

Wallin, Anna; Valero, Paola; Norén, Eva

Activities and values in school-age educare mathematics

International journal for research on extended education : JREE 9 (2021) 1, S. 45-56



Quellenangabe/ Reference:

Wallin, Anna; Valero, Paola; Norén, Eva: Activities and values in school-age educare mathematics - In: International journal for research on extended education : JREE 9 (2021) 1, S. 45-56 - URN: urn:nbn:de:0111-pedocs-265784 - DOI: 10.25656/01:26578; 10.3224/ijree.v9i1.05

<https://nbn-resolving.org/urn:nbn:de:0111-pedocs-265784>

<https://doi.org/10.25656/01:26578>

in Kooperation mit / in cooperation with:



<https://www.budrich.de>

Nutzungsbedingungen

Dieses Dokument steht unter folgender Creative Commons-Lizenz: <http://creativecommons.org/licenses/by/4.0/deed.de> - Sie dürfen das Werk bzw. den Inhalt vervielfältigen, verbreiten und öffentlich zugänglich machen sowie Abwandlungen und Bearbeitungen des Werkes bzw. Inhaltes anfertigen, solange Sie den Namen des Autors/Rechteinhabers in der von ihm festgelegten Weise nennen. Mit der Verwendung dieses Dokuments erkennen Sie die Nutzungsbedingungen an.

Terms of use

This document is published under following Creative Commons-License: <http://creativecommons.org/licenses/by/4.0/deed.en> - You may copy, distribute and render this document accessible, make adaptations of this work or its contents accessible to the public as long as you attribute the work in the manner specified by the author or licensor. By using this particular document, you accept the above-stated conditions of use.



Kontakt / Contact:

peDOCS
DIPF | Leibniz-Institut für Bildungsforschung und Bildungsinformation
Informationszentrum (IZ) Bildung
E-Mail: pedocs@dipf.de
Internet: www.pedocs.de

Activities and Values in School-Age Educare Mathematics

Anna Wallin, Paola Valero, Eva Norén

Abstract: Based on an empirical study of policy enactment and mathematical enculturation in Swedish school-age educare, a conceptualization of *mathematics* as the assemblage of *activities* and *values* is proposed. Observations were analysed using policy enactment theory and the lens of mathematical activities. The result shows that making creations, describing relationships and addressing problems are mathematical activities evident in the practices of school-age educare. Values of plausibility, critical stance and connectedness are evident. This alternative conceptualization of mathematics offers possibilities for respecting a balance between education and care in practice. The result opens for alternative ways of thinking about mathematics as a complementing and compensating area that resists the tendency towards *schoolification* in educare.

Keywords: extended education, mathematics, activities, values

Introduction

It is afternoon at the educare centre the Moon and children are engaged in various activities. I approach Gabriel and Michael who are sitting around a table. They are cutting out cardboard figures to build a city in which robots—that they had also assembled—can travel around. Gabriel designs a parking meter and calculates the fees. I ask Gabriel how much it costs to park. “Fifty kronor for four hours”, and he continues drawing. “Okay”, I say. “But how much is it to park one hour?” He thinks: “Well... 50 divided by... four...” Gabriel estimates: “Per hour it will be around 15 kronor, or we can say ten”. Michael objects: “It may not necessarily be division. This isn’t math... I mean, if it is 80 kronor, and if you park for two hours, it’s not certain that you should pay 40”. Michael continues as he gestures with hands and fingers: “If you buy three pieces of something in the store for 15 kronor...” He shakes his head, shows one finger and continues: “... and then you want to buy just one, it’s not certain one-piece costs five kronor”. I ask: “Why is that?” He shrugs: “I don’t know, maybe they want to earn money. One piece might cost seven or so...”

This vignette illustrates what could be considered mathematics in Swedish school-age educare. Children perform activities at will, based on their interests. The adult asks questions and invites children to explain. Materials are touched, cut and put together. Children’s stories and reasons for what they do emerge in conversation. There is a clear expression of what the situation *is not* about: “*This is not math...*” Michael exclaims when Gabriel tries to calculate prices using a typical school maths division: If a price for $4x$ equals 50, then x equals 50 divided by four. Michael points that in their robot, paper city another logic is valid—it may not necessarily be division. As in a real shop, they also want to earn money for the price of a unit. Still, there is a logical explanation for the price, and it is reasonable.

