Teachers' Views on Supporting Self-Regulated Learning in Early Childhood Science Education

Audrey K. Kittredge, Natalie Day, Lenka Janik-Blaskova, Heyi Zhang, and Sara Baker
akk42@cam.ac.uk, nad45@cam.ac.uk, lb653@cam.ac.uk, heyizhang@cantab.net, stb32@cam.ac.uk
University of Cambridge

Abstract: There are few in-depth qualitative investigations evaluating the challenges of child-led learning programs that might support children's self-regulated learning. We conducted focus group workshops with kindergarten and first grade teachers in the UK and found that, while teachers recognized potential benefits of child-led approaches in science education, they also expressed challenges that were novel in the literature on teacher views. In particular, teachers had a more detailed consideration of EF skill development, and reflected on the consequences to children's learning of how much instructional guidance they provided. Moreover, we found differences in challenges reported by kindergarten and first grade teachers. Future research is needed with teachers of low-income children and a broader range of education stakeholders, in programs that produce a measurable change in teachers' and children's learning.

Introduction

Classrooms which give children some control over their learning – an approach often called "child-led learning" – have existed for some time. Yet only recently has there been systematic study of the specific learning benefits that child-led learning might provide. Some early childhood educational programs which emphasize child-led learning – such as Montessori and Tools of the Mind – are associated with enhanced self-regulated learning ("SRL", the ability to control one's behavior and guide one's own learning), and the related ability of executive function ("EF", e.g. the ability to adapt to changing contexts) (Lillard & Else-Quest, 2006; Blair & Raver, 2014). Both SRL and EF are associated with children's school achievement and various positive outcomes later in life (e.g. Moffitt et al., 2011), and are implicated in the flexible thinking skills on the international PISA test (Ramos & Schleicher, 2016).

Existing child-led educational programs that support SRL and EF require a huge investment of resources in extensive training for teachers (Hsueh, Lowenstein, Morris, Mattera, & Bangster, 2014). As efforts to get teachers in everyday schools to adopt child-led approaches have been known to fail dramatically (Bakkenes, Vermunt, & Wubbels, 2010), it is critical to develop a better understanding of the challenges teachers face when trying to adopt child-led methods without extensive teacher training. We focus on child-led methods in playful science education, because science involves skills that embody SRL and EF (such as reflecting on evidence; e.g. Nayfeld, Fuccillo, & Greenfield, 2013), and play may motivate children to use such skills (Golinkoff, Hirsh-Pasek, & Singer, 2006). There is a small literature on teacher views of child-led learning programs, but none of these specifically focus on developing SRL and EF in early science learning.

We assessed UK teacher views on the feasibility of child-led learning in science. We ensured that teachers' views were evidence-based by engaging them in practice-based focus group workshops. Our workshops had features of professional development, such as teachers reflecting on their own practice together. Furthermore, we engaged teachers as co-researchers, to mirror the learner-led approach that teachers were encouraged to use. Unlike most other research on teacher views, we explicitly compared teachers from both kindergarten and first grade because they tend to differ in their use of child-led learning: First grade in the UK is more curriculum-bound than kindergarten, and subsequently tends to be less child-led (Wood & Bennett, 1999).

Methods

Participants

Workshop participants included 8 female teachers (see Table 1), 6 researchers (5 female), and 1 female Early Years Adviser from the Cambridgeshire County Council. We recruited kindergarten and first grade teachers from each school (one kindergarten teacher was unable to represent her school in the workshops due to illness).

Table 1: Teacher participants

Year group	Teacher codes	Schools represented	Years of experience		
			Average	Median	Range
Kindergarten	K-S1, KS-2, KS-3	S1, S2, S3	7	6	3-12
First grade	F-S1, F-S2, F-S3-1, F-S3-2, F-S4	S1, S2, S3, S4	2	2	1-5

Schools

Schools were a convenience sample, selected because of their interest in the project and their proximity to the researchers. Additional demographic and contextual information is presented in Table 2.

