frontiers in Education

ORIGINAL RESEARCH
published: 24 September 2021
doi: 10.3389/feduc.2021.732373

Exploring Formative Assessment and Co-Regulation in Kindergarten Through Interviews and Direct Observation

Heather Braund[1]*, *Christopher DeLuca*[1], *Ernesto Panadero*[2,3] and *Liying Cheng*[1]

[1]Assessment and Evaluation Group, Faculty of Education, Queen's University, Kingston, ON, Canada, [2]Faculty of Psychology and Education, Deusto University, Bilbao, Spain, [3]IKERBASQUE Basque Foundation for Science, Bilbao, Spain

Formative assessment practices have been theoretically connected to the development of self-regulation with mounting empirical evidence. Co-regulation is the process whereby a more capable individual (e.g., teacher or peer) attunes the behaviours, emotions, or cognitive processes of an individual (a student) to align with goals or expectations and is being recognized as a strategy for developing self-regulation. Formative assessment practices may facilitate co-regulation, however, much of the literature has focused on older student populations. This phenomenological study explored the relationship between formative assessment and co-regulation in eight Kindergarten classrooms. Eight Kindergarten teachers and four Early Childhood Educators (ECE) completed semi-structured interviews in 2019 during two time periods with each participant completing two interviews. To supplement the interviews, 56 h of classroom observations were completed in each classroom, totaling 448 h of observations across eight classrooms. Interviews were audio-recorded and transcribed verbatim. Qualitative data were analyzed thematically. Four themes emerged: 1) Authentic assessment and self-regulation practices, 2) Feedback as foundational, 3) Formative assessment and co-regulation have shared purposes, and 4) Connections between classroom assessment and co-regulation. Participants described their classroom assessment and self-regulation practices as authentic and natural for students while also providing examples of their interactions with students as a form of co-regulation. Feedback was articulated as foundational to both classroom assessment and co-regulation. Participants illustrated examples of feedback from peers (including through modified peer-assessment). Shared purposes between formative assessment and co-regulation placed students at the centre of the learning process, encouraging agentic behaviours, and scaffolding student thinking. The final theme underlined the need to broaden conceptualizations of assessment in Kindergarten. Findings suggested student agency as the bridge between classroom assessment and co-regulation, and a bidirectional, mutually supportive, relationship between formative assessment and co-regulation.

Keywords: classroom assessment, co-regulation, formative assessment, kindergarten, phenomenology

OPEN ACCESS

Edited by:
Kelly Beekman,
Fontys University of Applied Sciences, Netherlands

Reviewed by:
Desirée Joosten-ten Brinke,
Open University of the Netherlands, Netherlands
Lisette Wijnia,
Open University of the Netherlands, Netherlands

***Correspondence:**
Heather Braund
hlab@queensu.ca

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *29 June 2021*
Accepted: *06 September 2021*
Published: *24 September 2021*

Citation:
Braund H, DeLuca C, Panadero E and Cheng L (2021) Exploring Formative Assessment and Co-Regulation in Kindergarten Through Interviews and Direct Observation. Front. Educ. 6:732373. doi: 10.3389/feduc.2021.732373

INTRODUCTION

Regulation of behaviours during childhood is foundational to success throughout school and in life as self-regulatory behaviours have the potential to impact academic achievement, mental wellbeing, interpersonal behaviours, and healthy behaviours (Robson et al., 2020). Self-regulation is the process of an individual controlling their thoughts, emotions, and behaviours to meet their goals (Zimmerman, 2000; McClelland and Cameron, 2012). Research in the early years has identified a positive relationship between self-regulatory behaviours and academic achievement including literacy (Ponitz et al., 2009; Dice and Schwanenflugel, 2012; Lonigan et al., 2017) and mathematics (Blair and Razza, 2007; Ponitz et al., 2009; Birgisdottir et al., 2020). The following introduction will outline self-regulation and co-regulation in the early years followed by a description of how formative assessment and co-regulation are connected.

Self-Regulation and Co-Regulation in Early Years

There is a growing understanding that the development of self-regulation is particularly crucial during childhood, specifically, the first 5 years (Calkins, 2007; McCain et al., 2011). This understanding has facilitated an interest in exploring the development and measurement of self-regulation in early years contexts (Ponitz et al., 2008; Whitebread et al., 2009; McClelland and Cameron, 2012; Whitebread and O'Sullivan, 2012). The field of self-regulation is not without its limitations, including lack of conceptual clarity (McClelland and Cameron, 2012; Nigg, 2017) and a lack of diverse measures (Duckworth and Kern, 2011). Yet, despite these limitations, there has been increased interest in measuring and scaffolding the development of self-regulation in young children (Whitebread et al., 2009; Perry, 2019; Zakszeski et al., 2020).

Drawing on the role of others in shaping one's regulation, a subset of self-regulation research has now focused on the facilitation of co-regulation, which is a scaffolded approach necessary for young children to help them with developing their self-regulation (Rasku-Puttonen et al., 2003; Warwick et al., 2013). More specifically, co-regulation can be defined as the process whereby an individual (e.g., teacher, peer, or guardian) who is usually more capable in the task attunes the behaviours, emotions, or cognitive processes of an individual to align with goals or expectations (Colman et al., 2006; Volet et al., 2009; Kurki et al., 2016; Pauen, 2016). It is gradually through this process where the ability to regulate is transferred to the learner from the individual who is more competent at the task as they share the regulation process which helps to lessen the learning challenges experienced by the learner (Hadwin and Oshige, 2011). Co-regulation may be even more beneficial at the Kindergarten level by decreasing the cognitive demands placed on young learners through the provision of metacognitive language, strategies, and opportunities to practice regulating their thoughts, behaviours, and emotions with ongoing feedback (Silkenbeumer et al., 2018).

Some early years research has identified key co-regulation behaviours used to develop co-regulation. For example, in one study, part of the co-regulation of emotions included recognizing and naming emotions expressed by children in distress and giving them strategies to help regulate their emotions (Guo et al., 2015). Further, other important behaviours include coaching and modelling (Murray et al., 2015). Lastly, first-grade teachers also reported the need to acknowledge children's emotion and have a conversation with them about their actions (Kostøl and Cameron, 2020). All these actions help the learner to internalize the co-regulation strategies they experienced. This internalization is believed to be the primary system responsible for transforming from co-regulation into self-regulation (Demetriou, 2000). However, Allal (2020) posits that students never transition out of co-regulation but rather as their capacity to regulate develops, they engage in more complex co-regulation processes.

Research has demonstrated the role that parents, or guardians play in supporting self-regulatory development (Kopp, 1982; Bernier et al., 2010; Kiss et al., 2014). Similarly, previous research suggests that peers play a crucial role in the development of self-regulation (Montroy et al., 2016). Teachers can also help to facilitate the development of self-regulation (Duncan et al., 2018). Given that young children need a lot of direct support with developing their emotional regulation, one study lead by Silkenbeumer and others (2018) showcased how nine preschool teachers used co-regulation to support the development of emotional regulation in their students (ages 4–6). More specifically, teachers used metacognitive prompts and coached the children towards being able to regulate their emotions. Findings from the study also suggested that teachers had to change their co-regulation practices depending upon the developmental trajectories of the students suggesting that a one size approach to co-regulation is inappropriate (Silkenbeumer et al., 2018). Importantly, Allal (2020) emphasized the role that formative assessment activities play in the regulation of learning, as has been supported by plenty of other scholars (for a review Panadero et al., 2018). Therefore, next we expand on these connections.

Connecting Formative Assessment and Co-Regulation

Research suggests that classroom assessment practices can facilitate the development of self-regulation by involving students as active agents in their learning (Wiliam, 2011; Earl, 2013; Andrade and Brookhart, 2016; Panadero et al., 2016; Panadero et al., 2018; Panadero and Alonso-Tapia, 2013; DeLuca et al., 2019). Classroom assessment is the process of gathering evidence about student learning, but it is the way in which the gathered evidence is used that makes it either formative or summative (Black, 2013). Formative assessment is the process of gathering data about student learning, which results in feedback to adjust instruction and inform student learning. It is important to note that both teachers and students can be active agents throughout formative assessment (Black and Wiliam, 1998; Assessment Reform Group, 2002).