The vignette captures the tension explored in this paper. On the one hand, the practice of *school-age educare*—“*fritidshem*”¹ in Swedish—has held an “exceptional position [...] promoting both education, care, play and leisure in a beneficial way” (Klerfelt, Haglund,

1 85% of Swedish children between six and nine participate in school-aged educare, *fritidshem*. While school is compulsory from the age of six, school-aged educare is not. To participate in the latter, a child’s caregivers need to be working or studying (SNAE, 2018b). For more details, see Klerfelt et al. (2020).

Andersson, & Kane, 2020, p. 187) for children's general well-being and development. Education in this setting prioritizes meaning making and playful learning in caring ways. On the other hand, recent education policy in Sweden has tended to extend the teaching discourse of compulsory school to school-age educare, aiming to improve student achievement in international comparative measurements such as OECD's PISA tests (Government, 2016). The term *schoolification* highlights the tendency to assimilate other educational settings into schooling in content and character, subordinating their own value and importance to the goals of compulsory schooling (e.g., Gunnarsdottir, 2014; Lager, 2015). We claim that the tension between the possibilities of educare and the tendency towards schoolification is visible when mathematics is made explicit.

In 2016, the Swedish National Agency of Education (SNAE) revised the curriculum for school-age educare to support learning in different areas such as mathematics. "Mathematics as a tool to describe ordinary phenomena and solve ordinary problems" (The Swedish National Agency of Education [SNAE], 2018a, p. 25) is stated as an aim. The problem emerges since the term "mathematics" carries a meaning closely linked to the practices of compulsory schooling which are characterized by structured content, with a high priority given to formalization and the dominance of rules, numbers and symbols, the authority of math books, and solutions that fit the right answer in the book (Helenius et al., 2018; Holmberg, & Ranagården, 2016). Such an idea of mathematics is strongly rooted in the collective experience of formal school education, probably shared by most school-age educare participants—adults and children alike. If not challenged, there is the risk that the views, activities and relations typical of school mathematics will colonize and inhibit the emergence of other possible meanings of mathematics that are pertinent to school-age educare.

Indeed, the limited research that explores mathematics in extended education has pointed to this tension. For example, Haglund and Peterson (2017) explored why practitioners use board games in school-age educare. They showed that supporting social competences and structure were the most predominant reasons. Learning cognitive abilities was a secondary reason that appeared when mathematics was made evident. However, practitioners pointed to the difference of the use of board games for the development of mathematical skills in the context of school age educate and in school. Harvard Maare (2015) points to the tension between teachers' and children' intentions for developing mathematical relationships. Game designs that allow peer collaboration and children's affect and motivation bring attention to mathematics in school age educare. Nonetheless, the nature or characteristics of mathematics are not interrogated but remain subordinated to the interactions. Other intervention studies in countries such as Germany have emphasized that participation in extracurricular activities in a variety of areas, including mathematics, supports the development of social and academic competences (e.g., Fisher, & Klieme, 2013). In other locations, such as Hong Kong, studies have highlighted general competencies and lifelong learning abilities, encompassing non-formal and formal learning, as well as mathematics (e.g., Sivan, & Po Kwan Siu, 2020; Bray, 2013). It is evident in these studies that the meaning of "mathematics" in extended education is not interrogated. In some cases, the mathematical elements seem intended to supplement school; in other cases, the presence of mathematics seems intended to amend for the children's lack of success in school.

In this article, we propose an alternative understanding of what could be labelled as "school-age educare mathematics" in harmony with the formulation of education and care. Since school-age educare has a valuable offering that combines education and care for chil-

dren (Klerfelt et al., 2020), the question arises of how the mathematics education enacted in such spaces can be characterized to be distinct from school mathematics. We explore the mathematics enacted by staff and pupils in Swedish school-age educare. The aim is to provide an alternative conceptualization of mathematics education as a practice that offers a different view of knowledge and learning—complementation—, with the purpose of offering children experiences not available in the spaces in which they already participate—compensation. In this way, we explore the concerns of this current special IJREE issue with respect to mathematics.

Policy Enactment and Mathematical Enculturation as Theoretical Lenses

This research draws on two different tools from studies on educational policy change and mathematics education: policy enactment (Ball, Maguire, & Braun, 2012) and mathematical enculturation (Bishop, 1991a). The former allows us to understand recent policy modifications unfolded in the particular context of Swedish educare, and the latter makes it possible to think of “mathematics” as related to the cultural activities and values in such a context, in contrast to school mathematics.

