



Children's critical thinking skills: perceptions of Norwegian early childhood educators

Enrico Pollarolo, Ingunn Størksen, Tuula H. Skarstein & Natalia Kucirkova

To cite this article: Enrico Pollarolo, Ingunn Størksen, Tuula H. Skarstein & Natalia Kucirkova (2022): Children's critical thinking skills: perceptions of Norwegian early childhood educators, European Early Childhood Education Research Journal, DOI: [10.1080/1350293X.2022.2081349](https://doi.org/10.1080/1350293X.2022.2081349)

To link to this article: <https://doi.org/10.1080/1350293X.2022.2081349>



© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 30 May 2022.



Submit your article to this journal [↗](#)



Article views: 2966



View related articles [↗](#)







View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

Children's critical thinking skills: perceptions of Norwegian early childhood educators

Enrico Pollarolo ^a, Ingunn Størksen ^a, Tuula H. Skarstein ^b and Natalia Kucirkova ^a

^aNorwegian Centre for Learning Environment and Behavioural Research in Education, University of Stavanger, Stavanger, Norway; ^bDepartment of Early Childhood Education, University of Stavanger, Stavanger, Norway

ABSTRACT

The significance of learning to think critically from a young age is well documented. Early childhood educators play an essential role in children's critical skills development. Therefore, it is crucial to understand their perceptions of this concept. This qualitative study explored Norwegian early childhood educators' perceptions of critical thinking (CT). Ten educators representing three different kindergartens were interviewed. Thematic analyses revealed that the educators had many different understandings of CT; all agreed on the importance of CT for children's development and identified their role as essential in supporting and stimulating CT among children. They described CT more in relation to a child's dispositions and attitudes than cognitive skills and connected it mainly with social and physical aspects. Overall, this study contributes to raising awareness of the importance of supporting educators' knowledge about the CT concept and pedagogical approaches to enhancing CT in children.

KEYWORDS

Critical thinking; higher-order thinking; kindergarten; Norwegian early childhood educators; thematic analysis

Introduction

The importance of fostering and developing critical thinking (CT) in children from a young age (Lai 2011) has been widely discussed and endorsed in scholarship (Facione 2011; Lipman 1991). Education policy often highlights CT skills as an essential component of twenty-first-century skills – the set of skills needed to solve the challenges of a rapidly changing world and an unpredictable future (Wolff, Skarstein, and Skarstein 2020). CT competency is also one of UNESCO's key competencies in Education for Sustainable Development (Rieckmann 2018). Aligned with this vision is the 'Sustained Shared Thinking and Emotional Well-being' scale. This recognised quality assessment tool for early childhood education and care (ECEC) devotes part of the evaluation to children's higher-order thinking skills' support (Siraj, Kingston, and Melhuish 2015).

The centrality of the educator's role in enhancing and facilitating the development of CT is acknowledged (Pithers and Soden 2000). However, little is known about educators'

CONTACT Enrico Pollarolo  enrico.pollarolo@uis.no  Norwegian Centre for Learning Environment and Behavioural Research in Education, University of Stavanger, 4026, Stavanger, Norway

© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

own perceptions of children's CT more broadly and in Norwegian ECEC specifically. Despite extensive research on CT in education in general, few studies are concerned exclusively with children's CT in ECEC, and empirical research on CT in Norwegian ECEC has hitherto been minimal. The present study aimed to address this gap by exploring the Norwegian early childhood educators' perceptions of children's CT.

Definition of key terms

Building on previous definitions in the literature, the present article follows the definition of CT as a higher-order thinking skill involving both cognitive skills and dispositions (Facione et al. 1995; Lai 2011). According to Conklin (2011), higher-order thinking skills incorporate CT and creative thinking. CT is characterised by careful analysis and judgement (Conklin 2011). Moreover, CT has been defined as 'reflective and reasonable thinking that is focused on deciding what to believe or do' (Ennis 1985, 45) and can be regarded as the practical dimension of higher-order thinking (Ennis 1985).

Theoretical framework

The present study follows Vygotsky (1978) sociocultural learning theory, focusing on the role of social interaction in developing higher-order thinking skills (Allman 2020). For Vygotsky, higher mental functions originate in social activity, mediated by tools and signs (Hausfather 1996). When cultural signs become internalised, humans acquire the capacity for higher-order thinking (Huitt 2000). In Vygotsky's view of cognitive development, interaction between adults and children during joint production is indispensable for children's cognitive development. Thus, children engage in higher-order thinking through interaction and social activity (Hausfather 1996); in the ECEC context, educators play a crucial role in these interactions and activities with children.