A framework connecting co-regulation and formative assessment through three sources of regulation was developed by Allal (2007). The first source of regulation relates to the

structure of teaching and learning which involved the grouping of students (e.g., small group or partners), learning goals, and curricular materials. The second source of regulation is comprised of interactions between teachers and students including any adaptations made to their teaching practices or learning activities. The third source of regulation centres around student interactions such as their conversations and feedback. The model was further extended to suggest that students are constantly involved in co-regulation through different mechanisms such as the interactions with their peers. This extension acknowledges the role of social interactions and suggests less of a focus on individual development of self-regulation (Allal, 2020). This extension is helpful when considering the role of social development in Kindergarten because sometimes the role of assessment, as it is not so explicit at this educational level, might be overlooked.

The Kindergarten context is an opportune environment to encourage these agentic behaviours through formative assessment practices given the importance of developing self-regulation behaviours early in a child's development. Further, teachers are uniquely positioned to be the more capable other in co-regulation processes. However, despite these articulated connections between co-regulation and classroom assessment, there is a need to enhance our theoretical and empirical support for these constructs (Allal, 2020; Brandmo et al., 2020). Therefore, this paper addresses the need to understand more deeply the relationship between co-regulation and formative assessment within an early years context including both teachers and early childhood educators (ECE). To achieve this, we explored the relationship between formative assessment and co-regulation in a sample of eight Kindergarten classrooms. This study was guided by two research questions 1) How do teachers and early childhood educators articulate the relationship between formative assessment and co-regulation? 2) How can formative assessment and co-regulation be leveraged to increase student agency?

METHODS

This qualitative study adopted a descriptive phenomenological approach (Dowling, 2007) to deeply understand the experiences of teachers and ECEs with formative assessment and co-regulation in Kindergarten. This approach centred on rich descriptions of the practices as reported by the participants and observed by the researcher (Davidsen, 2013). To maintain transparency and ensure methodological rigor, the Consolidated Criteria for Reporting Qualitative Research checklist was used. This 32-item checklist uses questions to prompt researchers about important components to report in qualitative research (Tong et al., 2007).

Context

Kindergarten programming differs across jurisdictions. In Ontario, a play-based approach to education underpins the Kindergarten program. In publicly funded elementary schools, students attend school every day for the full day. The Kindergarten program is organized around four frames: Belonging and Contributing, Self-Regulation and Well-Being, Demonstrating Literacy and Mathematics Behaviours, and Problem Solving and Innovating (OME, 2016a). The assessment practices are often used to make student thinking visible. The primary aim of assessment in Ontario Kindergarten classrooms is to support student learning and facilitate the development of self-regulation. Assessment data is typically collected using observations and documentation. This data can then be used to provide descriptive feedback to students to help them achieve their goals. Teachers look for evidence of growth when observing students and documenting their learning in relation to curricular expectations. Three formal reports are provided during a school year to describe student growth in learning (OME 2016b).

In Ontario, each Kindergarten classroom has a teaching team that includes one Kindergarten teacher paired with one registered ECE who are in the classroom full time. The goal is for the teacher and ECE to work collaboratively and as a partnership. Generally, the assessment responsibility falls to the teacher for formal reporting however, ideally the ECE is involved in gathering data about student learning and in construction of formal reports.

Participants

Eight Kindergarten teachers and four ECEs all self-identified as females participated in this study during the 2018–2019 year. Teachers and ECEs self-selected to participate as they were interested in self-regulation. Five of the teachers and one of the ECEs had additional support for self-regulation through an emotional literacy program. Only four ECEs agreed to participate across the 8 classrooms, thus there were not complete teaching pairs (an ECE and teacher) for each classroom.

The participants were recruited from one Ontario schoolboard, across five schools (including those within a city and one in the countryside) and across neighbourhoods with differing socioeconomic statuses. For the teachers, their years in practice varied from 6 months to 23 years. For the Early Childhood Educators (ECEs), their years in practice varied from 4 to 9 years. A summary of demographic information can be found in **Table 1**. Participants were recruited using snowball sampling whereby the recruitment notice was sent to the assessment and early years coordinators who then passed along the study information to principals and teachers within the school board. The participants were diverse and ranged in years of practice to help increase the likelihood that this sample was representative of other Kindergarten teachers and ECEs both within the school district and beyond. Participants provided informed written consent. Parents/guardians also provided their consent for classroom observations. No participants withdrew from the study.

Data Collection Procedures

Data collection consisted of Time 1 in the winter of 2019 and Time 2 in the Spring of 2019, with 12 weeks in between. This timing was intentional to capture changes in teacher and ECE assessment practices and development of student self-regulation. Further, this timing allowed for the researcher to probe about

TABLE 1 | Demographic data for participants.

Participant ID number	Years of experience	Gender	Early childhood educator (ECE) participated
1	9	Female	Yes (ECE1)
2	23	Female	Yes (ECE2)
3	11	Female	No
4	20	Female	Yes (ECE3)
5	14	Female	No
6	6 months	Female	No
7	8	Female	Yes (ECE4)
8	7	Female	No

practices that she had observed during the first time period. It is important to note that this study is part of a larger study and the evolution of practices and self-regulation will not be the focus of this paper. At the start of data collection, the researcher completed an eight-hour orientation day in each classroom observing the teacher, ECE, and the students which facilitated an understanding of the self-regulation and assessment practices within each classroom. Each time period consisted of 3 days within each classroom. The interviews were generally conducted on the third day following extended classroom observations for each time period. Therefore, a total of 16 interviews were conducted with teachers (one interview per teacher for each time period) and eight interviews with ECEs (one interview per ECE for each time period). At least 56 h were spent in each classroom (T1 = 32 h, T2 = 24 h) and overall, 448 h in kindergarten classrooms for data collection.

Six research assistants helped to collect data. All research assistants attended training days with the lead researcher to learn how to observe for assessment practices and strategies used to develop student's self-regulation and how to conduct interviews. Most interviews were conducted by the researcher however, a research assistant conducted the interview when there was a schedule conflict.

Measures

Two types of measures were used: interviews and classroom observations. The interviews were guided by a semi-structured interview protocol drafted for each time period (available in **Supplementary Appendix B**). The protocol for Time 1 aimed to understand their conceptions of assessment, self-regulation, and the relationship between the constructs. Whereas the interview protocol for Time 2 focused on documenting concrete examples of their assessment practices and strategies for developing student's self-regulation behaviours. The interview questions were piloted with four graduate students purposefully selected for their expertise in teaching, cognitive studies, early years education, and assessment using a think aloud protocol. This process was used to ensure that individuals understood the interview questions, to evaluate the flow of the interview protocol, to gauge a sense of how participants might respond to each question, and to identify areas for improving the interview protocol. Minor changes to the interview protocols were made including rewording of questions, changes to the sequence of questions, and addition of prompts. All interviews were audio-recorded and transcribed verbatim. The interviews ranged between 13 and 44 min with an average time of 41 min for the first time period and an average of 24 min for the second time period.

The classroom observations were focused on documenting examples of teacher's and peer's behaviours aimed at developing self-regulation. These observations followed a general running record format rather than a structured observation protocol. To support the notes, direct quotations were also captured as much as possible. Additionally, the observations also captured contextual information that may have been important to consider during the analysis process in alignment with anecdotal notes as suggested in the Growing Success: The Kindergarten Addendum (OME, 2016).