Ball and collaborators’ (2012) notion of policy enactment directs attention to the multiple translation processes that people-in-practice undertake when making sense of and acting on the intentions of policy documents. Moving away from ideas of “implementation”, policy enactment offers tools to study concrete actions—through which policy becomes alive—in context. The enactment brings together contexts, values and history in the process of unfolding new activities in practice. Despite being strongly interconnected, the interpretive, material and discursive aspects of enactment can be distinguished analytically to capture different angles of the translations, reinterpretations and new creations that people enact in practice. The material aspect invites us to consider the physical contexts and artefacts used and produced to materialize policy. The interpretive aspect directs the gaze to participants’ articulations of, “what does this text mean to us?” (Ball et al., 2012, p. 43). The discursive aspect emphasises how the new productions and processes of meaning making relate to contextual and historical conditions so that they come to be considered true (Ball, 2015). These perspectives are used to consider mathematics in educare.

Policy intentions in Sweden are inscribed in the Education Act (SFS 2010:800), the curriculum (SNAE, 2018a) and related commentary material (SNAE, 2016). These documents define the policy directives that are to be translated into educational settings. The enactments of policy involve recontextualization at different levels of education. Material and interpretive aspects are visible in the curriculum document and accompanying guidelines circulated by SNAE to facilitate interpretations of policy in practice. For instance, a commentary material (SNAE, 2016) unfolds the intended meanings of the curriculum and provides suggestions for practice. The discursive aspect is partially evident in the worldwide tendency of educational policy to emphasise improved student performance in international comparative assessments (Ball, 2003). Such a tendency has affected extended education in both character and content (Klerfelt et al., 2020; Noam, & Triggs, 2018). Over the years, central components and concepts have been changed in the policy intentions. In the 2010

Education Act activities became education and children became students. We claim that when mathematics as a tool for problem solving in everyday contexts appeared in the 2016 curriculum, policy discursively aligned school-age educare and school (Wallin, Norén, & Valero, 2019) since mathematics is conveyed as a means of educating for problem solving—one of the key ideas of the Swedish school curriculum (SNAE, 2018a).

Bishop (1988) proposes understanding mathematics education as a process of enculturation. From this perspective, the mathematics curriculum is an educational policy that aims to steer and influence society with regard to what counts as mathematics. The curriculum brings together the values, goals and ambitions of a given society with particular views of mathematics. Furthermore, “mathematics is a part of everyone’s curriculum [...] because it is a part of everyone’s culture” (Bishop, 1991b, p. 196). Through the study of different cultures, societies and contexts around the world, Bishop has identified various forms of mathematical knowledges and related values and qualities. One of these approaches is “Western Mathematics”, with which people in Western Modern societies are familiar because it is present in academia and school curricula (Bishop, 1991a). Western Mathematics embeds a set of values such as rationalism and objectivism, control and progress, openness and mystery. These values are seldom explicitly discussed, but function implicitly in the enactments of the school curriculum in practice. As values vary according to culture, context and society, they can feel more or less familiar to the people involved. As a result, Bishop (1988) identified the need for mathematics education to work “in tune with the ‘home’ culture of the society” (p. 179).

A problem in mathematics education is the tension between the expansive culture of Western Mathematics that dominates the curriculum and the many other “home cultures” of people, communities and societies that do not identify with Western culture. Such cultures often clash with the norms and values imposed by Western school mathematics. As an alternative, Bishop (1988) proposed that there are six activities that are part of all researched human cultures and contexts. They are “universal” because they are performed in all cultures in various ways and with various meanings. They encapsulate the mathematical, because they emerge when people engage with others and their material conditions in situations that require reasoning, doing and systematic thinking. *Counting*, answers the question “how many?”. *Locating* relates to the spatial world. *Measuring* relates to the comparison and arrangement of quantities. *Designing* involves creating, constructing and describing things or shapes. *Playing* involves the agreement on rules for operating and strategizing in situations, as well as distancing oneself from reality in an imaginary world to operate with a set of conditions and rules to achieve a goal. *Explaining* includes actions and talk of motivations, formalizations and reasoning. Bishop (1988) described these six mathematical activities as “necessary and sufficient for the development of mathematical knowledge” (p. 182). These ideas are important in studies of mathematics education in contexts different from school such as ethnomathematical practices (e. g., Nutti, 2013) and preschool mathematics (Helenius et al., 2018). These theoretical lenses are used to examine the tension.