Study background

Critical thinking requires that the individual have a certain core set of cognitive skills (e.g. analysis, interpretations, inference, explanation, evaluations and self-regulations) along with affective dispositions (Facione 1990). Among the most commonly cited thinking dispositions are habits of mind that can include fair- and open-mindedness, respect for others' viewpoints, inquisitiveness, flexibility, the desire to be well informed and the propensity to seek reason, (Lai 2011). Therefore, according to Facione (2011), the ideal critical thinker is characterised by both cognitive skills and these attitudes and dispositions, which may be regarded as their general approach to life. By developing CT skills and fostering these dispositions, it is possible to educate strong critical thinkers (Facione 2011) and lay the foundation for critical literacy's goal of recognising inequalities and injustices in order to move toward transformative action and social justice (Mulcahy 2008), which forms the basis of a rational and democratic society.

In addition to this wider societal need, there is a pragmatic need to understand the CT concept in Norway, given that it is featured in the Norwegian kindergarten curriculum (Ministry of Education and Research 2017). Although no full definition is provided, The Framework Plan includes three mentions of CT in relation to existential, ethical, and philosophical questions:

- (1) 'Kindergartens shall foster the children's ability to think critically, act ethically and show solidarity' (10);
- (2) 'Kindergartens shall use interaction, dialogue, play, and exploration to help the children develop critical thinking, ethical judgment and an ability to put up resistance and take action to effect change' (21); and
- (3) 'By talking about and wondering at existential, ethical and philosophical questions, the children shall be enabled to formulate questions, listen to others, reflect and find answers. This way, kindergartens shall help steer the children towards critical thinking and sound judgement.' (54) (Ministry of Education and Research 2017).

Our study aims to provide insight into these concepts from kindergarten teachers' perspectives.

CT research has hitherto focused on older children. A Canadian study examined educators' understanding of CT and higher-order thinking from kindergarten to grade 9 and found that the educators regarded CT as an essential skill but also showed a limited understanding of the term (Schulz and FitzPatrick 2016). Another study found that CT development in children aged 4–12 years occurred through a process of fading and appropriation/transformation that can be associated with 'scaffolding' (Daniel and Gagnon 2011). CT has also been linked with the Reggio Emilia approach (Fernández-Santín and Feliu-Torruella 2020). In the Norwegian context, several studies have focused on how to develop CT at school level, (e.g. Børhaug 2014; Elm Fristorp and Roos 2014; Wagner 2019). To the best of our knowledge, only one Norwegian study has addressed CT in kindergarten (Hognestad 2015). That study highlighted the importance of children's active participation in CT and the social practice of thinking.

Recognising the importance of being able to think critically from a young age, as underlined in the literature and in curriculum materials, and given the lack of research on CT in ECEC, our study set out to address the following research question:

What are Norwegian educators' perceptions concerning critical thinking (CT) in ECEC?

Method

Participants

The invitation to participate in the study was sent to three ECEC centres that had previously collaborated with the University of Stavanger. All educators in these centres, who worked with children aged between 4 and 6, were given information about the study. Informed consent to participate in a semi-structured interview was obtained from the educators. In particular, they were assured that the material would be anonymised in all publications relating to the project and that the data would be treated with a high level of confidentiality. Ten educators from three centres responded positively. Eight were pedagogical leaders, and two were ECEC educators working with children with special needs. The participants had worked in ECEC centres for an average of 17 years (minimum 1.5 years; maximum 35 years). Ethical considerations were presented to and approved by the Norwegian Center for Research Data (NSD).

Study procedure

The interview questions were developed and tested through three pilot interviews with ECEC professionals working at the University of Stavanger, all of whom had experience as ECEC educators. The interview questions were adjusted and refined based on their feedback (Appendix A).

To give the ten participants an opportunity to reflect on the interview questions in advance, the questions were sent to them several days in advance of the interviews. The first half of the interview focused on educators' perceptions of CT, and the second half focused on the role of mathematics as a stimulus for children's critical thinking skills. The questions were designed to align with the themes set out in the Framework Plan (Ministry of Education and Research 2017). Owing to the volume of data collected, this article focuses on educators' understanding, approach and perceptions about CT, leaving the theme of mathematics for a future article.