Data Analyses

Transcripts and classroom observations were uploaded into NVivo (Version 12) for coding. All data were analyzed using an inductive thematic approach (Braun and Clarke, 2006). Another researcher coded more than 20% of the data to ensure inter-coder reliability with an agreement level of 94%. This inter-coder reliability process included coding 3 transcripts from the ECE dataset and 2 from the teacher data set separately and then comparing our coding line by line. These transcripts were selected for their longer length and complex nature, to potentially maximize the breadth of the initial codebook. As noted by O'Connor and Joffe (2020), a common practice in qualitative research is for intercoder reliability to be performed for 10–25% of the total data, and for one researcher to code the rest of the data. Our intercoder reliability was over 90% after comparing the first 20% of the total data, leading the research team to feel comfortable with a single researcher coding the rest of the data, as long as measures were taken to mitigate bias, ensure researcher reflexivity, and involve the whole research team in the identification of emergent themes.

Although one researcher did the remainder (80%) of the open coding, the coding process continued to be a highly reflexive and iterative process between the single coder and the larger research team. Each transcript was coded individually with all segments of text assigned a code (open coding). After open coding was finished, multiple debriefs were held between both coders to plan axial coding (developing sub-themes) as well as selective coding (re-analysing sections of data with a focus on emergent sub-themes). These subthemes were then organized to form the

TABLE 2 | Overview of themes and subthemes. Please note that 'T' represents a teacher participant and ECE represents an early childhood educator.

Research question	Theme	Subthemes	Sample quotations
1. How do teachers and early childhood educators articulate the relationship between formative assessment and co-regulation?	1. Authentic assessment and self-regulation practices	a. Natural	"so in planning and assessment all together, when I say planning about all that stuff . . . there's always self-regulation and social skills and self-awareness involved, it's always happening every day" (T7, Time 1)
		b. Interactive	"If I'm looking for a specific "skill" I'll tailor those interactions so that I get the answers I'm looking for" (ECE2, Time 2)
		c. Developmentally appropriate	"I would say the play-based the play-based learning. It is better for self-regulation in my opinion because it's very natural, very fluid and, and the students aren't feeling the pressure of doing like a test. They're learning to naturally build on their, their natural focus and engaging in activities" (ECE3, Time 1)
	2. Feedback as foundational	a. From teacher and ECE	"And then I guess in assessment they're getting that ongoing assessment all of the time. For example, in writer's workshop today we would say "Okay in your next step it would be to maybe add a period. Or take away the uppercase letters in your sentence." So, they're getting ongoing assessment all day long in the form of feedback like conversations that are happening in the play (T3, Time 1)
		b. From peers	"The children understand that we use Funster (an application where students can add their work and provide reflections related to their work) as a self-reflective documentation piece and that what fills my bucket the most is when they notice the strengths and achievements of their peers more so than even their own accomplishments" (T3, Time 2)
2. How can formative assessment and co-regulation be leveraged to increase student agency?	3. Formative assessment and co-regulation have shared purposes	a. Students as active agents	"I think it would be cool to get them to think about asking them when we know when you did a good job on that. What do you like about, and why did you, or did you find that task easy? Did you find that task hard?" (T6, Time 2)
		b. Extend and scaffold student thinking	"I feel that eventually, students begin to internalize our dialogues and it helps them self-reflect on how they feel. For example, students LOVE our feelings meeting and will never let me forget it" (T7, Time 2)
	4. Connections between classroom assessment and co-regulation	a. Broadening conceptualizations of assessment	"Naming and explaining an array of emotions, strategies to handle them (important that this doesn't just happen in crisis-mode—we need to talk about being frustrated, really silly, sad, etc. before we are out-of-control) Helping students name the emotions they are feeling" (T7, Time 2)
		b. Student agency as a bridge between assessment and co-regulation	"...it's a work in progress to get kids to own what they're actually doing . . . and how much effort they're putting into things. If it's . . . recording of the snails in the little snail atrium or whether it's how they're talking to their friends. Like I think in order to self-assess, they have to sort of be aware, and also be able to accept that they've made mistakes or that they have room for growth. And so that's very individual. But I do try to get them to be accountable. However reluctant they are" (T4, Time 1)

broader patterns labeled as themes. The overall themes were mapped onto their corresponding research questions.

Final theme development was done in consultation with the research team. Overall, the only stage of coding that was truly done by a single coder was the open coding stage of 80% of the transcripts, and this was only done for pre-existing codes from the initial codebook that were verified by a high degree of intercoder reliability–all new codes, subthemes, and theme

development were formed in collaboration with the whole research team. Any new codes and emergent sub-themes were immediately recorded by the primary coder in a coding diary and shared with the research team for a critical review. A coding diary was maintained throughout every stage of the coding process to reflect on reasons for the new code/sub-theme, acknowledgement of potential biases, and other memos. Thematic saturation was reached after analyzing six of the eight teachers and after the third ECE.

Efforts to Increase Trustworthiness

Using multiple data sources and triangulating the themes across data sources help to increase the credibility for this study (McMillan and Schumacher, 2010; Creswell, 2013). Additionally, the researchers encouraged the participants to answer honestly and developed a rapport to reassure participants which enhances credibility (Shenton, 2004). All teacher participants were offered the opportunity to review summaries of their interviews as a means of member checking and to ensure appropriate interpretation of the data. Only one participant acknowledged receipt and approved the summary from their interviews. This process was not repeated for the ECEs given the lack of uptake from the teacher participants. For dependability, the researchers provided rich and detailed descriptions of the study design, data collection, and analyses. Lastly, the researcher maintained a reflexivity journal documenting her assumptions, biases, questions, and potential interpretations.

RESULTS

Four themes emerged from both sets of the data and are organized according to their corresponding research question. The themes identified answer each research question in efforts to provide clarity regarding the relationship between formative assessment and co-regulation. An overview of affiliated themes and subthemes organized according to their affiliated research question can be found in **Table 2**. Additional quotations and overall frequencies for each theme can be found in **Supplementary Appendix A** demonstrating how often the themes emerged across interviews and participant groups. Please note that in the section below "T" represents teacher, "ECE" represents an early childhood educator participant, and "CO" represents data collected from classroom observations.

Research Question 1: How do Teachers and Early Childhood Educators Articulate the Relationship Between Formative Assessment and Co-Regulation?

In order to answer the first research question, two main themes were identified: 1) Authentic assessment and self-regulation practices, and 2) Feedback as Foundational. Each theme will be described in greater detail below and include illustrative examples from interviews and observations to operationalize the relationship between formative assessment and co-regulation.

Theme 1: Authentic Assessment and Self-Regulation Practices

Most teachers and all ECEs emphasized that their classroom assessment and self-regulation practices needed to be authentic, interactive, and developmentally appropriate. Part of the authenticity included having assessment as a natural part of the classroom environment and relevant to the students. For most formative assessment, teachers did not remove students from their environment to assess. Rather, they tried to assess while students were engaged in play and learning. For example, this ECE described further, "and with our . . . with assessments, we're trying to do them very naturally. So, it's not like stressful for the children" (ECE3, Time 1). Another strategy that contributed to authentic assessment and self-regulation practices included planning for both to occur daily. All participants discussed how they incorporated student's interests which added authenticity.

There were also different levels of interaction across the eight classrooms. Some teachers regularly interacted with students whereas others sat back and observed the students with little interaction. The participants who interacted more with students tended to engage with them through co-regulation. Some interactions between participants and their students were as simple as asking students to explain their process. For example, one student was playing with blocks, so the teacher approached the student, took a picture, and asked, "What are you building? Can you tell me about it?" (T8, Time 1, CO). Another way that they interacted with students was through "noticing and naming" which is an assessment practice outlined in the Growing Success Ontario assessment policy. Teachers and ECEs would identify when a desired behaviour was occurring and name it back to the students. This assessment practice provided students with the language to identify their learning and verbalize it as they progressed. Further, this formative assessment practice facilitated co-regulation. Sometimes the examples of interaction were between peers but were originally facilitated by the teacher or ECE. One teacher highlighted the importance of co-regulation,

> . . . continue to help them and getting kids to help co-regulate we have amazing co regulators in here too. So, getting other children on board as well because just like learning (numbers) through play and learning oral language through play, children learned co-regulation and self-regulation through play as well ... (T7, Time 1).