Summing up, these two theoretical lenses allow us to approach the explicit entrance of mathematics into the 2016 curriculum modification from the perspective of mathematical enculturation. We acknowledge that there has always been “mathematics” in the practices of school-age educare. But by investigating the actual enactments of mathematical enculturation, it is possible to characterize what is particular to the context of educare. Therefore, this study takes the work of practitioners in the field as a point of departure and attempts to respect their work and expertise. At the same time, the research adopts a critical stance that problematizes

the tendency towards schoolification imposed by policy changes and offers an alternative conceptualization for practice. By researching the mathematics enacted in centres, our intention is to make visible and add meaning to the position of mathematics in school-age educare, where “care, play and leisure [relate] in a beneficial way” (Klerfelt et al., 2020, p. 187).

Methodological and Analytical Approach

Contextual conditions create a dynamic process of policy/curriculum enactment (Ball et al., 2012). These conditions bring together configurations of values, attitudes, relationships, historic development and resources into the enactment process. Since contextual conditions are unique in each setting, the overall research design for this research is based on two comprehensive case studies (Flyvbjerg, 2006) in two distinct school-age educare centres—the Moon and the Sun—both located in a medium-sized municipality in Sweden. Both settings service ten-year-old children in school buildings. The Sun is part of a rural school where most children have Swedish backgrounds, while the Moon operates in an urban area where the children have more cosmopolitan roots.

The empirical material for this study is the set of participatory observations completed by the first author of this article. Twelve observation sessions between one and three hours each were conducted in two educare centres offered to children in the ages of nine and eleven. Participants in the observations were one school-age educare teacher, one staff, one school teacher and children at the centres. Some caregivers were also included, since they engaged in some activities when collecting their children. The observations were documented using field notes, photos, audio- and video recordings. The video recordings were collected as the researcher moved around observing and talking to children, identifying Bishop’s mathematical activities. No general video recording was made to protect children’s privacy. The overall material amounted to 60 minutes of recordings and 73 photos.

Ethical considerations follow the Swedish Research Council’s (2017) general principles for quality and ethics in research. Permission was granted by the municipality and the leadership of each centre. Staff, children and caregivers signed written participation consent. The names of all institutions and characters are fictional. The first author’s identity as a researcher shifted with the settings—at the Moon, she was a familiar mathematics teacher at the school, while at the Sun, she was an outsider. Being familiar to the children in the Moon was an advantage since the children did not seem to change their behaviour when she came closer, but it was a disadvantage since the participants were aware of her research interest in mathematics education.

The observations were analysed in detail by the first author and then in collaboration within the research team. The recordings were closely examined to select sequences of activity where it was clear that one or more of Bishop’s six mathematical activities were evident, by paying attention to the participants’ verbal communication, bodily expressions and actions. In this first stage, 21 sequences varying between 15 seconds and 7.32 minutes, were selected.

In the second stage, each one of the 21 sequences were analysed, paying attention to the aspects of policy enactment theory—the interpretive, the material and the discursive—at the

concrete level of the enactment process taking place. A table was completed for each sequence, describing the situation, who was involved, what the situation was about, and which of the six mathematical activities were evident and in which form. The interpretive aspect described how the participants were talking, gesturing and posing questions as they made sense of the mathematical activity. The material aspect organized the use of space and artefacts that were drawn as part of the activities and interactions. It became evident that the participants' bodies played a role in relation to other artefacts. The idea of bodies as an active force in learning (De Freitas, & Sinclair, 2013, p. 454) allowed us to focus on bodily movements and gestures as materialisations of mathematical activity. The discursive aspect was traced through connecting each of the situations to the characteristics of the centres' culture. Out of this second stage of analysis a pattern emerged regarding the frequency with which Bishop's mathematical activities were evident and how the aspects of enactment were configured. This led to the identification of three types of school-age educare mathematical activities: *making creations*, *describing relationships* and *addressing problems*.

In the last stage, the 21 tables of sequences were examined again with the focus on how attitudes, justifications and ideas were represented and defended in expressions and productions. Applying a keen and subtle eye to the interpretive, discursive and material aspects in each sequence revealed three types of formations covering values of school-age educare mathematics. Values that were frequently enacted in the 21 sequences were *plausibility*, *critical stance* and *connectedness*.

Results

The resulting identification of three types of activities and values provides a way to talk about mathematics “in tune with”—to paraphrase Bishop (1988, p. 179)—the cultural context of school-age educare. In other words, the analysis of situations where Bishop's six mathematical activities emerged explicitly, and the analysis of the discursive, interpretive and material aspects of their enactment led to identification of the activities and values of school-age educare mathematics. Below, the values and activities are presented in general and then illustrated with three vignettes that provide us with insight into their enactment in practice.