Interviews

The interviews were carried out in person at ECEC centres and lasted 30 min on average, from 20 min up to one hour, depending on the responses. The interviews were audio-recorded and transcribed. The transcripts were proofread to check for any incongruence between the audio recordings and the transcriptions. Participating educators were presented with their interviews in transcribed form to verify that the content was as intended.

Analysis

The interview transcriptions were subjected to thematic analysis (Braun and Clarke 2012) using NVivo 12. The first step of the analysis involved familiarisation with the data, which had already begun during the transcription phase. After the transcripts were validated, notes were taken during multiple readings. Finally, the data were systematically analysed, beginning with data coding. While an inductive approach was generally applied, it is worth emphasising that it is impossible to be purely inductive; researchers always bring their own notions to data analyses to some extent (Braun and Clarke 2012).

The data were coded according to four elemental coding methods (Saldaña 2021): descriptive, in vivo, process, and concept coding. These elemental methods were effective in assigning labels to the data. They were found to be appropriate for identifying concepts and ascribing meaning to the data. Initially, around 140 codes were identified. After the first author conducted the initial analyses, two more authors joined the analysis process. Following several consultations between the researchers during the process of defining and reviewing the themes, the final themes were identified.

Quotations from the transcripts were selected as illustrative examples for each theme. The quotations have been translated from Norwegian to English with considerable effort to preserve the participants' original meanings as far as possible. At times, however, it was necessary sentence structure needed to be altered for readability. The ellipses in parentheses represent parts of the transcriptions that were added for enhanced understanding of

the meaning. The participants' names were anonymised, and educators 1–10 were labelled E1–10 in the presented results.

Findings

The data analysis resulted in three main themes, each with four or five sub-themes, as detailed in Figure 1.

- 'CT is so many different things'. Diverse definitions of CT
- 'I think it means everything'. The importance of CT
- 'Awareness of our role is very important'. Educators' role

'CT is so many different things'. Diverse definitions of CT

Participants had diverse understandings of CT, as illustrated by the following quotes. Several educators identified and connected CT with the propensity to listen to other perspectives. For example, E6 explained, '(CT is) about seeing different perspectives or having different perspectives (...) so they (children) understand that others have a different point of view to theirs'. Educators emphasised that CT is closely related to the habit of being open to other people's ideas and mindsets. E10 said, '(CT means being) allowed to be myself and be confident in oneself, but at the same time provide room for others to be themselves.'

Several educators have reported that CT is also based on the concept of 'wondering together.' The Norwegian word 'wonder' encompasses a deep meaning connected to the ability to be open, the aptitude to be surprised and disposed to reflect and ask oneself about things and marvel at something. As E1 said, 'Every time we challenge children, talk with them, wonder together, it facilitates CT.' Educators perceive CT as the ability to reflect and wonder together and to learn to think for oneself and wonder what the answer to a question might be.

Participants often mentioned the idea of challenging children with open-ended questions. E7 said, 'It is good if they can wonder about the things we do, we ask them wondering questions, ... , Why do we do this?' while E9 indicated, 'It is to wonder with the children, to reason forward to something together, with open-ended questions.'

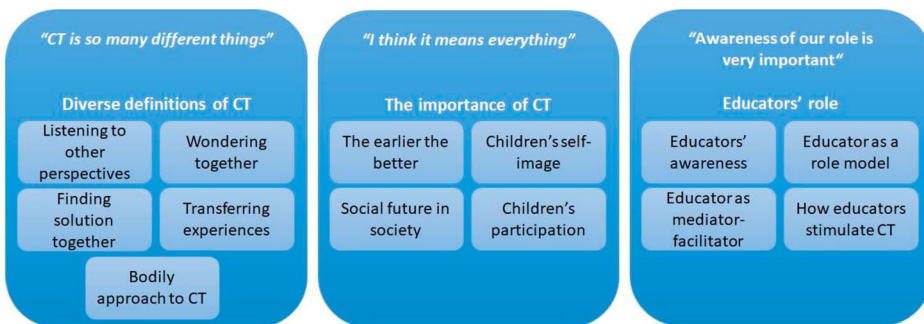


Figure 1. Themes and sub-themes established during the analysis of the semi-structured interviews.