Other times, these interactions occurred within the whole group. For example, Teacher 3 had a song for transitions that the class sang which emphasized that students were to be quiet and walk in a line with their hands at their sides among other things (CO, Time 1). Further, these interactions were facilitated by assessment practices such as the ongoing and regular observations described in this study.

Most participants described the benefits of learning through play given the young ages of Kindergarten students (between 4 and 5 years of age). Teachers and ECEs also discussed the impact on their assessment practices. This teacher explained further, "I think this way of assessing and instruction and play based

learning and child centered learning, inquiry learning and how that affects my assessment and reporting. I think that's going to trickle upward" (T7, Time 1). The need for practices to be developmentally appropriate was also mentioned. An example shared included the focus on self-regulation as this ECE described, "I think the biggest thing is self-regulation, I know it's the biggest part of all of this . . . " (ECE, Time 2). The focus on authenticity helped to connect assessment and self-regulation. These practices facilitated the development of self-regulation through the process of co-regulation with an individual or multiple individuals who were more adept at the task.

Theme 2: Feedback as Foundational

The second theme reiterated the relevance of feedback for assessment and co-regulation. All participants emphasized the importance of students receiving feedback from different sources including teachers, ECEs, and peers. Feedback was ongoing throughout the school day. When asked to describe formative assessment, feedback was at the forefront for a different teacher,

> Formative assessment occurs at the beginning before activities and lessons and throughout. So, it's constant back and forth feedback between the teachers and the students and the parents and each other and the students with each other (T4, Time 1).

The feedback was also in relation to self-regulation behaviours and learning depending upon the instance. One teacher discussed how feedback was used to reinforce positive behaviours including being able to manage emotions as described here.

> So, assessment for learning. So, for us to provide feedback, it's continual and constant. You're constantly like all day long. How many times do you hear me say things that are reinforcing self-regulation and routines and dealing with their emotions? ... So, I think, yes, it's operating in our classroom. Yes. It's mostly oral feedback and it's continuous and positive (T2, Time 2).

A different teacher discussed the need to repeat feedback, "Some of them are better [at] remembering from day to day, but it is a lot. You just have to keep, it's a lot of repetition, a lot of similar feedback, time after time. Hoping that eventually it kind of clicks . . . " (T8, Time 2). The participants described providing ongoing feedback so that students could internalize the feedback and change their behaviours.

Through interviews and classroom observations (CO), the importance of peer feedback was highlighted by many participants. Some of the teachers and ECEs also described how they observed improvement in students being able to articulate their feelings to their peers as described by this teacher.

> I don't think that I hear as many outloud conversations with them, like sort of self-talk surrounding self-regulation with kids. I tend to hear it more in terms of play in terms of things like that. And the conversations that I hear around self-regulation tend to be peer to peer conversations where they're trying to negotiate a problem or disagreement or sharing of resources . . . (T1, Time 2).

As hinted at by this teacher, these conversations between peers not only provided a forum for formative assessment through feedback but also allowed them to negotiate and co-regulate their behaviours. Sometimes these opportunities were facilitated by the teacher to create intentional student groupings with the purpose of peer-modelling. According to classroom observations, students co-regulated each other by telling each other to stop certain behaviours, wash their hands before eating, and how to behave during carpet time (CO, Time 1).

Listening to the conversations between peers also provided an opportunity for teachers and ECEs to assess learning as described by this ECE, "I listen to their conversations with peers to see how much they understand" (ECE 2, Time 1). Additionally, students also used the "notice and naming" assessment practice with each other. This teacher described an ideal example of self-regulation, "Child can notice/name their own feelings and needs and further can identify the needs of their peers and be able to assist their peers in regulating/modifying their behaviour if needed" (T3, Time 2). These examples highlight the value of involving students in formative assessment and encouraging students to provide each other with feedback.

Research Question 2: How can Formative Assessment and Co-Regulation be Leveraged to Increase Student Agency?

Two main themes emerged demonstrating ways in which formative assessment and co-regulation could lead to more agentic behaviours. The third theme described the shared purposes between formative assessment and the fourth theme connected co-regulation and classroom assessment.

Theme 3: Formative Assessment and Co-Regulation have Shared Purposes

The third theme identified three shared purposes between formative assessment and co-regulation. The first similarity was that both formative assessment and co-regulation involved students in the learning process. At their best, these practices encouraged students to be active agents during learning. For example, this teacher described how success criteria could be co-constructed with the students. "More specifically, It's supposed to be more student generated now. It's supposed to be more classroom generated. Rather than a teacher doing an anchor chart and just saying "this is what you need to do"" (T2, Time 1). This process of generating criteria as a class could also be a form of co-regulation by some students with greater understanding leading the way in identifying and naming the criteria. One teacher shared ideal implementation of formative assessment where she hoped to encourage students to share their thinking

out loud. Encouraging reflective thinking was also discussed as a formative assessment practice in which students were active. This ECE elaborated,

> It's just through conversation and reflection when you reflect on a task that they did and they're proud of themselves. And then what can we do differently? So, a lot of it is just through verbal communication and revisiting what we've done . . . (ECE 1, Time 1).

As described in the examples above, these activities were not necessarily individual in nature.

The second shared purpose accentuated that formative assessment and co-regulation aimed to extend and scaffold student thinking. Sometimes the extension was in relation to behaviours and problem solving as discussed by this teacher "And we've been able to actually step back, and we see them trying to solve problems on their own and they still need help. But they're just starting that conversation. They're starting to show that initiative on their own with their peers . . . " (T8, Time 2). This same teacher was ready to co-regulate during her observations. One example included when a group of students were struggling to share snap cubes. Teacher 8 approached the students and asked how many of them wanted to play. After she received a number, she showed the students how to divide the snap cubes between those who wanted to play (Time 1, CO).

Teachers and ECEs also observed and listened to students frequently to monitor their ongoing attempts to self-regulate. One teacher gave students space to try and regulate their behaviours, however, when students struggled, she frequently stepped in and engaged in co-regulation until they became more proficient with regulation (Time 1, CO). Another strategy that teachers and ECEs used frequently to develop self-regulation was prompting through questioning and dialogic assessment. This ECE shared that these practices were used in her classroom, "So it's not like stressful for the children and just kind of doing it through conversation, through asking them questions, to see their insights and ideas" (ECE 3, Time 1). Teachers and ECEs often used these conversations as an opportunity to assess what students had learned and to extend their thinking. Further, like many practices identified in this study, these conversations offered the opportunity to co-regulate students. The importance was also placed on the process of thinking rather than just on the final product. This teacher explained further,

> it sounds a little formal, for kindergarten, but like having the dialogue with them, getting to know them really seeing what they're doing and why and how they're doing things. So, it's not just the product or the result, it's the process that they're going through (T4, Time 1).

Lastly, these conversations and ongoing dialogue were described as helping students to internalize the behaviours. This internalization is foundational for moving from co-regulation to self-regulation.

Theme 4: Connections Between Classroom Assessment and Co-Regulation

The final theme demonstrated the connections between classroom assessment and co-regulation across the eight Kindergarten classrooms. Findings highlighted the need to broaden conceptualizations of classroom assessment in Kindergarten. Teachers and ECEs shared many examples of practices used to promote the development of self-regulation. However, if using traditional conceptions of assessment, the practices may not be recognized as assessment ones. Yet, traditional conceptions of assessment may be more appropriate for older grades and thus assessment should look different in Kindergarten. The adaptation of traditional assessment practices may result in more developmentally appropriate practices. The assessment policy that guides Kindergarten assessment in Ontario is the *Growing Success Addendum* (OME, 2016). This policy began to push traditional conceptions of assessment by developing the "noticing and naming" practice described earlier. The process of noticing a desired behaviour and naming it back to the student was used by all teachers and ECEs who participated in this study. Interestingly, this assessment practice was not just used in relation to learning, but also used frequently to develop self-regulatory behaviours such as understanding and expressing emotions. Noticing and naming was also used by students as described by this teacher, "I think it's cute sometimes to hear them say things or notice something in somebody or notice somebody's sad and go over right away. Saying, you're sad because your body is crunched down" (T6, Time 2). The noticing and naming practice was reported as helping to develop emotional literacy by most participants.

