that children's digital competence is a dynamic and ongoing process which is informed by the socio-technological factors. This leads to variations in how adequate digital competence is interpreted and enacted in preschool pedagogical practices. Addressing children's digital competence as a dynamic and ongoing process has consequences for how to design and conduct educational practices in the early education (Lund et al., 2019; Olofsson et al., 2020).

In characterizing children's digital competence, the preschool teachers, further, highlighted the importance of integrating and combining analog and digital technologies. To develop children's digital competence in early education, thus, preschool teachers need more sophisticated skills where they can use both analog and digital technologies to create a lively learning space.

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