Several educators also believed that the attitude of being respectful of others' ideas and perspectives helps children develop the ability to work together to find solutions. Thus, the educators perceived a connection between CT and the ability to apply different approaches to find solutions together. E1 reflected on this idea: *'If we cooperate, we should consider our approach. What benefits you, what benefits me and us as a team?'* E5 expressed that CT *'is to teach them there is no single answer, but many ways to arrive at the same conclusion.'*

While identifying CT skills with problem-solving abilities, E5 also indicated a link between the development of CT and the importance of supporting children in developing their ability to transfer what they have learned to new experiences: *'What they learn in one setting, they can apply in a new setting.'* E6 emphasised the value of CT in the development of new transferable skills and their application – for example, by using building techniques acquired from the sandbox to new constructions with Lego. For E8, thinking critically means analysing and interpreting personal experiences: *'When a person thinks critically, they analyse and interpret experiences of episodes that they have experienced.'*

The findings suggest that some educators also identified a physical and experiential approach to CT, disconnecting it from an abstract idea. Referring to very young children, E3 said,

I think all kinds of learning for very young children happen through the body; they learn with their body, they are very physical. So, I think that CT is very experimental, very physical, and not so abstract. (...) they must grasp, touch, grasp to comprehend.

In line with this idea, educators identified embodied learning as important in the development of CT: *'When children are allowed to experience the world through their body and risky play ... there is a lot of CT in that'* (E4). E6 said, *'To discover that the knowledge or learning you are confident in is embodied; it has become a part of the working memory, and then we build on this.'*

'I think it means everything'. The importance of CT

The participants all agreed on the relevance of CT and reflected on the importance of beginning to stimulate CT development in early childhood education. As E8 observed, *'Actually, the first thing I kind of thought was the earlier, the better'*. E2 connected this need with future education: *'It will be a very useful skill for children to bring with them as they start school, (...) therefore it is important that we in kindergarten start already now'*.

Educators expressed that CT is essential for children's identity and social development. Educators believe that supporting CT lays the foundation for children's social functioning and contributes to society itself. They noted that supporting children's CT helped them in constructing their self-image. E9 explained that it is important for children's self-image *'that they dare to say their opinion and stand for it'*. The educators believed that developing the ability to think critically imbues children with greater confidence in revealing their authentic selves and to have the courage to stand for something they believe in. As E4 also observed, *'I think it certainly plays a big role, (...), that they are robust, they dare to show who they are, that they dare to stand for something they mean'*. In this context, educators believe that children must be taken seriously and encouraged to express their opinions.

In educators' experience, CT is thus relevant for children's future social development. E1 said, *'I also think that in societies out there we have more and more use for critical thinking. (...) I think it's very important because they are citizens going out into the world.'* The development of CT skills in ECEC *'helps them later in life when they have to learn to be independent, discuss with others, and find solutions to things that happen in life'* (E7). For the educators, CT skills are abilities that children will carry with them throughout their lives: *'to take it with you further in life, in school, in society, ... to contribute to society'* (E5).

As mentioned in relation to the previous theme, the educators believe that awareness of their own thoughts and values helps children to understand that other children and adults may have opinions that differ from theirs. Thus, CT skills develop thanks to those abilities of cooperation that are indispensable when we encounter others' points of view: *'It's about being aware of one's own thoughts and values actually, because you also meet other people'* (E6). E1 said, *'We have a problem, (...), and then we have to help each other to help solve this in different ways'*.

In this context, the findings reveal that the educators identified conflict situations as a key arena for working with and developing CT skills: *'We talk to both parties, they are allowed to tell their version, and we ask more open-ended questions, how they think the other child is feeling'* (E4). E8 further observed,

They disagree on things, so I think it's so important that we intervene, and we emphasise that we tell both sides of the story ... we do not just say «now you have to stop» and then they can go out to play ... we explain to the kids (...), and then they learn, looking a little bit at both sides of the issue.

Several of the present study's participants also expressed that building and stimulating CT in children means involving them in decision-making processes and encouraging their participation: *'They are allowed to be in the process, to be involved and decide, and so you ask them "What do you think? What do you want?"'* (E8). E10, for example, stated, *'Not having a very tight programme, I think is important ... being able to have enough time through everyday life and take the children with you, and to let them choose, maybe through free play.'*