The value of *plausibility* was visible as participants expressed justifications and arguments that made their actions reasonable by connecting to the world outside the educare setting. *Critical stance* was evident in the form of challenges to, questionings of and reflections on their own doings or the doings of others. The value of *connectedness* was traced in the participants' involvement in the situations, in their actual collaboration with others, and in the ways in which they responded—turning and moving—towards each other. The values were expressed not only in verbal enunciations, but also in the bodily actions and use of artefacts, space and materials.

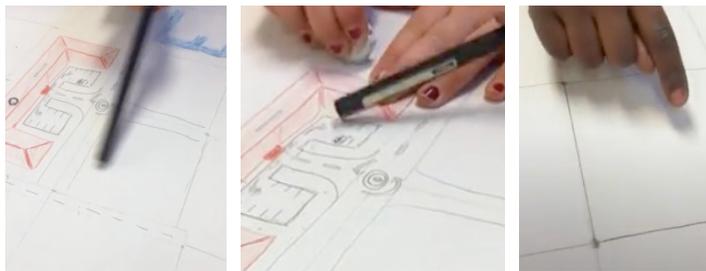
Making creations was an activity where designing was dominant, while counting, localization and explaining were less evident. In making something new, artefacts and children played a crucial role in participants' conversations and actions. Creations, reproduction of patterns and constructions were produced. Creativity appeared as a framing approach in the

situations. Taking a critical stance was slightly more salient in this activity than the values of plausibility and connectedness.

In the activity *describing relationships*, explaining, locating and measuring, and the value of plausibility were more salient. The situations were framed in the instructional and teaching approach, where the focus of communication among participants was on describing concepts and ideas for the purpose of producing descriptions and generalizations. Artefacts and bodily movements were evident in explanations.

When it came to *addressing problems*, measuring, playing and counting were most frequent and the value of connectedness was slightly more salient and crucial in participants' involvement with each other, exchanges and reasoning. Artefacts and children's bodies were tools to elaborate ideas and generate strategies to achieve commonly agreed aims. Tackling problems while taking existing rules and ways of acting in a familiar social context into consideration was an approach that framed the situations.

Mapping "Our City"

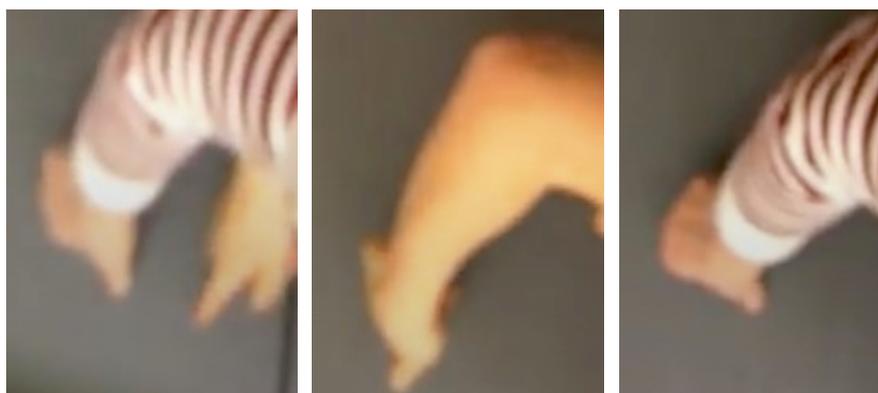


At the Moon, school and school-age educare staff are working with the children in building "Our city". Sofia and Johanna are drawing on an A1 sheet of paper. They are using special coloured markers and a ruler. I head to their table, asking what they are up to. Sofia lifts her head and answers enthusiastically: "We are making a map of a city." Johanna explains that they are making this map because they are going to build a city based on it. They explain that the map represents an urban area and with their markers indicate different buildings and arrangements. "Here there will be a pet shop", says Johanna, placing her marker where the shop will be located. The grocery stores and the pet shop seem far away from each other, so I ask: "Why is there such a large distance between the pet shop and the grocery store?" Johanna moves the marker back and forth on the highway connecting the grocery store to the pet shop and says: "Because ... it should be suitable for cars to go between..." Then Johanna places the marker between the grocery store and a closer, empty area across the street and says: "If we put it here, then everyone can just walk". For clarification, I ask: "Okay, you should be able to drive to the pet shop?" Sofia nods and ends the discussion by demonstrating the idea of the map making: "... you can go by car because there's a road here", sliding the marker again back and forth along the road.