Teachers and ECEs reported that they struggled with integrating student-centred assessment practices such as self-assessment and peer-assessment. Student-centred assessment practices have some foundational elements including that they are individualized, they are focused on learning and growth, they motivate students, they encourage students to be actively engaged in the regulation of their learning, and they are useful for different stakeholders (Ministry of Education Kuwait, 2016). However, despite indicating that they didn't integrate these practices in their interviews, the classroom observations showcased unique ways that participants were adapting self-assessment and peer-assessment to better fit within the Kindergarten context. One example showed how a teacher modeling self-awareness about writing, "Like when I'm doing a journal sentence, "Okay, what am I missing?" "What do you need at the end?" (T2, Time 1). Another way that self-assessment differed from traditional conceptions was by using co-regulation to develop self-assessment skills. This teacher explained,

> Through conversation. Like if they're doing something that they shouldn't, stop praising. If they're doing well, talking to them. So how do you think that made

> someone feel and try talking them through the problems and getting them to talk with each other through problems (T8, Time 1).

When one ECE was asked about the frequency in which she and the teacher used self-assessment she said, "Occasionally, but again, I said that was one of the ones I'm sure there's many ways that we can be doing better that way" (ECE 1, Time 1). Similarly, a different ECE described this example in terms of modeling,

> So students, when they're in conflict guiding them through communication. Modeling maybe the wording initially when they're building on their self-awareness and how to handle problems, bottling the wordiness. Wording what they can do next time and guiding them through that (ECE 3, T2).

In this example, the focus on building self-awareness and developing the necessary vocabulary to describe their thinking is an important component of self-assessment. Therefore, many participants recognized the role that they played in modeling (as part of co-regulation) but did not recognize elements of self-assessment. Further, participants did not realize that they were developing self-assessment skills through adapted practices.

These practices aimed at encouraging the identification, monitoring, and assessment of emotions and one's behaviours may be an early precursor to self-assessment skills. The process of identifying one's current emotional state and judging its appropriateness may be an opportunity for assessment to promote self-regulation development. All participants used a whole-group approach called feeling circles where students were asked to identify their current emotion (through ongoing self-assessment) and explain how and why they named that feeling. When students had trouble explaining their emotions, the teacher and ECE would co-regulate them. Further, there was a real hesitancy by participants to use what was traditionally conceptualized as peer-assessment. Therefore, they tended to describe instances where peer feedback was used instead. Given that many of the students were unable to write their feedback, much of the peer feedback was delivered verbally. These conversations between students provided an organic mechanism for co-regulation, where a peer would remind a student not to do something and explain why as one example. These examples uncover ways that teachers and ECEs co-regulated their students by adapting their assessment practices to align with the Kindergarten context.

The second subtheme that emerged centred around the idea that student agency could act as a bridge between formative assessment and co-regulation. This relationship was not always described by participants however, this may be due to the limitations of traditional assessment conceptions. The relationship between formative assessment and co-regulation was observed across the eight classrooms. Similar to other practices, teachers and ECEs engaged in co-regulation with their students to develop their self-assessment skills. As part of the co-regulation process, participants gave students the language for them to identify, assess, and explain their emotions.

Six teachers and two ECEs used the Zones of Regulation (Kuypers, 2020) program to help develop student's self-regulation behaviours. This program has pictures of emotions with each matched to a colour. Therefore, students learn to identify when they are in different arousal states and start by naming the colour associated with a specific set of behaviours. As their understanding builds alongside their vocabulary, they work to transition towards regulating their behaviours so that they stay within the more positive and productive states. For example, one teacher referenced the Zones of Regulation when a student was not listening, so she said, "You are making me feel blue" (T8, Time 1, CO). Teacher 3 used the Zones of Regulation for attendance each day. As students came into the classroom, they had to place their picture in the colour zone that best represented their current emotion. She explained that this was useful information for her as it provided an understanding of how the students were feeling. This teacher prompted students regularly to assess their emotions and work towards a different zone. The process of ongoing monitoring and assessment of emotions encouraged students to be active agents. Students were also encouraged to set goals related to their self-regulation behaviours. Teachers and ECEs would then encourage students to monitor and assess their progress towards their goals. These goals were sometimes established by the teachers or ECEs.

A foundational element of student agency was the belief that Kindergarten students could regulate their behaviours. One teacher shared her thinking, ". . .I think they're much more capable than you would maybe imagine" (T3, Time 1). Two of the eight teachers described the importance of encouraging students to document their learning and emotions which could help to facilitate student agency. This teacher explained further, "They self-document with their own app that they have. Sometimes that is purely, seemingly academic, but there's a lot to glean for me when they're trying to self-document with an iPad about how their state is" (T4, Time 2). This is an example where the responsibility was shifted to students as they became more competent following co-regulation. These findings accentuated the need to push the boundaries for traditional conceptions of assessment to make way for these innovative practices.

DISCUSSION

This study explored the relationship between formative assessment and co-regulation across eight Kindergarten classrooms. Our two research questions showed four emerging themes among the participants. In this final section, we will present these themes organized around three discussion points. These are: 1) Interactions are foundational for formative assessment and self-regulation; 2) students need to be active agents during formative assessment and co-regulation; and 3) conceptualizations of classroom assessment need to be broadened for Kindergarten contexts. These will be described below with educational implications embedded throughout.

The participants described interactions as foundational for their assessment and self-regulation practices with co-regulation

as the most usual type of regulation. It is interesting to note that teachers emphasized the need for co-regulatory interactions to involve peers in addition to the adults in the room. Meaningful interactions described earlier also occurred between students where again, an individual who was more competent at the task worked to co-regulate one of their peers. A common thread across the examples described and observed included that Kindergarten students necessitated ongoing support for both their development of self-regulation and their involvement in assessment processes such as feedback, noticing and naming, or self-assessment. However, this support varied and was individualized to best support each student reiterating that a one size fits all mentality is not appropriate for co-regulation or formative assessment. Therefore, in response to the first research question, these interactions and ongoing dialogues helped to facilitate the relationship between formative assessment and co-regulation.

In Allal's model of co-regulation (2020) interactions are central given that they are encompassed within two of the three sources of regulation. Further, Allal proposed that all learning that occurs in the classroom context is co-regulated to some extent. However, the current study shed insight on co-regulation through assessment practices rather than through assessment tools or their curricular materials. More specifically, teachers and ECEs focused on describing the processes that they undertook when assessing with less focus on what they used to observe and document what they were noticing.

Additionally, a key function of the interactions described in this study was to develop student's self-regulatory skills through co-regulation and formative assessment. Findings in this study suggest a mutually beneficial relationship between co-regulation and formative assessment. More specifically, co-regulation offered opportunities to provide formative feedback to students and other formative assessment practices such as "noticing and naming" provided opportunities to co-regulate students. Previous research has focused on how formative assessment can be used to promote the development of self-regulation with little consideration for the inverse relationship. However, Broadbent et al. (2021) examined how self-regulated learning impacted formative assessment in post-secondary blended and online learning environments. Findings suggested that self-efficacy was a significant predictor for online learning and effort regulation predicted formative assessment scores for learners in the blended context. Other components of self-regulated learning such as critical thinking, time management, and metacognition were not significant predictors. Although these findings are interesting, the focus was on self-regulated learning rather than co-regulation and the population was much older than the current study supporting the need to examine the directionality of the relationship between co-regulation and formative assessment further in primary classrooms.