'Awareness of our role is very important'. Educator's role

Educators identify their role as essential when it comes to supporting and stimulating CT among children. First, educators acknowledge that they must be aware of the importance of focusing on the children and remaining open to their questions and reflections. Educators described the importance of their awareness and of being conscious of the need to *'be vigilant about what concerns children, it is most important, all the time. Not necessarily to sit with them and teach, but that you are, in a way, awake to questions'* (E2). Many of the educators emphasised the importance of being open to questions from children as well as open to their reflections and experiences. Again, E2 noted, *'We are conscious of being open to those questions and of getting them to reflect on themselves, to arrive at common and possible answers.'* Educators reported that it was important not to provide answers right away but to support the children in finding them. E4 said, *'I think it is very important that we are open to what the children convey, that we do not*

give them an answer right away but that we help them find a solution. We must ask them the open-ended questions'. At the same time, educators must 'be present, to be where the children are, (...) when they show interest, to create wonder and curiosity' (E5), not only physically but also in terms of awareness of the children's interests. The teacher must express their interest and take the children seriously: 'Take children seriously, be interested, be accommodating, show initiative, listen, we are very, very, present' (E4).

In the process of identifying themselves as facilitators, educators also reported the necessity of following and supporting children's interests. In doing so, educators recognised their role as motivators and models and essential in supporting children's CT. E1 said, *'Awareness of our role is very important.'* E3 had a similar view: *'We adults become very important role models.'*

Many educators identified the practice of asking open-ended questions as key to working with and supporting CT: *'I think that when we ask them such open-ended questions, they get to think critically themselves.'* (E4) Asking open-ended questions in everyday situations is among the most frequently suggested approaches to stimulate CT. E1 summarised as follows:

I think that there are situations that we experience in kindergarten during the whole day. There are probably a hundred different situations that we experience implicitly. Every time we challenge children, talk to them, wonder at the same thing, it facilitates critical thinking.

Discussion

Our results verify that the participants identified CT as encompassing various dispositions and attitudes (e.g. the propensity to listen to other perspectives) and the mental habit of being open to and respectful of diverse viewpoints. According to the literature review presented by Lai (2011, 2), dispositions and attitudes, such as 'open- and fair-mindedness, inquisitiveness, flexibility, a propensity to seek reason, a desire to be well informed, and a respect for and willingness to entertain diverse viewpoints' together with cognitive skills constitute CT. In this respect, the connection between CT and the ability to wonder formulated by educators is also consistent with the participants' ideas of CT dispositions and attitudes. The development of an inquisitive approach in children, stimulating their curiosity and sense of wonder, is central to the Framework Plan (Ministry of Education and Research 2017). Educators recognised these important aspects of CT as essential dispositions, and these dispositions have also been acknowledged in research as important to the ideal critical thinker (Facione 1990, 2011; Facione et al. 1995). However, research defines the ideal critical thinker as characterised by these dispositions and a set of cognitive skills that constitute the core skills for CT. These skills include the ability to engage in cognitive analysis, interpretation inference, evaluation explanation and self-regulation (intended as self-examination and self-correction) (Facione 1990, 2011; Facione et al. 1995). These cognitive skills are in line with the top levels of the categories of cognitive process dimensions (analyse, evaluate, create) in Bloom's revised taxonomy, a scheme for classifying educational goals and objectives (Krathwohl 2002). The present study's findings demonstrate that educators associate CT in ECEC more explicitly with children's personal dispositions than with their

cognitive skills. Although participants emphasise different analytical approaches to solving a given problem (Facione 2011), other CT cognitive skills are given less emphasis. This may reflect the Framework Plans approach, wherein these core CT cognitive skills are assigned less weight than dispositions and attitudes.

The relationship between CT cognitive skills and CT disposition has been studied in different educational fields (Profetto-McGrath 2003; Yang and Chou 2008). Results from these studies found a lower level in CT cognitive skills and a higher level in CT disposition among baccalaureate nursing students (Profetto-McGrath 2003). It has also been demonstrated that an improvement in CT cognitive skills reinforces CT disposition (Yang and Chou 2008). Nonetheless, increased CT disposition does not enhance an individual's CT cognitive skills. As noted, although the participants did not appear to refer directly to cognitive skills, they associated the concept of CT with the ability to solve problems and transfer skills to other contexts. According to Mayer and Wittrock (1996), problem-solving, thinking, and reasoning are interchangeable terms. For example, CT evaluates ideas that could be used to solve a problem, and transfer is the ability to use what was learned to solve new problems. However, the debate on the possibility of transferring CT skills from one domain to another is still open, and there is different empirical evidence that documents both success and failure in the attempt to transfer CT skills and abilities (Lai 2011).

The educators' assertion that introducing children to CT practices from an early age can help them in their educational development and help them encounter the world critically reflects research by Aizikovitsh-Udi and Cheng (2015) demonstrating the importance of the educator's consistent and systematic promotion of CT in their classes to help students practice and develop their CT skills. Jensen (2005) also found that children's early exposure to quality CT skills can stimulate more sophisticated thinking skills in the future.