Table 2: School demographics (Higher Derivation Pupil Premium percentage indicates lower family incomes)

School code	Location (UK county)	No. of students	Student:Teacher ratio	Students eligible for Deprivation Pupil Premium	Government inspection rating	Proportion of students of white British heritage
S1	Cambridgeshire	207	24.3:1	8.2%	Outstanding	2/3
S2	Norfolk	139	20.5:1	12.9%	Good	Majority
S3	Cambridgeshire	295	23.5:1	7.5%	Good	Majority
S4	Cambridgeshire	202	23.2:1	13.9%	Requires Improvement	Not available

Procedure

Workshop Participants met four times in seven weeks. Each workshop was four hours long, and consisted of researcher-led interactive activities, short researcher presentations, teacher reflections (both individual and in year groups), and collaborative planning sessions. Workshops were audio- and video-recorded.

Throughout the series of workshops the researchers would lay the theoretical framework, which aimed to simultaneously encourage the use of child-led practices and support for children's SRL. Researchers presented evidence on child-led practices associated with developing SRL and EF (e.g. Perry, Hutchinson, & Thauberger, 2008), as well as classroom-relevant examples of child-led learning (e.g. using hooks to elicit children's interest in science). Teachers were encouraged to share relevant experiences in their practice (e.g. examples of SRL in their classrooms), highlighting opportunities and challenges. They were then asked to plan child-led activities across the next two weeks, which they often did collaboratively. At the next workshop, many teachers brought evidence in the form of photos from their classrooms, and reflected as a group on their recent experiences trying child-led learning methods in the classroom. The workshop topics became gradually more teacher-led, mirroring our theme of child-led learning: In the first two workshops teachers planned activities with shared goals (e.g. supporting children's SRL with a scientific investigation), and in the third workshop teachers chose a specific issue to focus on in their classroom. While we did not specifically aim to induce change in teachers' practice or learning, because our workshops had elements of professional development, they symbiotically met the needs of both researchers and teachers.

Data coding and analysis

Transcription of audio files was done partly by our research team and partly outsourced to a company. Teachers were identified by researchers present at the workshops, who recognized voices in audio recordings and linked them to transcripts, cross-checking with video recordings as necessary. Only passages which included teacher discussion (as opposed to researcher-only discussions) were included in the final analysis.

In total, six researchers (three of whom participated in the workshops) were involved in thematic analysis using NVivo 11. In the first stage of analysis, the second author and a research assistant coded the transcribed workshop recordings for instances of Challenges (either obstacles that teachers see arising during child-led learning which may prevent them from implementing the approach, or things that teachers identified as desirable but not something they currently had). These instances were then grouped into commonly recurring themes (Braun & Clarke, 2006) by the authors. Then the third author and another research assistant, supervised by the first author, recoded Challenges to ensure systematicity and classified each instance of a Challenge according to a final list of themes derived from the first stage of analysis. They also identified instances of Benefits (positive consequences of using a child-led approach). They did this by first coding data from the first workshop, checking reliability until a sufficient rate of agreement (at least 86%) was reached. Then the research assistant coded the remaining data. This paper presents a subset of the coded themes to which all teachers in at least one of the year groups contributed to.

Results and discussion

Teachers expressed the view that the child-led learning methods they had adopted resulted in numerous benefits, as in previous research (e.g. Sak, Erden, & Morrison, 2016), but also identified many challenges.

