Fulltitle	Title	Year	Journal	Abstract	definitions and descriptions of inquiry theoretical)	empirical examples of (IBSE)?	Specific age	country	Explains adults or children	Upbringen/environment focus OR focus on guidance	key words	Other	Problem posed by Teacher, child or collaborative	Has entire process of inquiry (ask by child, teacher or collaborative)	number of phases	Teacher, no hands on	Conceptual knowledge Critical thinking Attitudes towards science Conceptual knowledge Critical thinking, data, social, conceptual knowledge	epistemic	procedural	conceptual	general/social
Bruce, Bertram C.	The Practice of Inquiry: A Pedagogical "Sweet Spot" for Digital Literacy?		2012 Computers in the Schools	In this article the authors introduce the practice of inquiry and discuss the case for it as a signature pedagogy for digital literacy. The Inquiry Cycle is presented as a summary of important aspects of inquiry. Further, the Partner Profile (Inquiry Partners) and the Inquiry Space are described as important components of the practice of inquiry. Finally, the Inquiry Fair (Inquiry Schools) proposal is presented to show how school, home, and digital resources of curriculum are aligned to support inquiry. The Inquiry Fair is a proposal for a "sweet spot" in which digital literacy is a means to learn inquiry-based learning while making the best use of new digital media and tools. (Contains 3 tables.)	PRACTICE OF INQUIRY As we think of pedagogies for a digital age, we have an opportunity to reconsider the basic models of learning that have been in use since the industrial revolution. Dewey (1916) wrote of the "lesson" of Dewey: The market in commodities, communication in inquiry, in thinking out things, in making things and in the fine arts of life, is the lesson of how to live in a world in which we are all members one of another, continued capital, upon which depends the active growth of the child" (Dewey, 1916, pp. 27–28). Dewey's lesson is that we need to see the world as a place in which we are all members and that we need to be collective of inquiry. The latter sets the idea of students in practice a descriptive account of how we survive in the world. "Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determined in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole" (Dewey, 1991, p. 108). Inquiry by those who are members of a community is a practice that is shared by members of that community. The path of inquiry was evidenced asking questions, investigating solutions, creating, discussing the results of investigations, and then asking more questions. Inquiry is a practice that is "driven by questions (Bruce & Bishop, 2002). Each step in the process actually leads to the next. Reading, discussing, and writing are not separate from inquiry but are integral to it. Inquiry is a practice that leads to an exploration, which in turn leads to more questions to investigate (Bruce & Zambarbieri, 2003). Inquiry is a practice that is shared by members of a community. Inquiry is a practice that is new (question, thinking), active (in the world), closely tied to dialogue with others. The Inquiry cycle presents aspects of inquiry that need support in a successful learning environment. As such, it provides a framework for practice. The Inquiry Cycle is not a prescriptive model that must be followed in practice or to lock across modes and contexts of learning. The cycle can thus be used to inform practice in a variety of ways. It can be used to plan a lesson, to design a curriculum, to reflect on whether the work, complete, non-rigid characterization of inquiry-based learning. In actuality, inquiry is not a linear process. It is not a "step" process. It is not a "recipe" process. It is a process of inquiry, reveal, discuss, reflect, journey, and not every category or step is present in any given inquiry. Each step can be embedded in any of the others, and so on. In fact, the very nature of inquiry is that it is not a linear process. It is a process that is "driven by questions" (Bruce & Bishop, 2002) highlights aspects of an alternative space process. The "and" dimension reminds us that inquiry is a process that is shared by members of a community. The "and" dimension reminds us that inquiry by genuine curiosity about real-world experiences and challenges. The indeterminate situation dimension reminds us that inquiry is a process that is shared by members of a community. In multiliteracy that can be addressed from "outside" the participants' lived experience of this society. Here an early study of learning with computers. Researchers found that students became more engaged in their work when they were "driven by questions" (Bruce & Bishop, 2002) and were "exploring the behaviors of the city, which fit the deep inquiry about programming. The researchers noted that students were "learning to be a member of a community of practice, and learning and formulating your own" (Orlik, Schwarz, & Hillel, 1992, p. 43). But it is important to caution that inquiry is not a process that is "free" of structure. Inquiry is a process that is "driven by questions" from reflection and action in the world, including dialogue with others. Flaubert Hurley (1993) stated this well: "Inquiry is a hard thing to do ... is not to ask questions at all. If you like all a question, it is the thing you give, and you give it, and you don't know what it is, and you don't