CT skills and social-emotional learning are closely linked, and CT dispositions positively affect social-emotional learning (Arslan and Demirtas 2016). Research has also demonstrated that CT and self-regulation are positively related to social-emotional learning (Arslan 2018). This study's results appear to corroborate this. Conversely, while the participants emphasised the social and personal aspects while reflecting on CT's relevance to children's development, the participants did not mention the existential and philosophical aspects covered in the Framework Plan (Ministry of Education and Research 2017) during the interviews.

It was interesting that the participants perceived both conflict and collaborative situations as good opportunities for working on the development of children's CT abilities. Conflicts are experiences that can contribute to children's learning in terms of cognitive, social and moral development (Skoglund 2019). Supporting children in the process of explaining their reasons in conflict situations helps them develop consciousness with respect to their thinking and can stimulate their ability to think about thinking in a process often termed 'metacognition' (Conklin 2011). Collaborative learning also increases and promotes CT and, in particular, it fosters the development of CT through discussion, clarification of ideas and evaluation of others' ideas (Gokhale 1995; Karami, Pakmehr, and Aghili 2012).

Conflict and collaboration interactions recall Vygotsky (1978) and the educators' role not only in transmitting information but also in serving as facilitators for learning

(Gokhale 1995; Hanno, Jones, and Lesaux 2021). According to Vygotsky's (1978) socio-cultural theory, mediation plays a key role in cognitive development and effective learning; ECEC educators have the potential to make a significant impact through their role in the mediation process. Children must be active thinkers, and their educators must actively involve them in the thinking process (Conklin 2011). These ideas are interwoven with the concept of the teacher's role in the Reggio Emilia approach: as they observe the children, educators ask questions, discover the children's ideas, hypotheses and theories, and provide occasions for discovery and learning (Gandini 1993). Questions are key to higher-order thinking skills (Conklin 2011) as they are the most powerful teaching tools for increasing the quality of instruction. Questions that require high-level thinking, such as open-ended questions designed to support or exercise children in thinking and problem-solving (Siraj, Kingston, and Melhuish 2015), can foster CT skills in children (Nappi 2017).

Finally, while the Framework Plan (Ministry of Education and Research 2017, 54) suggests existential, ethical and philosophical questions as means of stimulating CT skills, the participants in this study appeared to be more focused on the problem-solving, transference, and social and physical aspects of CT. This is in accordance with research demonstrating that it is more common to associate problem-solving approaches with higher-order thinking skills in education, whereas from a philosophical perspective, it is more common to endorse CT and logical reasoning (Lewis & Smith 1993; Resnick 1987).

Study limitations and future directions

According to the Framework Plan, ECEC centres should help children to develop the ability to think critically, and all the interviewed educators perceived CT as essential in ECEC. They characterised it in connection with various dispositions and attitudes and considered their role to be essential as a form of mediation, supporting children as facilitators. Future research could further explore this heightened attention towards dispositions rather than children's cognitive skills when exploring educators' perspectives on CT. It would also be interesting to investigate whether the Vygotskian theoretical conceptualisation of educators as facilitators who ask open-ended questions and support children in realising their potential is the most helpful theory for understanding the relationships between ECEC educators' perspectives and CT.

Overall, our results represent the perspectives of a small group of Norwegian ECEC educators, who may have responded from a best-practice perspective. With no documentation of their actual practice in kindergarten, we cannot determine the extent to which their perspectives are reflected in their activities with the children. Nevertheless, the study offers insights into how Norwegian early childhood educators approach the concept of CT and contributes to expanding the discussion on the need to stimulate CT in young children.

Acknowledgements

We wish to thank all the participating educators. We also thank Ragnhild Lenes, Svanaug Lunde, and Thomas Hammerø Lund for their support in refining the interview questions. Special thanks

are due to Hege Cecilie Nygaard Barker for her assistance in the transcription and translation activities. This study was funded by the Research Council of Norway (RCN) through grant number 275576 (FILIORUM).