Researcher-initiated themes: Challenges in supporting children's SRL and EF

The workshops focused on aspects of teaching that were not common in teachers' current practice, such as consciously focusing on practicing children's SRL. As in prior work, teachers felt that appropriate help-seeking to further one's own learning (an SRL strategy) was lacking in their children (e.g. Sak et al., 2016). Teachers in our workshops also discussed a novel challenge, the ability to be flexible mentally (similar to the EF of "cognitive flexibility" or "switching") in science problem-solving: K-S3: "It's hard for them to process how to do it in a different way. […] the ice melting in the sun, where else can the ice melt?". Teachers also reflected on other novel themes, such as classroom organization barriers to supporting children's SRL: K-S1: "I know that they won't just think, "Oh, I'd better go and do that", and then go and grab the resources. […] it's sort of like the way the room is set up, to a certain extent. And I think then, that's a barrier, isn't it?"

Emergent themes: Challenges of instructional guidance and individual needs

While the themes of SRL and EF were initiated by researchers, there were many themes that teachers initiated in their discussions. Teachers discussed a lack of appropriate resources (e.g. space, materials, budgets) that resonated strongly with previous research (e.g. Sak et al., 2016). They also focused on how much instructional guidance to give, an open, hotly debated question in psychology research (e.g. DeCaro, DeCaro & Rittle-Johnson, 2015). Both our teachers and others note a tension between children's interests and teachers' learning goals (Jónsdóttir, 2017). However, while other studies discuss the consequences of providing less guidance for students' enjoyment of activities (Jónsdóttir, 2017), our teachers focused on the consequences of providing less guidance for children's *learning*. For instance, they focused on opportunities for knowledge assessment, scientific misconceptions, and acquiring knowledge different from the original learning goal: K-S2: "I think it's important to […] be careful not to jump in too quickly, you can find out what they know by listening to them...". Our teachers thus contributed a novel emphasis on children's learning to teacher views on instructional guidance, which aligns with psychology researchers' focus on learning goals (e.g. DeCaro et al., 2015).

Some children's needs prevented them from reaping the benefit of child-led activities. In particular, teachers in our workshops emphasized the barrier of language difficulties in child-led learning, in contrast to previous research which reports benefits of child-led learning for language skills (Beneke & Ostrosky, 2009): F-S1: "We really didn't want to lead him to use any particular language, so it was a bit of a challenge for us to allow him to be open-minded and to allow him to decide what he wants to do. If he doesn't have the vocabulary, he can't explain to us." Our teachers' attention to individual differences in children's response to less instructional guidance is noteworthy, as this is an active topic of psychology research (e.g. DeCaro et al., 2015).

Differences between kindergarten and first grade teachers

Several themes were more prevalent in one year group (i.e. over ¾ of the instances of the theme came from teachers in one year group). Kindergarten teachers voiced challenges with lesson planning more than first grade teachers, perhaps because of less practice structuring activities around learning goals (other work has mainly noted such planning challenges in older classrooms; So et al., 2014). First grade teachers, by contrast, were overwhelmingly more frustrated with classroom-external constraints. They were more than nine times as likely as kindergarten teachers to discuss challenges of national curriculum and assessment, school-level rules, timetables, and staffing issues. First grade teachers were also vocal about challenges in trying to follow children's interests and in group work, perhaps because these were different from their usual practice. These themes echo much past research (e.g. Sak et al., 2016), but the contrast with kindergarten teachers is novel.

Conclusion

These novel challenges with child-led learning that teachers voiced in our workshops were not trivial, and the differences between kindergarten and first grade teachers underscore the difficulty of using a child-led approach in more curriculum-focused first grade classrooms (Wood & Bennett, 1999). Taken together with the perceived benefits of child-led learning, these findings can inform efforts to improve early childhood education. Future work could draw on larger samples of teachers, and focus on including teachers of children from different demographics to assess the generalizability of these findings. Future research could also evaluate whether other stakeholders such as children, parents, senior school leadership, and policy makers share similar views on the challenges of child-led learning. Moreover, as teachers need to change in their own professional learning and

behavior to see a change in children's learning and behavior (Vrikki, Warwick, Vermunt, Mercer, & Van Halem, 2017), future work should systematically evaluate challenges of child-led learning in programs that cause a measurable change in both teacher learning and children's SRL and EF skills.