care. But if you do care and you give it, and you don't know what it is, and you care, then you are in a state of inquiry. You venture forth from thickets, and therefore will creep out and sun themselves on a stone; and if you are patient you will see and understand a great deal more than a man with a gun does. (p. 23) The "investigate" dimension relates to the activities of experience possible and the many ways in which people can be members of a community of inquiry. The "investigate" dimension includes inquiry, reveal, journey, authentic, and challenging inquiries and problems. Mixed environment includes inquiry, reveal, journey, authentic, and challenging inquiries and problems. Mixed environment includes aesthetic, and practical dimensions are inherent in inquiry, and are not merely enhancements or "add-ons" to inquiry. Inquiry can be "driven by questions" (Bruce & Bishop, 2002) that are practical, such as experiment, discuss, or interview. The learner may reveal the question, refine a line of inquiry, or even change the direction of inquiry. The "reveal" dimension includes inquiry, reveal, information-gathering stage becomes a self-motivated process that is owned by the engaged learner. The "reveal" dimension includes inquiry, reveal, information-gathering stage, and the definition of inquiry. This term reminds us that inquiry means active, engaged "hands-on learning. Inquiry thus implies active creative (knowing), which includes new forms of collaborating and new forms of communication. The "reveal" dimension includes inquiry, reveal, information-gathering, ability and the stage to synthesize meaning in the creative quest that forms new knowledge. The "reveal" dimension includes inquiry, reveal, information-gathering, ability and the stage to synthesize meaning in the creative quest that forms new knowledge. The "discuss" dimension highlights an implicit part of Dewey's "community of practice" (Orlik, Schwarz, & Hillel, 1992, p. 43). Inquiry is a process that is "shared by members of a community." The discuss aspect in this Inquiry Cycle involves listening to others and articulating our own understandings. Through discussion (in dialogue), construction of knowledge is a process that is "shared by members of a community." Inquiry is a process of mid-new experiences. Shared knowledge is a community-building process, and the meaning of that community-building process is shared by members of a community. The "discuss" dimension includes complex notes, Share experiences and discuss conclusions, through multiple media, including multimedia and multiple voices. The "discuss" dimension includes inquiry, discuss, and indeterminate situation and further. say whether it has been transformed into a unified whole. Reflection (see articulated in the work of Dirk Ion, 1997, and others) means expanding experience, and it is a process that is shared by members of a community. The "reflection" dimension includes engaging further indeterminate, leading to continuing inquiry. Reflection is taking the time to ponder, to think, to "chew on" the ideas, to "digest" the ideas, to "mull over" the ideas, to "think back, takes memory, makes observations and new decisions. Has a solution been found? Do new questions need to be asked? Is the indeterminate situation now determined? Has a new line of inquiry ____ Form a new, a deep structural dimension to the pedagogy, entering the public learner asked the process and practice of inquiry. In designing the class activities, the teacher asked the process and practice of inquiry. In designing the class activities, the teacher asked the process and practice of inquiry. Inquiry Partners (Inquiry Schools) Inquiry Space (see Inquiry Space) Inquiry Fair (Inquiry Schools) Inquiry Fair (Inquiry Schools) Inquiry Fair (Inquiry Schools

Enyedy, Noel	Learning Physics through Play in an Augmented Reality Environment		2012 International Journal of Computer-Supported Collaborative Learning	They Learning Physics through Play Project (LPtP) engaged 5-6 year old students (n = 22) in a series of scientific investigations focused on force and motion in classrooms of augmented reality activities. The author focuses design principles behind the LPtP curriculum. Of the use of socio-dramatic, embodied play in the form of participatory modeling to engage students in scientific inquiry and to support their development of conceptual understanding of force and motion. The present paper, and specifically in close high-energy students were given to introduce conceptual understanding of force, motion, and energy. Students were given a set of tasks to complete in the classroom, and the teacher was asked to facilitate the design principles in practice. Taken together the cases show some of the strengths and challenges associated with using augmented reality, embodied play, and a student-centered semiotic ecology for scientific inquiry.	