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Enrico Pollarolo  <http://orcid.org/0000-0002-0458-9559>

Ingunn Størksen  <http://orcid.org/0000-0002-2258-1788>

Tuula H. Skarstein  <http://orcid.org/0000-0002-1673-1129>

Natalia Kucirkova  <http://orcid.org/0000-0002-2805-1745>

References

- Aizikovitsh-Udi, E., and D. Cheng. 2015. "Developing Critical Thinking Skills from Dispositions to Abilities: Mathematics Education from Early Childhood to High School." *Creative Education* 06 (04): 455–462. doi:10.4236/ce.2015.64045.
- Allman, B. 2020. "Socioculturalism." In *The Students' Guide to Learning Design and Research*, edited by R. Kimmons, and S. Caskurlu, 44–53. Retrieved from <https://edtechbooks.org/studentguide/socioculturalism>: EdTech Books.
- Arslan, S. 2018. "Social Emotional Learning and Self-Regulation: The Mediating Role of Critical Thinking." *International Journal of Learning and Change* 10 (2): 101–112.
- Arslan, S., and Z. Demirtas. 2016. "Social Emotional Learning and Critical Thinking Disposition." *Studia Psychologica* 58 (4): 276. doi:10.21909/sp.2016.04.723.
- Børhaug, K. 2014. "Selective Critical Thinking: A Textbook Analysis of Education for Critical Thinking in Norwegian Social Studies." *Policy Futures in Education* 12 (3): 431–444. doi:10.2304/pfie.2014.12.3.431.
- Braun, V., and V. Clarke. 2012. "Thematic Analysis." In *APA Handbook of Research Methods in Psychology, Vol 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological*, edited by I. H. Cooper, 57–71. Washington, DC: American Psychological Association. doi:10.1037/13620-004.
- Conklin, W. 2011. *Higher-order Thinking Skills to Develop 21st Century Learners*. Huntington Beach: Shell Education.
- Daniel, M.-F., and M. Gagnon. 2011. "Developmental Process of Dialogical Critical Thinking in Groups of Pupils Aged 4 to 12 Years." *Creative Education* 02 (05): 418. doi:10.4236/ce.2011.25061.
- Elm Fristorp, A., and M. Roos. 2014. "Training Skills in Critical Thinking in Teacher Education in Norway and Sweden? A Comparative Analysis." Teachers matters-But How?, linnaeus university, växjö, Sweden, 23-24 Oct., 2014.
- Ennis, R. H. 1985. "A Logical Basis for Measuring Critical Thinking Skills." *Educational Leadership* 43 (2): 44–48.
- Facione. 1990. *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction (The Delphi Report)*. Millbrae, CA: The California Academic Press.
- Facione. 2011. "Critical Thinking: What it is and why it Counts." *Insight Assessment* 2007 (1): 1–23.
- Facione, S., A. Carol, N. C. Facione, and J. Gainen. 1995. "The Disposition Toward Critical Thinking." *The Journal of General Education* 44 (1): 1–25.