This study highlighted that formative assessment and co-regulation have shared purposes including the need for students to be active agents in the learning process. This involvement was through the co-construction of success criteria, verbalizing thinking, and reflective thinking. Another shared purpose between the two constructs included the aim to extend and scaffold student thinking. The extension of thinking was not solely in relation to learning: some instances were in relation to behaviours. Teachers and ECEs observed and listened to students frequently. They remained ready to step in and co-regulate when students struggled with managing their behaviours or on a specific task. Our participants implemented questioning, prompting, and dialogic assessment to develop student's self-regulation. During these practices, students were actively involved.

Another useful assessment practice is that of dialogical and strategic questioning, which may not be at the forefront when considering traditional assessment practices. Yet, questioning has been proposed as an effective formative assessment practice (Black, 2003). Teachers in the current study used questioning to collect data about student learning but also as a vehicle for co-regulation where they further prompted students to extend and explain their thinking. The process of encouraging students to articulate their thinking out loud through a series of questions is strategic questioning (Butler et al., 2017). This practice is recognized as an important strategy for developing student's self-regulation behaviours (Butler et al., 2017). It is promising to have observed teachers and ECEs in the current study using strategic questioning while engaged in co-regulation.

These findings align with recent research in Kindergarten where DeLuca et al. (2019) explored teacher's assessment practices in 20 classrooms through classroom observations, video data, and semi-structured interviews. Their study highlighted the importance of a student-centred approach to classroom assessment and self-regulation. Teachers used open-ended questioning and ongoing conversations most frequently for assessment and to develop student's self-regulation. Lastly, they also reported that teachers tended to use self-assessment and peer-assessment to a much lesser extent. Together, these findings posit that Kindergarten teachers demonstrate hesitancy in integrating self- and peer-assessment in classrooms. This hesitancy and perceived lack of comfort may be due to the need for broadened conceptualizations of assessment in order to align with the developmental needs in Kindergarten classrooms.

Different practices used to promote self-regulation were shared by participants, but they did not necessarily align with traditional conceptions of assessment. For example, the noticing and naming practice is traditionally considered in relation to learning, yet participants regularly used this practice as a means for developing self-regulation and to facilitate co-regulation. Similarly, teachers and ECEs generally reported that they did not integrate self- and peer-assessment in their classrooms, but these practices were observed during observations and recognized during interviews. Therefore, it seems that participants did not recognize the full potential of their assessment practices in the development of self-regulation.

Part of recognizing the full potential of assessment in Kindergarten includes involving students in the process. Therefore, student agency emerged to bridge formative assessment and co-regulation. Teachers and ECEs worked to model the desired behaviours and provide students with the language to describe their behaviours. By equipping students with the appropriate vocabulary and encouraging them to actively monitor their behaviours, they can develop their agentic behaviours. Thus, by broadening our conceptions of assessment we

can celebrate the many ways that teachers and ECEs work to develop self-regulation through adapting their assessment practices.

Teachers and ECEs in this study demonstrated that they were constrained by traditional conceptions of assessment. Peer-assessment is one of the practices that could be broadened. For example, peer-assessment in the current study was discussed more in relation to peer-feedback and peer modelling which do not align with traditional conceptions of assessment. However, these could be important steps that with ongoing development could lead to peer-assessment. It is possible that peer feedback and peer modelling are more appropriate for use in the early years context where students may not be comfortable going through the full peer-assessment process. Participants in the current study described ways in which they encouraged students to model self-regulation and when they noticed appropriate behaviours, they would notice and name them back to the students. This noticing and naming could be an early pre-cursor to peer-assessment as a means for how students could notice and name behaviours to their peers which would help them to share their thinking. During peer-assessment, students can share their thinking and have some ownership within the assessment process (Dixon et al., 2011). Previous research has suggested that there is a relationship between peer-assessment and co-regulation (Panadero et al., 2016) which aligns with examples in the current study. Further, it is important to recognize that peer-assessment may not always be in relation to learning at the Kindergarten level. It may be more developmentally appropriate to start with providing feedback about emotions and behaviours as was evidenced in the current study.

Another assessment practice that could be broadened is self-assessment. Recently, Perry et al. (2020) had Grade 3 students complete a Learning Log multiple times during a writing task to encourage self-assessment. The Learning Log included an opportunity for students to identify the emotion that they were feeling while learning. In addition to the emotion, students were asked to explain their feelings, identify a strategy, and share what they would do differently next time. The Learning Log would be too complex for Kindergarten students, however it is very interesting that the researchers started with having students assess their feelings in relation to the writing activity. This is similar to the ongoing focus in the current study on assessing one's emotions throughout the school day. The use of similar prompting questions could be an early pre-curser to self-assessment and developmentally appropriate for Kindergarten students.

LIMITATIONS

This study has limitations. First, our study provides a small snapshot of teacher's and early childhood educator's assessment practices across the eight classrooms. Despite spending 56 h in each of the classrooms, important assessment or self-regulation practices may have been missed. Second, all our participants self-identified as female therefore, it is unknown whether practices and interactions would differ in male teachers. Third, data were collected within one school board which had ongoing initiatives aimed at developing student's self-regulatory behaviours. However, despite sampling from one school board, efforts were made to sample diverse classrooms including those from high, middle, and low socio-economic areas. And fourth, this study was exploratory in nature thus causal relationships have not been explored.

Future Directions for Research

It is clear that scholars should continue to examine the directionality of the relationship between formative assessment and co-regulation. Findings from this study suggest that there may be a bidirectional relationship between the two constructs where they each benefit the other in Kindergarten classrooms. Further, researchers also need to employ more time points during instruction beyond the middle and end of the year as those were explored in the current study. Thus, longitudinal studies and research with more occasions of measurement are needed. Lastly, as more is understood about the relationship between co-regulation and assessment, interventional studies should be used to examine the effects of specific formative assessment practices on co-regulation.

CONCLUSION

This phenomenological study provides empirical insights into the relationship between co-regulation and classroom assessment within the early years context. Our findings showcase opportunities for co-regulation through formative assessment practices such as noticing and naming, questioning, dialogic, and feedback. Teachers and ECEs in the study demonstrated how co-regulation can involve students learning actively through assessment and has the potential to increase student agency. Therefore, these findings propose a bidirectional, mutually beneficial, relationship between formative assessment and co-regulation. We know that Kindergarten students are capable of agentic behaviours during assessment processes, however, they require ongoing support from teachers and peers through modelling, scaffolding, and co-regulation as suggested by findings from this study. As the ultimate goal of formative assessment, student agency can be used to bridge formative assessment and co-regulation.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available. Those interested in receiving this data may contact the corresponding author. Any additional sharing of data would need to be approved by the institutional research ethics board. Requests to access the datasets should be directed to HB, hlab@queensu.ca.

ETHICS STATEMENT

This study involved human participants and was reviewed and approved by the General Research Ethics Board at the appropriate institution. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

HB, CD, and LC made substantial contributions to the study design, data analyses, and interpretation. HB collected all data and lead the manuscript writing. EP provided theoretical and conceptual guidance. All authors contributed to the drafting of the manuscript and all subsequent revisions. HB is accountable for the accuracy and integrity of the work.

FUNDING

HB was supported in part by funding from the Social Sciences and Humanities Research Council (Award # 752-2016-1858).