This vignette illustrates the activity of *making creations*. A creative perspective frames the overall activity. Children design an urban space, measure at scale the sizes of the elements that

will make up that part of the city, locate them in ways that seem suitable and explain the ideas behind their design. Holding markers, they use their hands to show the spatial environment and slide the marker between points to make visible the distance between buildings. The values of critical stances and plausibility are enacted when the children link the map to reality as a way of expressing similarities with situations they are familiar with, reflect on the characteristics of their design and justify their choice of distances. In the children's conception of the urban area design, it is evident that customers will be required to have a car. Their design of the area and the consequences this brings are justified because of the connection to an existing urban area nearby their school. The value of connectedness is embedded in the bodily and verbal expressions that children build together and that emerge in the relations between maps, cities and realities as they generalize and justify their creation—for example, if the distance is long, there is a highway and therefore one needs a car.

Increasing Security



At the Sun, children and one school-age educare teacher are playing in the imaginary setting called Sara's Café. In the room, children have created several businesses and have labelled them: there is a veterinarian, a bank, a police station, a toy shop and, of course, Sara's Café. The teacher, "Sara", who dresses up to play the role of the café owner and a child, Patrick, are standing by the wall discussing something. I get closer to observe and record their interaction. Patrick, the police officer in town, has been called to install a security system at the café. Patrick is telling Sara how to operate the newly installed alarm box. "Put your thumb here and push". Patrick points to the wall, to the imaginary box, showing her how to push a pretend button. Sara does as he tells her, though not for long enough, and informs him about her observation: "Whoops! A light on the alarm box turned yellow". Patrick reacts to the light, quickly extends his hand to reach the box and says: "Press again but a bit longer. Now press OK and then press three other buttons. Now you should enter a passcode". Sara follows the instruction carefully. The alarm is set, and the policeman returns to his police station.

The vignette above is a *describing relationships* activity, framed by an instructional and teaching discourse. In this case, however, it is not the teacher who instructs and teaches but the

child who frames the situation. The child describes and explains to Sara the function of a security system, creating an imaginary object and using his hands as he points to and presses imagined buttons for a certain duration and number of times. His instructions are accurate and Sara understands him; he seeks her attention, then reflects on and reacts to her actions. Connectedness is evidenced in his relation to Sara and the system. Measuring appears in the bodily actions of pressing the buttons, as he shows a sense of time span that relates to the speed needed to move the fingers on the box. He verbally and bodily describes and explains the function of a technological system and generalizes it—when there is a security box, one needs to press certain buttons and enter a passcode for it to work. The value of plausibility is evident as his security system is designed to mirror an existing object, pictured through imagination, but actualized in the concrete situation.

Making a Withdrawal



I'm sitting in a corner at Sara's Café. Mary and Rita are the bank tellers today. Sara approaches them and states her errand at the bank: "What is my balance?" Rita replies: "You have 1500 kronor in your bank account". Sara points to the coins and bills: "Great, I want to withdraw 1500 kronor in different denominations. I need money with lower denominations to give change to my customers". The girls start to talk, count and discuss. After a while, it seems that their calculation goes wrong. Rita becomes confused, looks at the stack of coins and bills and turns to Mary: "3000 ... no, wait, wait. Where were we?" The counting takes a while and Sara waits patiently. Rita becomes a bit stressed and says: "Sara, can you please come back in a while, when we have this worked out? We will contact you." Rita turns to Mary and says: "Now, I need to count by myself. Do not put any money in here please. Let me have some peace and quiet". Rita starts to count the money; she lays the coins and bills in a stack and starts to write the amounts on a memo pad. She writes and rewrites, putting the bills into piles and explaining the calculations to Mary. Mary listens and helps. After some minutes, she shrugs her shoulders and lifts her face in triumph: "Now we need to call Sara and tell her it's all worked out!"

This vignette illustrates the activity of addressing problems. It unfolds a perspective of tackling problematic issues as a process with an unknown end or result. As Sara enters the bank to withdraw money, nobody can predict how the situation will evolve. The children measure the value of the money, count the bills and coins to match the desired withdrawal amount with their denominations, and engage in playing as bank tellers with a customer. Connectedness appears in a special way as Sara allows the space for the children to do their work without intervening. The children recognize their challenge but kindly ask to be alone to think. A critical stance emerges as the children recognize the difficulty in counting money in given denominations and restart counting in a more systematic and strategic way, considering the desire of the customer—the amount to be withdrawn and the small denominations. The arguments were connected to familiar situations and became a source of justifications for participants' actions and expressions.