- Fernández-Santín, M., and M. Feliu-Torruella. 2020. "Developing Critical Thinking in Early Childhood Through the Philosophy of Reggio Emilia." *Thinking Skills and Creativity* 37: 100686. doi:10.1016/j.tsc.2020.100686.
- Gandini, L. 1993. "Fundamentals of the Reggio Emilia Approach to Early Childhood Education." *Young Children* 49 (1): 4–8.
- Gokhale, A. A. 1995. "Collaborative Learning Enhances Critical Thinking." *Journal of Technology Education* 7 (1): 23–30.
- Hanno, E. C., S. M. Jones, and N. K. Lesaux. 2021. "Back to Basics: Developmental Catalysts of Quality Improvement in Early Education and Care." *Policy Insights from the Behavioral and Brain Sciences* 8 (2): 200–207. doi:10.1177/23727322211032258.
- Hausfather, S. J. 1996. "Vygotsky and Schooling: Creating a Social Context for Learning." *Action in Teacher Education* 18 (2): 1–10.
- Hognestad, M. B. K. 2015. "Critical Thinking in Kindergarten." *EDUCACIÓN Y CIENCIA* 18: 57–68. doi:10.19053/01207105.5335.
- Huitt, W. G. 2000. *A Constructivistic Approach to Learning [PowerPoint]*. Valdosta: Valdosta State University.
- Jensen, E. 2005. *Teaching with the Brain in Mind*. (2nd ed). Alexandria VA: Association for Supervision and Curriculum Development.
- Karami, M., H. Pakmehr, and A. Aghili. 2012. "Another View to Importance of Teaching Methods in Curriculum: Collaborative Learning and Students' Critical Thinking Disposition." *Procedia - Social and Behavioral Sciences* 46: 3266–3270. doi:10.1016/j.sbspro.2012.06.048.
- Krathwohl, D. R. 2002. "A Revision of Bloom's Taxonomy: An Overview." *Theory Into Practice* 41 (4): 212–218.
- Lai, E. R. 2011. "Critical Thinking: A Literature Review." *Pearson's Research Reports* 6 (1): 40–41.
- Lewis, A, and D Smith. 1993. "Defining Higher Order Thinking." *Theory Into Practice* 32 (3): 131–137.
- Lipman, M. 1991. *Thinking in Education*. Cambridge: Cambridge University Press.
- Mayer, R. E., and M. C. Wittrock. 1996. "Problem-solving Transfer." In D. Berliner & R. Calfee (Eds.), *Handbook of Educational Psychology*, 47–62. New York: Macmillan.
- Mulcahy, C. M. 2008. "Chapter 1: The Tangled web we Weave: Critical Literacy and Critical Thinking." *Counterpoints* 326: 15–27.
- Nappi, J. S. 2017. "The Importance of Questioning in Developing Critical Thinking Skills." *Delta Kappa Gamma Bulletin* 84 (1): 30.
- Pithers, R. T., and R. Soden. 2000. "Critical Thinking in Education: A Review." *Educational Research* 42 (3): 237–249. doi:10.1080/001318800440579.
- Profetto-McGrath, J. 2003. "The Relationship of Critical Thinking Skills and Critical Thinking Dispositions of Baccalaureate Nursing Students." *Journal of Advanced Nursing* 43 (6): 569–577. doi:10.1046/j.1365-2648.2003.02755.x.
- Research, M. o. E. a. 2017. *Framework Plan for the Content and Tasks of Kindergartens*. In: Norwegian Ministry of Education and Research Oslo.
- Resnick, L B. 1987. *Education and Learning to Think*. Washington, DC: National Academy Press.
- Rieckmann, M. 2018. "Learning to Transform the World: Key Competencies in Education for Sustainable Development." *Issues and Trends in Education for Sustainable Development* 39: 39–59.
- Saldaña, J. 2021. *The Coding Manual for Qualitative Researchers*. London: sage.
- Schulz, H. W., and B. FitzPatrick. 2016. "Teachers' Understandings of Critical and Higher Order Thinking and What This Means for Their Teaching and Assessments." *Alberta Journal of Educational Research* 62 (1): 61–86. doi:10.11575/ajer.v62i1.56168.
- Siraj, I., D. Kingston, and E. C. Melhuish. 2015. *Assessing Quality in Early Childhood Education and Care: Sustained Shared Thinking and Emotional Well-Being (SSTEW) Scale for 2–5-Year-Olds Provision*. Stoke-on-Trent: Trentham Books.
- Skoglund, R. I. 2019. "When" Words Do Not Work": Intervening in Children's Conflicts in Kindergarten." *International Research in Early Childhood Education* 9 (1): 23–38.

- Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.
- Wagner, D.-A. 2019. "Critical Thinking and use of Film in Norwegian Lower Secondary History Classrooms." *History Education Research Journal* 16 (2): 274–290.
- Wolff, L.-A., T. H. Skarstein, and F. Skarstein. 2020. "The Mission of Early Childhood Education in the Anthropocene." *Education Sciences* 10 (2): 27. doi:[10.3390/educsci10020027](https://doi.org/10.3390/educsci10020027).
- Yang, Y. T. C., and H. A. Chou. 2008. "Beyond Critical Thinking Skills: Investigating the Relationship Between Critical Thinking Skills and Dispositions Through Different Online Instructional Strategies." *British Journal of Educational Technology* 39 (4): 666–684. doi:[10.1111/j.1467-8535.2007.00767.x](https://doi.org/10.1111/j.1467-8535.2007.00767.x).

Appendix: Interview guide

- (1) How many years of teaching experience do you have?
- (2) What is your understanding of critical thinking? What does this term mean in the context of young children, particularly in relation to the Framework Plan. What do you think?
- (3) Given what you have just said, do you think that some are more important than others when it comes to these skills? Why?
- (4) What role do you think these skills play in the daily activities of kindergarten? What is your opinion about supporting children's critical thinking in kindergarten?
- (5) How can children benefit from being stimulated to reason, argue and seek solutions in kindergarten?
- (6) How can kindergarten teachers work to support and stimulate these skills?
- (7) Are there any special activities you or other employees in the kindergarten carry out in the kindergarten to stimulate children's thinking?