ACKNOWLEDGMENTS

The lead researcher would like to thank all of the research assistants who helped with data collection, their efforts are greatly appreciated. Additionally, thank you to all of the participants for welcoming us into your already busy classrooms and for sharing your practices. A special thank you to my committee member, Kristy Timmons who provided invaluable support and expertise.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2021.732373/full#supplementary-material

REFERENCES

Allal, L. (2020). Assessment and the Co-regulation of Learning in the Classroom, *Assess. Educ. Principles, Pol. Pract.*, 27, 332–349. doi:10.1080/0969594x.2019.1609411

Allal, L. (2007). "Introduction. Régulations des apprentissages : orientations conceptuelles pour la recherche et la pratique en éducation," in *Régulation des apprentissages en situation scolaire et en formation*. Editors L. Allal and M. Lopez (Brussels, Belgium: De Boeck), 7–23. doi:10.3917/dbu.motti.2007.01.0007

Andrade, H., and Brookhart, S. M. (2016). "The Role of Classroom Assessment in Supporting Self-Regulated Learning," in *Assessment for Learning: Meeting the challenge of Implementation*. Editors D. Laveault and L. Allal (London: Springer International Publishing), 293–309. doi:10.1007/978-3-319-39211-0_17

Assessment Reform Group (2002). *Assessment for Learning: 10 Principles*. London: University of Cambridge.

Bernier, A., Carlson, S. M., and Whipple, N. (2010). From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children's Executive Functioning. *Child. Dev.* 81 (1), 326–339. doi:10.1111/j.1467-8624.2009.01397.x

Birgisdottir, F., Gestsdottir, S., and Geldhof, G. J. (2020). Early Predictors of First and Fourth Grade reading and Math: The Role of Self-Regulation and Early Literacy Skills. *Early Child. Res. Q.* 53, 507–519. doi:10.1016/j.ecresq.2020.05.001

Black, P. (2003). *Assessment for Learning: Putting it into Practice*. Maidenhead, England: Open University Press.

Black, P. (2013). "Formative and Summative Aspects of Assessment: Theoretical and Research Foundations in the Context of Pedagogy," in *SAGE Handbook of Research on Classroom Assessment*. Editor J. McMillan (Thousand Oaks, CA: SAGE Publications, Inc), 167–178.

Black, P., and Wiliam, D. (1998). Assessment and Classroom Learning. *Assess. Educ. Principles, Pol. Pract.* 5, 7–74. doi:10.1080/0969595980050102

Blair, C., and Razza, R. P. (2007). Relating Effortful Control, Executive Function, and False Belief Understanding to Emerging Math and Literacy Ability in Kindergarten. *Child. Dev.* 78 (2), 647–663. doi:10.1111/j.1467-8624.2007.01019.x

Brandmo, C., Panadero, E., and Hopfenbeck, T. N. (2020). Bridging Classroom Assessment and Self-Regulated Learning. *Assess. Educ. Principles, Pol. Pract.* 27 (4), 319–331. doi:10.1080/0969594X.2020.1803589

Braun, V., and Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qual. Res. Psychol.* 3 (2), 77–101. doi:10.1191/1478088706qp063oa

Broadbent, J., Sharman, S., Panadero&Fuller-Tyszkiewicz, E. M., and Fuller-Tyszkiewicz, M. (2021). How Does Self-Regulated Learning Influence Formative Assessment and Summative Grade? Comparing Online and Blended Learners. *Internet Higher Edu.* 50 (4), 100805. doi:10.1016/j.iheduc.2021.100805

Butler, D. L., Schnellert, L., and Perry, N. E. (2017). *Developing Self-Regulating Learners*. New Jersey: Pearson Education, Inc.

Calkins, S. (2007). "The Emergence of Self-Regulation: Biological and Behavioral Control Mechanisms Supporting Toddler Competencies," in *Socioemotional Development in the Toddler Years*. Editors C. Brownell and C. Kopp (New York, NY: The Guilford Press), 365–384.

Cameron Ponitz, C. E., McClelland, M. M., Jewkes, A. M., Connor, C. M., Farris, C. L., and Morrison, F. J. (2008). Touch Your Toes! Developing a Direct Measure of Behavioral Regulation in Early Childhood. *Early Child. Res. Q.* 23 (2), 141–158. doi:10.1016/j.ecresq.2007.01.004

Colman, R. A., Hardy, S. A., Albert, M., Raffaelli, M., and Crockett, L. (2006). Early Predictors of Self-Regulation in Middle Childhood. *Inf. Child. Develop.* 15 (4), 421–437. doi:10.1002/icd.469

Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Thousand Oaks, CA: Sage.

Davidsen, A. S. (2013). Phenomenological Approaches in Psychology and Health Sciences. *Qual. Res. Psychol.* 10 (3), 318–339. doi:10.1080/14780887.2011.608466

DeLuca, C., Pyle, A., Roy, S., Chalas, A., and Danniels, E. (2019). Perspectives on Kindergarten Assessment: Toward a Common Understanding. *Teach. Coll. Rec.*, 1–29.

Demetriou, A. (2000). "Organization and Development of Self-Understanding and Self-Regulation," in *Handbook of Self-Regulation*. Editors M. Boekaerts, P. R. Pintrich, and M. Zeidner (San Diego: Elsevier Academic Press), 209–251. doi:10.1016/b978-012109890-2/50036-6

Dice, J. L., and Schwanenflugel, P. (2012). A Structural Model of the Effects of Preschool Attention on Kindergarten Literacy. *Read. Writ* 25 (9), 2205–2222. doi:10.1007/s11145-011-9354-3

Dixon, H. R., Hawe, E., and Parr, J. (2011). Enacting Assessment for Learning: the Beliefs Practice Nexus. *Assess. Educ. Principles, Pol. Pract.* 18 (4), 365–379. doi:10.1080/0969594x.2010.526587

Dowling, M. (2007). From Husserl to Van Manen. A Review of Different Phenomenological Approaches. *Int. J. Nurs. Stud.* 44 (1), 131–142. doi:10.1016/j.ijnurstu.2005.11.026

Duckworth, A. L., and Kern, M. L. (2011). A Meta-Analysis of the Convergent Validity of Self-Control Measures. *J. Res. Pers* 45 (3), 259–268. doi:10.1016/j.jrp.2011.02.004

Duncan, R. J., Schmitt, S. A., Burke, M., and McClelland, M. M. (2018). Combining a Kindergarten Readiness Summer Program with a Self-Regulation Intervention Improves School Readiness. *Early Child. Res. Q.* 42, 291–300. doi:10.1016/j.ecresq.2017.10.012

Earl, L. M. (2013). *Assessment as Learning: Using Classroom Assessment to Maximize Student Learning*. Thousand Oaks, CA: Corwin.

Frivold Kostøl, E. M., and Cameron, D. L. (2020). Teachers' Responses to Children in Emotional Distress: A Study of Co-regulation in the First Year of Primary School in Norway. *Education* 3-13, 1–11.

Guo, Y., Leu, S. Y., Barnard, K. E., Thompson, E. A., and Spieker, S. J. (2015). An Examination of Changes in Emotion Co-regulation Among Mother and Child

Dyads during the Strange Situation. *Infant Child. Dev.* 24 (3), 256–273. doi:10.1002/icd.1917

Hadwin, A., and Oshige, M. (2011). Self-Regulation, Coregulation, and Socially Shared Regulation: Exploring Perspectives of Social in Self-Regulated Learning Theory. *Teach. Coll. Rec.* 113 (2), 240–264.

Kiss, M., Fechete, G., Pop, M., and Susa, G. (2014). Early Childhood Self-Regulation in Context: Parental and Familial Environmental Influences. *Cogn. Brain Behav.* 18 (1), 55.

Kopp, C. B. (1982). Antecedents of Self-Regulation: A Developmental Perspective. *Dev. Psychol.* 18 (2), 199–214. doi:10.1037/0012-1649.18.2.199

Kurki, K., Järvenoja, H., Järvelä, S., and Mykkänen, A. (2016). How Teachers Co-regulate Children's Emotions and Behaviour in Socio-Emotionally Challenging Situations in Day-Care Settings. *Int. J. Educ. Res.* 76, 76–88. doi:10.1016/j.ijer.2016.02.002

Kuypers, L. (2020).The Zones of Regulation. *Social Thinking, Inc.* available at: http://www.zonesofregulation.com/index.html.