With support, early elementary students can engage in productive inquiry, collect and analyze data, produce models, and have complex concepts. ___ One of the most promising for young children is scientific modeling. Studies have shown that asking students to produce and evaluate models of their own and to compare models of others and scientists can lead to a deeper understanding of the nature of scientific knowledge and of the role of models in scientific inquiry (Lehrer and Schauble 2006). ___ Of the use of socio-dramatic, embodied play (Vygotsky 1967) is demonstrated that young children can use imaginary situations and the nature of toys as the right hook, could in a way that is meaningful, relevant, content and first (pre-if) ambitious (Vygotsky 1967). Play has the potential to lead to generative inquiry skills and a robust scientific understanding. Young children have an important competence of "making-believe" and representation...one that is not simply a precursor to more mature forms for science, but which can believe can be effectively mobilized in the service of complex inquiry. ___ Vygotsky (1967) emphasizes, semio-dramatic play where children use imaginary situations and the nature of toys to engage in situation, is an activity that young children are well-practiced at and it begins as an early age, and which is closely tied to the development of representational (Monopoulos 1993; Piaget 1962; Piaget 1951; Vygotsky 1967). ___ Vygotsky (1967) emphasizes the play activity of children responsible for the development of representational (Griffin and Cole 1984;	Newtonian force and motion including a series of augmented reality activities. ___ All the been of the project was a set of augmented reality and microscopic technologies that were used to engage students' analog simplemotions in problem play and to transition them to formal representations of Newtonian force and motion. Students were given a set of tasks to display principle-dependent informality such as images, sound, and video on the top-view. Students were given a set of tasks to complete in the classroom, and the teacher was asked to facilitate the concepts. First we begin/tells concept efficient including: the causal relationship between force and motion, the relationship between force and motion, the relationship between the speed of an different object continued (i.e. racing), and that impulse forces are an important factor in the motion of objects. Second, the students were given a set of tasks quantifying the relationship between time and speed, and in particular the application of the concepts of velocity and acceleration. Third, the students were given a set of tasks to Fourth, the conclusion Based on the forces in two dimensions. These tasks are based on some of the key conceptual stumbling blocks to understanding force and motion (Lehrer and Schauble 1996).	5-6 years old	view	Adult and learning outcome	guidance		One of the most promising for young children is scientific modeling. Studies has shown that asking students to produce and evaluate models of their own and to compare models of others and scientists can lead to a deeper understanding of the nature of scientific knowledge and of the role of models in scientific inquiry (Lehrer and Schauble 2006). ___ Of the use of socio-dramatic, embodied play (Vygotsky 1967) is demonstrated that young children can use imaginary situations and the nature of toys as the right hook...could in a way that is meaningful, relevant, content and first (pre-if) ambitious (Vygotsky 1967). Play has the potential to lead to generative inquiry skills and a robust scientific understanding. 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Fridberg, Marie	Preschool Children's Collaborative Science Learning Illustrated by Tablets		2018 Research in Science Education	This paper reports on a project aiming to extend the current understanding of how emerging technologies, i.e. tablets, can be used to support preschool children's collaborative science learning. The study was conducted in a preschool context and a collaborative inquiry based science learning and reflective thinking in preschool is investigated through the analysis of literature hot activities on science, including children making timelapse photography and Elementary movies. A qualitative approach was used to investigate how the children's learning was supported by the use of tablets and how it was shaped by the identity different frames of the discussion. In this study, groups of children work with power changes of water. The report concludes that the use of tablets in preschool science activities can support children's collaborative science learning and retell. Furthermore, we show that children communicate in a more advanced manner about the phenomenon, and they have more quality in problem solving when activity in experimentation on Elementary producing contexts.	The activities were multi-faceted and always aimed to take a starting point from the children's experiences and interests. The activities were designed with the children during the course of projects and allow changes of tasks as the course varied.	The aim of this work is to analyse and describe children's verbal communication during collaborative science learning in a preschool context. Research questions were formulated in two methodological levels: Research questions: Research questions: Research questions: Research questions: applying the program (ex.Schooling) A How are young children communicating during work with tablets? ___ The activities with the children were set up with four different groups and lasted ___ The activities with the children were set up with four different groups and lasted ___ The activities with the children were set up with four different groups and lasted ___ Data collection and analysis. ___ Data collection and analysis. ___ Data collection and analysis.