Discussion and Conclusion

This paper began by pointing out a tension between the possibilities of educare and a policy tendency towards schoolification where “mathematics” appears in the curriculum as an explicit education area in school-age educare. The unchallenged association of mathematics with the practices of school may reinforce such tendencies, which compromises the special qualities to be found in the combination of education and care that characterizes school-age educare as a space for children's whole development and well-being. Questioning whether an alternative conceptualization of “mathematics” is possible emerges as a way to counteract unchallenged policy directions about what counts as mathematics in school-age educare. Theoretical tools from policy enactment theory, drawing on Ball and collaborators (2012) and mathematical enculturation based on Bishop (1988, 1991a, 1991b), allowed a detailed study of how activities can be recognized as mathematical in a broader cultural sense unfolding in the enactment of the interpretive, discursive and material aspects of the curriculum. In contrast to Haglund and Peterson (2017), these theoretical tools allowed us to explore the mathematics not as a discourse of “learning cognitive abilities”, but as a particular emergence in a practice where education and care are combined (Klerfelt et al., 2020).

The results showed that three types of *school-age educare mathematical activities* and a set of three *values* were enacted in practice. “Mathematics” refers to the particular configurations of the cultural mathematical activities—counting, locating, measuring, playing, explaining and designing—and the lived-in, embodied values emerging as participants engage in the context of school-age educare. The activities of making creations, describing relationships and addressing problems, together with the values of plausibility, critical stance and connectedness offer a way of conceptualizing school-age educare mathematics as a complementary approach to knowledge and learning. We envision school-age educare as a space for the enactment of activities and values, experiences and challenges coming alive in the entanglements of contexts, participants, interpretations, discourses and materialities. In short, a space of emerging mathematical possibilities. The vignettes presented in the paper illustrate such spaces. The empirical identification of these mathematical activities and values may not

be the only possible way, but it was the way that was evident at the Sun and the Moon at the time of observation.

Our conceptualization offers a description that differs from the usual ways of viewing school mathematics. There is no prescribed syllabus or content to follow, nor predetermined list of right abilities or competencies in this view of school-age educare mathematics. From our perspective, mathematics emerges out of children's and teachers' genuine interest and engagement, and out of what they know and who they are. As proposed by Harvard Maare (2015), children's interests and affects need to be met more in the educational debate. The mathematics is not external to them, but it is in their daily conversations, actions, productions, thoughts, imaginations and challenges as they relate and reason in the cultural context of school-age educare. This type of mathematics values care for others and the situation, the good reasons that are expressed to support actions, and the efforts to tackle challenges together. Such a set of values also differs from school mathematics values. Thus, school-age educare mathematics offers a compensatory area for children's experience.

This conceptualization provides a concrete tool for practitioners to understand, think about and recognize "mathematics" while respecting the nature of their own practice. Teachers and staff can identify and stimulate the emergence of mathematical activities and values through communication and encouragement. They can take a step back or get involved to build on children's interests, knowledge and expression. In this way, school-age educare mathematics can offer a complementation and compensation to school mathematics.

References

- Ball, S. J. (2003). The teacher's soul and the terrors of performativity. *Journal of Education Policy*, 18(2), 215–228.
- Ball, S. J. Maguire, M. & Braun, A. (2012). *How school do policy: Policy enactments in secondary schools*. London: Routledge.
- Ball, S. J. (2015). What is policy? 21 years after: reflections on the possibilities of policy research. *Discourse: Studies in the Cultural Policies of Education*, 36(3), 306–313.
- Bishop, A. J. (1988). Mathematics education in its cultural context. *Educational studies in mathematics*, 19(2), 179–191.
- Bishop, A. J. (1991a). *Mathematical Enculturation: A Cultural Perspective on Mathematics Education*. Dordrecht: Kluwer.
- Bishop, A. J. (1991b). Mathematical values in the teaching process. In A. J. Bishop, S. Mellin-Olsen, J. Van Dormolen (Eds.), *Mathematical knowledge: Its growth through teaching* (pp. 193–214). Springer, Dordrecht.
- Bray, M. (2013). Benefits and tensions of shadow education: Comparative perspectives on the roles and impact of private supplementary tutoring in lives of Hong Kong students. *Journal of International and Comparative Education*, 2(1), 18–30.
- de Freitas, E. & Sinclair, N. (2013). New materialist ontologies in mathematics education: The body in/of mathematics. *Educational Studies in Mathematics*, 83(3), 453–460.
- Fisher, N. & Klieme, E. (2013). Quality and effectiveness of German all-day schools: Results of the study on the development of all-day schools. In J. Ecarius, E. Klime, L. Stecher & J. Woods (Eds.), *Extended Education: An International Perspective* (pp. 27–52). Opladen: Budrich.

- Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research, *Qualitative inquiry*, 12(2), 219–245.
- Government (2016). Regeringens insatser inom området matematik, ett av de ämnesområden som mäts i TIMSS, TIMSS Advanced och PISA. Stockholm: Utbildningsdepartementet.
- Gunnarsdóttir, B. (2014). From play to school: are core values of ECEC in Iceland being undermined by ‘schoolification’? *International Journal of Early Years Education*, 22(3), 242–250.
- Haglund, B. & Peterson, L. (2017). Why use board games in leisure-time centres? Prominent staff discourse and described subject positions when playing with children. *International Journal for Research on Extended Education*, 5(2), 188–206.
- Harvard, Maare, Å. (2015). *Designing for peer learning: mathematics, games, and peer groups in leisure-time centers*. Diss. Lund: Lund University.
- Helenius, O., Johansson, M., Lange, T., Meaney, T., Riesbeck E. & Wernberg, A. (2018). *Matematiska aktiviteter*. The National Agency of Education.
- Holmberg, K. & Ranagården, L. (2016). Logics of “Good teaching”: Exploring Mathematics Education in Primary School in Sweden. *Athens Journal of Education*, 3(3), 225–240.
- Nutti, Y. J. (2013). Indigenous teachers’ experiences of the implementation of culture-based mathematics activities in Sámi school. *Mathematics Education Research Journal*, 25(1), 57–72.
- Klerfelt, A., Haglund, B., Andersson, B. & Kane, E. (2020). Swedish School-Age Educare: A Combination of Education and Care. In S. Hoon Bae, J. L. Mahoney, S. Maschke, L. Strecher (Eds.), *International Developments in Research on Extended Education: Perspectives on extracurricular activities, after-school programs, and all-day schools* (pp. 173–192). Toronto: Budrich.
- Lager, K. (2015). *I spänningsfältet mellan kontroll och utveckling: en policystudie av systematiskt kvalitetsarbete i kommunen, förskolan och fritidshemmet*. Diss. Göteborg: Göteborg University.
- Noam, G. G. & Triggs, B. B. (2018). Expanded learning: A thought about terminology, typology, and transformation. *International Journal for Research on Extended Education*, 6(2), 165–174.
- OECD. (2019). PISA 2019 What school lives mean for students’ lives, OECD <https://www.oecd-ilibrary.org/docserver/acd78851-en.pdf?expires=1586362787&id=id&accname=guest&checksum=C2268A856B66EE4B2FED52B387E004F9> Accessed 200829
- SFS 2010:800. *The Education Act*. The Department of Education.
- Sivan, A. & Po Kwan Siu, G. (2020). Extended Education for Academic Performance, Whole Person Development and Self-fulfilment: The Case of Hon Kong. In S. Hoon Bae, J. L. Mahoney, S. Maschke, L. Strecher (Eds.), *International Developments in Research on Extended Education: Perspectives on extracurricular activities, after-school programs, and all-day schools* (pp. 211–221). Toronto: Budrich.
- Swedish research council (2017). *Good Research Practice*. Stockholm: Vetenskapsrådet.
- The Swedish National Agency of Education (2018a). *Curriculum for the compulsory school, preschool class and school-age educare 2011* (Rev. 2018, English version). Stockholm: The Swedish National Agency for Education.
- The Swedish National Agency of Education (2018b). *Elever och personal i fritidshem 2017/18*. <https://www.skolverket.se/getFile?file=3941> Accessed 200829
- The Swedish National Agency of Education (2016). *The School-Age educare. A commentary material for the fourth part of the curriculum*. Stockholm: The Swedish National Agency of Education.
- Wallin, A., Norén, E., & Valero, P. (2019). Tensions in the Swedish fritidshem mathematics curriculum: A policy enactment perspective. In J. Subramanian (Ed.), *Proceedings of the 10th International Mathematics Education and Society Conference (MES 10)*. Hyderabad, India: MES.