Lonigan, C. J., Allan, D. M., and Phillips, B. M. (2017). Examining the Predictive Relations between Two Aspects of Self-Regulation and Growth in Preschool Children's Early Literacy Skills. *Dev. Psychol.* 53 (1), 63–76. doi:10.1037/dev0000247

McCain, M., Mustard, F., and McCuaig, K. (2011). *Early Years Study 3: Making Decisions, Taking Action*. Toronto, ON: Margaret and Wallace McCain Family Foundation.

McClelland, M. M., and Cameron, C. E. (2012). Self-regulation in Early Childhood: Improving Conceptual Clarity and Developing Ecologically Valid Measures. *Child. Dev. Perspect.* 6 (2), 136–142. doi:10.1111/j.1750-8606.2011.00191.x

McMillan, J. H., and Schumacher, S. (2010). *Research in Education: Evidence-Based Inquiry*. New York, NY: Pearson.

Ministry of Education, Kuwait (2016). Retrieved from https://www.moe.edu.kw/teacher/Documents/%D8%A7%D9%84%D9%84%D8%BA%D8%A9%20%D8%A7%D9%84%D8%A7%D9%86%D8%AC%D9%84%D9%8A%D8%B2%D9%8A%D8%A9/learner%20centered%20teaching/5-Assessment%20in%20LCT%20.pdf.

Montroy, J. J., Bowles, R. P., and Skibbe, L. E. (2016). The Effect of Peers' Self-Regulation on Preschooler's Self-Regulation and Literacy Growth. *J. Appl. Dev. Psychol.* 46, 73–83. doi:10.1016/j.appdev.2016.09.001

Murray, D. W., Rosanbalm, K., Christopoulos, C., and Hamoudi, A. (2015). *Self-regulation and Toxic Stress: Foundations for Understanding Self-Regulation from an Applied Developmental Perspective (OPRE Report 2015-21)*. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Nigg, J. T. (2017). Annual Research Review: On the Relations Among Self-Regulation, Self-Control, Executive Functioning, Effortful Control, Cognitive Control, Impulsivity, Risk-Taking, and Inhibition for Developmental Psychopathology. *J. Child. Psychol. Psychiatry* 58 (4), 361–383. doi:10.1111/jcpp.12675

O'Connor, C., and Joffe, H. (2020). Intercoder Reliability in Qualitative Research: Debates and Practical Guidelines. *Int. J. Qual. Methods* 19, 160940691989922. doi:10.1177/1609406919899220

OME (2016). Growing Success-The Kindergarten Addendum: Assessment, Evaluation, and Reporting in Ontario Schools. available at: http://www.edu.gov.on.ca/eng/policyfunding/growingsuccessaddendum.html.

OME (2016a). The Kindergarten Program. available at: http://www.edu.gov.on.ca/eng/curriculum/elementary/kindergarten.html.

Panadero, E., and Alonso-Tapia, J. (2013). Self-Assessment: Theoretical and Practical Connotations. When it Happens, How Is it Acquired and what to Do to Develop it in Our Students. *Electron. J. Res. Educ. Psychol.* 11 (2), 551–576.

Panadero, E., Andrade, H., and Brookhart, S. (2018). Fusing Self-Regulated Learning and Formative Assessment: a Roadmap of where We Are, How We Got Here, and where We Are Going. *Aust. Educ. Res.* 45 (1), 13–31. doi:10.1007/s13384-018-0258-y

Panadero, E., Jonsson, A., and Strijbos, J.-W. (2016). "Scaffolding Self-Regulated Learning through Self-Assessment and Peer Assessment: Guidelines for Classroom Implementation," in *Assessment for Learning: Meeting the challenge of Implementation*. Editors D. Laveault and L. Allal (Springer International Publishing), 311–326. doi:10.1007/978-3-319-39211-0_18

Pauen, S. (2016). Understanding Early Development of Self-Regulation and Co-regulation: EDOS and PROSECO. *J. Self-Regulation Regul.* 2, 3–16.

Perry, N. E., Lisaingo, S., Yee, N., Parent, N., Wan, X., and Muis, K. (2020). Collaborating with Teachers to Design and Implement Assessments for Self-Regulated Learning in the Context of Authentic Classroom Writing Tasks. *Assess. Educ. Principles, Pol. Pract.* 27 (4), 416–443. doi:10.1080/0969594x.2020.1801576

Perry, N. E. (2019). Recognizing Early Childhood as a Critical Time for Developing and Supporting Self-Regulation. *Metacognition Learn.* 14 (3), 327–334. doi:10.1007/s11409-019-09213-8

Ponitz, C. C., McClelland, M. M., Matthews, J. S., and Morrison, F. J. (2009). A Structured Observation of Behavioral Self-Regulation and its Contribution to Kindergarten Outcomes. *Dev. Psychol.* 45 (3), 605–619. doi:10.1037/a0015365

Rasku-Puttonen, H., Eteläpelto, A., Arvaja, M., and Häkkinen, P. (2003). Is Successful Scaffolding an Illusion? Shifting Patterns of Responsibility and Control in Teacher–Student Interaction during a Long Term Learning Project. *Instructional Sci.* 31 (6), 377–393. doi:10.1023/a:1025700810376

Robson, D. A., Allen, M. S., and Howard, S. J. (2020). Self-regulation in Childhood as a Predictor of Future Outcomes: A Meta-Analytic Review. *Psychol. Bull.* 146, 324–354. doi:10.1037/bul0000227

Shenton, A. K. (2004). Strategies for Ensuring Trustworthiness in Qualitative Research Projects. *Efi* 22, 63–75. doi:10.3233/efi-2004-22201

Silkenbeumer, J. R., Schiller, E.-M., and Kärtner, J. (2018). Co- and Self-Regulation of Emotions in the Preschool Setting. *Early Child. Res. Q.* 44, 72–81. doi:10.1016/j.ecresq.2018.02.014

Tong, A., Sainsbury, P., and Craig, J. (2007). Consolidated Criteria for Reporting Qualitative Research (COREQ): a 32-item Checklist for Interviews and Focus Groups. *Int. J. Qual. Health Care* 19, 349–357. doi:10.1093/intqhc/mzm042

Volet, S., Summers, M., and Thurman, J. (2009). High-level Co-regulation in Collaborative Learning: How Does it Emerge and How Is it Sustained? *Learn. Instruction* 19 (2), 128–143. doi:10.1016/j.learninstruc.2008.03.001

Warwick, P., Mercer, N., and Kershner, R. (2013). 'Wait, Let's Just Think about This': Using the Interactive Whiteboard and Talk Rules to Scaffold Learning for Co-regulation in Collaborative Science Activities. *Learn. Cult. Soc. Interaction* 2 (1), 42–51. doi:10.1016/j.lcsi.2012.12.004

Whitebread, D., Coltman, P., Jameson, H., and Lander, R. (2009). Play, Cognition and Self-Regulation: What Exactly Are Children Learning when They Learn through Play? *Educ. Child Psychol.* 26 (2), 40–52.

Whitebread, D., and O'Sullivan, L. (2012). Preschool Children's Social Pretend Play: Supporting the Development of Metacommunication, Metacognition and Self-Regulation. *Int. J. Play* 1 (2), 197–213. doi:10.1080/21594937.2012.693384

Wiliam, D. (2011). What Is Assessment for Learning? *Stud. Educ. Eval.* 37 (1), 3–14. doi:10.1016/j.stueduc.2011.03.001

Zakszeski, B., Hojnoski, R. L., Dever, B. V., DuPaul, G. J., and McClelland, M. (2020). Early Elementary Trajectories of Classroom Behavior Self-Regulation: Prediction by Student Characteristics and Malleable Contextual Factors. *Sch. Psychol. Rev.* 49 (2), 161–177. doi:10.1080/2372966X.2020.1717373

Zimmerman, B. J. (2000). "Attaining Self-Regulation: A Social Cognitive Perspective," in *Handbook of self-regulation*, 13–39. Editors M. Boekaerts, P. R. Pintrich, and M. Zeidner (San Diego, CA: Academic Press).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.