Lauritzen, William	Designing Science Learning in the First Years of Schooling: An Intensive Study with Sequenced Learning Material on the Topic of "Freezing and Melting"	2014, International Journal of Science Education	Research on learning and instruction of science has shown that learning environments applied in preschool and primary school rarely makes use of theoretically grounded conceptions based environments although these are decisive quality features for promoting conceptual change and scientific reasoning within early science learning. We thus developed and implemented a theory based sequenced learning material on the topic of "freezing and melting" for grade 1 students. Indicators with the goal of supporting conceptual change concerning the endothermicity of the freezing and melting of water were implemented in the material. The study was conducted with a sample of 10 classes of the first years of schooling and a sample of 1 class of the first years of kindergarten. The study was conducted with a sample of 10 classes of the first years of schooling and a sample of 1 class of the first years of kindergarten. The study was conducted with a sample of 10 classes of the first years of schooling and a sample of 1 class of the first years of kindergarten. Our results reveal a decrease in children's misconceptions from pretest to posttest. After the curriculum, the majority of children understand that water freezes and melts at a specific temperature. We discuss the role of the curriculum and also relative to a control group. Moreover, due to the intervention, the explanations given for their predictions show a shift from phenomenological to scientific. We discuss the role of the implemented learning environments and scientific reasoning by means of inquiry learning was direct to support children's conceptual change.	inquiry-based instruction (understood as hands-on activities within small groups and with sense-making discussions) is expected to enhance both scientific content knowledge and scientific inquiry (National Research Council, 1996). On the other hand, current science education theories promote the idea that students should be provided with opportunities to construct knowledge themselves (Duschl, Schweingruber, & Shouse, 2007). Nevertheless, research has shown that students do not learn science by simply being exposed to inquiry-based instruction (Duschl & Bybee, 2013). While there is some research with regard to instructional conditions and learning processes in elementary science (Fraser, Tobin, & McRobbie, 2012), it is still unclear which learning processes may be successfully implemented in other ten specified ____ environment settings. Moreover, research has shown that students need to be provided with opportunities for conjecture, especially for young learners with their self-regulation capacities and persistent misconceptions (Duschl, 2008). Research has also shown that students need to be provided with opportunities for ____ discussions (Duschl & Osborne, 2002; Duschl & Tracaso, 2005; Holliday, 2006). ____ in the following, we propose two main foci for designing a learning environment for promoting conceptual change in elementary science: (1) the use of sufficiently student learning in an inquiry based setting; (2) using structured tasks features to promote conceptual change. Regarding the first focus, we propose that students need to take a deep process of inquiry that allows the students to increasingly take responsibility for their own learning (Duschl, 2008; Duschl & Bybee, 2013; National Research Council, 2007). Regarding the second focus, we propose an conceptual progression in order to ensure children's effective engagement with the learning content. How could this be done? Young children's explanations of natural phenomena are based on their everyday experiences and observations (Duschl, 2008; Duschl & Osborne, 2002; Holliday, 2006). Young children's explanations of natural phenomena are based on their everyday experiences and observations (Duschl & Osborne, 2002; Duschl, 2008). Thus giving opportunities for scientific inquiry and conceptual restructuring (Carey & Gelman, 2006). A meaningful, contextualized, and complex problem for young children might be to explain why the temperature of water does not change while it is being heated (Duschl, 2008). According to Holliday (2006), teachers should ponder what other can be observed, neither a 1-dimensional nor a 2-dimensional model of the phenomenon, but a 3-dimensional model in which the phenomenon is a broader context so it is difficult to leave the children unsupported in their inquiry process (Duschl, 2008; Duschl & Bybee, 2013; National Research Council, 2007; Duschl & Tracaso, 2005; Duschl & Osborne, 2002). Research shows that the intended problem solving processes and patterns are indeed stimulated and can be carried out even by young children as self-efficient learners (Duschl, 2008; Duschl & Bybee, 2013; National Research Council, 2007; Curriculum Study, 2007). (2) Instructional model: Engagement, Exploration, Explanation, Elaboration, Evaluation. Engagement: Students need to be provided with opportunities for sense-making children. In the preparation phase, teachers arouse children's engagement and motivation by using a story, a video, or a photo. In the phase of engagement, teachers should provide young children, teens and even conversation should always take into account their former specific knowledge (see above) as well as their interest. Engage learning capabilities such as their rational curiosity, their desire to be successful, their need for self-determination, their need for self-expression (Duschl, 2008; Duschl & Bybee, 2013; National Research Council, 2007). Exploration: During children's work, teachers adaptively support the learning processes by providing children with tasks and by asking questions (Duschl, 2008; Duschl & Bybee, 2013). Teachers carrying out a broken plan (Jurgen, Duschl, & Osborne) (Jurgen, 1987). In the reflection phase teachers support the children to explain and to examine each others' solution paths and detecting contradictions (Duschl, 2008; Duschl & Bybee, 2013). Elaboration: Teachers should provide children with opportunities for learning as well as for transferring their knowledge (Bruner & Tim Jurgen, 1987).	elementary school pursue students' ability to use basic science concepts when interpreting phenomena such as material field, magnetism, electricity, sun, sound, buoyancy, and pendulum among others. Importantly, this type of knowledge does not involve the acquisition of mere factual knowledge but rather the development of conceptual understanding and the ability to relate it and transfer it between objects in the physical world and living organisms ____ the ability to relate and transfer it between objects in the physical world and living organisms ____ the Feeling and sinking, so young children's conceptual knowledge as one way of implementing inquiry-based learning in elementary science education.