References

Bakkenes, I., Vermunt, J. D., & Wubbels, T. (2010). Teacher learning in the context of educational innovation: Learning activities and learning outcomes of experienced teachers. *Learning and Instruction, 20*, 533-548.

Beneke, S., & Ostrosky, M. M. (2009). Teachers' views of the efficacy of incorporating the project approach into classroom practice with diverse learners. *Early Childhood Research & Practice*, *11*(1). Retrieved from http://ecrp.uiuc.edu/

Blair, C., & Raver, C. C. (2014). Closing the achievement gap through modification of neurocognitive and neuroendocrine function: Results from a cluster randomized controlled trial of an innovative approach to the education of children in kindergarten. *PLoS ONE*, *9*(11), e112393.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

DeCaro, D.A., DeCaro, M.S., & Rittle-Johnson, B. (2015). Achievement motivation and knowledge development during exploratory learning. *Learning and Individual Differences*, 37, 13-26.

Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science*, *318*(5855), 1387–1388. https://doi.org/10.1126/science.1151148

Golinkoff, R. M., Hirsh-Pasek, K., & Singer, D. (2006). Why play = learning: A challenge for parents and educators. In D. G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (Eds.), *Play = Learning : How Play Motivates and Enhances Children's Cognitive and Social-Emotional Growth.* Oxford, UK: Oxford University Press.

Hsueh, J., Lowenstein, A. E., Morris, P., Mattera, S. K., & Bangser, M. (2014). *Impacts of social-emotional curricula on three-year-olds: Exploratory findings from the Head Start CARES Demonstration. (No. OPRE Report 2014-78).* Washington, D.C.: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. Retrieved from the MDRC website: http://www.mdrc.org/sites/default/files/Head%20Start%20CARES%203s%20Report%202014.pdf

Jónsdóttir, S. R. (2017). Narratives of creativity: How eight teachers on four school levels integrate creativity into teaching and learning. *Thinking Skills and Creativity*, *24*, 127–139.

Lillard, A., & Else-Quest, N. (2006). The early years. Evaluating Montessori education. *Science*, 313(5795), 1893–1894.

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., … Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, 108(7), 2693–2698.

Nayfeld, I., Fuccillo, J., & Greenfield, D. B. (2013). Executive functions in early learning: Extending the relationship between executive functions and school readiness to science. *Learning & Individual Differences*, 26, 81–88.

Perry, N. E., Hutchinson, L., & Thauberger, C. (2008). Talking about teaching self-regulated learning: Scaffolding student teachers' development and use of practices that promote self-regulated learning. *International Journal of Educational Research*, *47*(2), 97-108.

Ramos, G., & Schleicher, A. (2016). *Global Competency for an Inclusive World*. Organization for Economic Co-operation and Development, Directorate for Education and Skills. Retrieved from the OECD website: https://www.oecd.org/education/Global-competency-for-an-inclusive-world.pdf

Sak, R., Erden, F. T., & Morrison, G. S. (2016). Child-centred education: Preschool teachers' beliefs and self-reported practices. *Early Child Development and Care*, 186(8), 1185–1202.

So, W-M. W., Cheng, M.-H. M., Kong, S.-C., & Ching, N.-Y. F. (2014). Views of primary science teachers towards the use of online resources to support the implementation of inquiry learning. *Education 3-13*, *42*(4), 386–401. https://doi.org/10.1080/03004279.2012.710640

Vrikki, M., Warwick, P., Vermunt, J. D., Mercer, N., & Van Halem, N. (2017). Teacher learning in the context of Lesson Study: A video-based analysis of teacher discussions. *Teaching and Teacher Education*, *61*, 211–224. https://doi.org/10.1016/j.tate.2016.10.014

Wood, E. & Bennett, N. (1999). Progression and Continuity in Early Childhood Education: Tensions and contradictions. *International Journal of Early Years Education, 7* (1), 5-16.