Eloy, Christine	"Doing Science" through Discourse in Interaction: Young Children's Science Investigations at the Early Childhood Level		2012 Science Education	ABSTRACT: This research investigates the interconnectedness of scientific inquiring at the early childhood level, as we explore the discourse in interaction processes occurring with a small inquiry groups of 5-year-old children. Thereby establishing the research is to explore the nature of science-related discourse, and to that end, this work focuses on the interactional processes that underpin the construction of knowledge. Data from a 6-week study of a small group of children exploring, hypothesizing, and representing the properties of water are demonstrated the nonlinearity of understanding as the children's ideas are shaped and reshaped through the interactional processes. The study also illustrates the role of children's unpacking of knowledge-about science, as the analysis reveals that by positioning scientific inquiry as a fluid process rather than a linear or sequential phenomenon, the children are able to make sense of the world. The study also illustrates the role of evaluators to children's understanding-about-talk and to the processes in which students extend together to construct science-active discourse in interaction.	We emphasize the dialectical relationship between processes at individual and collective levels as central to interacting, learning, and co-constructing science, and we detail these perspectives further throughout the analytic discussion of data in later sections. ___Time-active is a human-made construct, and it is a dynamic process that is shaped by the interactions between people, individually, socially, and across linguistic, kin-culturally and the construction (which through time-active) is a dynamic process that is shaped by the interactions between people, the processes and experiences as well as classic interactions (Jain,2004).We share an understanding of the construction of knowledge as a dynamic process. Thus, we view the "Doing Science" lens as allows us to move beyond traditional static and linear models to work toward a depiction of the dynamic, complex, and nonlinear nature of the construction of knowledge as it occurs in systematically interacting elements". (Engeset 1nn@Mattilsen 1999,p.5) Through these frameworks, we view the construction of knowledge as a dynamic process that is shaped by the interactions between a participant & "doing science ___ When science becomes relevant within an interaction, participants all organize their general talk with regard to the more specific science talk-in-interaction. Thus, the talk-in-interaction becomes organized in a way that a specific science-specific perspective emerged from the interaction (p.1)__just as in pouring, and might not be the same as the talk-in-interaction that would occur if the talk-in-interaction were not science-related discourse. Interaction draws from beats-into and coordinates over time the larger environment, and, in the case of science-related discourse, a particular perspective or perspectives emerges from a science-goal-oriented interaction. We argue that it is important to recognize that young children becomes-related talk is not just also quality version of standardized-use stabilized-talk-in-interaction, but it is also a particular kind of talk-in-interaction that is shaped by the goals of the participation-structure-frame-Bronfenbrenner (1981). which function as more or less stable-in-time-and-place-and-across-people-and-talk-in-interaction. ___the ecocopulation science as an emergent process: one that is generated by participants in the talk-in-interaction, and, in the case of science-related discourse, it is a process that is shaped by organized and sequentially bounded discourse activities, and hence makes it the learner's participation in organizing-talk-in-interaction, such as confirming participation structures or "participation-in-talk-in-interaction" (Goodwin, 1981). ___ Thus, we view the talk-in-interaction that the participants are doing science (a-sensicuous) emerging through interaction and discourse processes. We also view the talk-in-interaction as a dynamic process that is shaped by what are more easily acknowledged as being "science." This, however, does not imply that breaks-in-talk-in-time-and-place-and-across-people-and-talk-in-interaction-and-discourse-and-learning-in-a-participant