



Teaching Citizen-Learners

A Professional Development Framework for 21st Century Excellence

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In this white paper, we build on the ideas outlined in our initial Citizen-learners paper that introduced the need, capacities, and competences for excellence in 21st century education. While our first paper focused on what citizen-learners look like, this paper focuses on questions of teaching and teacher development: What do teachers do to facilitate citizen-learning? What tools and practices do they use? What should a professional development program look like that supports the teaching of citizen-learners? After reintroducing the Citizen-learners framework and underlying beliefs about learning and professional development, we discuss the practices and tools teachers use when supporting citizen-learners in the classrooms. We suggest a set of design principles for professional development programs based on decades of research at Project Zero, and illustrate several approaches using the method of Collaborative Inquiry. We conclude by identifying potential next steps, as well as appendices of useful resources for educators.

While much of professional practice is routine, the essential challenges of professional work center on the need to make complex judgments and decisions leading to skilled actions under conditions of uncertainty. This means that professional practice is frequently pursued at or beyond the margins of previously learned performances. That circumstance creates two related challenges for professional practice and education: professionals must be trained to operate at the uncertain limits of their previous experience, and must also be prepared to learn from the consequences of their actions to develop new understandings and better routines. They must also develop ways of exchanging those understandings with other professionals so the entire professional community benefits from their insight.

– Gardner & Shulman (2005)

Overview

Supporting the development of teachers – creating the conditions and processes in which they build their skills, knowledge, and practices – is the cornerstone of any effective curricular change initiative. When considering how best to support teachers, Gardner and Shulman remind us that it is not enough to focus on the routine work of teachers. Instead, we need to understand the complex choices and ambiguities teachers face in their professional work as facilitators of learning. We must assist teachers to expand their skills and practices to perform at “the uncertain limits of their previous experience.” Moreover, we must design ways in which teachers can learn from and with one another as well as share their insights with a broader community of educators.

At the heart of effective teaching are several perennial questions such as, “What should my students learn and why? Who are my students and how will they learn in a deep and lasting way? How will I and the learners know that they have learned?” Answers to these questions entail making critical choices about educational content, pedagogy, and assessment. Teachers must grapple with and develop answers to these questions. Avoiding such questions, exploration, and choices delegitimizes their professional practice. Instead, teachers must be supported and entrusted to navigate inherent uncertainties as facilitators of learning in order to make judgments that benefit the learners, communities, and larger society. Although not easy, the effort is particularly vital when the goal of a curriculum is to develop citizen-learners.

Building on the initial *Citizen-learners* white paper (Krechevsky, Wilson, & Gonzalez, 2020), this companion paper describes in greater detail various teaching techniques and tools that support citizen-learners. We propose core principles of, and effective programs for, high-quality teacher professional development of citizen-learning practices. Our proposal is informed by key findings and experiences

from over 50 years of Project Zero educational research into teaching practices and development. We also draw on broader trends in education regarding the evolving expansion of teachers' role from deliverer of knowledge or "sage on the stage," to include learning coach, facilitator, or "guide on the side." We include examples from different classrooms and schools using Project Zero ideas to illustrate what these principles, pedagogies, and professional development programs look like.

Background

In 2020, Centro Educacional de Campos (CEC), a k-12 school network and teacher development center in Brazil, and Project Zero (PZ), a research center at the Harvard Graduate School of Education, began a collaboration to develop an innovative k-12 framework to guide curriculum and professional development to foster the thinking, learning, and entrepreneurial skills needed in the 21st century. Although CEC's near-term focus is its network of schools and centers, CEC is ultimately interested in how such a framework can influence schools throughout Brazil, supporting educators and students by providing essential tools for living ethical and meaningful personal, social, and professional lives. After this one-year project, Project Zero and CEC will evaluate the prospects of extending the work to potential new phases of implementing and refining the framework and subsequent curriculum and teacher development for CEC and contexts beyond Brazil.

The first white paper, *Citizen-Learners: A Framework for 21st Century Excellence in Education* (2020), put forth an ambitious vision of key capacities and competences necessary for learners to become effective participants in today's complex world. We shared an organizing framework, examples, and detailed developmental indicators from which a potential curriculum could be developed. This white paper extends the discussion to examine how teachers support citizen-learners in classrooms, and how tools and practices can be tailored to develop citizen-learners' capacities and competences. We consider how best to support teachers themselves as citizen-learners by identifying key principles and recommendations for the design of effective professional development.

In an attempt to connect pedagogies and professional development principles to the Brazilian context, we consulted with Brazilian colleagues and surveyed some of the literature to better understand the nuances of teacher professional development in Brazil more generally, and CEC in particular. We have come to better understand several sobering aspects of being a teacher in Brazil. Much of professional development in Brazil is a "one-size-fits-all" model, implemented by government officials or higher education professionals, without input from schools or teachers (Nascimento, 2014; Villegas-Reimers, 2003). In 2017, out of 2,079,000 teachers in K-12 education; only 726,000 (34%) joined continuous education programs (Carvalho, 2018). Eighty-four % of teachers desire more PD than they receive (OECD, 2020). In addition, although the critical pedagogy of Paulo Freire (1968) continues to influence progressive educators in Brazil and elsewhere, the current government's actions aim to minimize, if not erase, Freire's impact on the country's curriculum and pedagogy. However, this initiative is limited due to the pedagogical independence of state and city public education systems and private schools to choose their own curriculum.

The COVID-19 pandemic and related stresses on Brazilian schools have exacerbated teachers' already low morale and lack of a sense of purpose (Araujo, Arantes, & Pinheiro, 2020). In light of the absence of a national accreditation, evaluation, or professional development system in Brazil, each school or school system has its own form of professional development. These schools and systems rarely communicate with each other or share knowledge. Teachers' professional learning typically occurs once a year in the

week before school starts, and often takes the form of an informal exchange of ideas and information, rather than formal professional development. In sum, the above paints a challenging systemic picture for any ambitious initiative aiming to alter the content and practices of teaching. Further work is necessary to test the claims we put forth about teaching and professional development within the cultural context and needs of the educators and school leaders in Brazil.

The pedagogical tools and professional development ideas presented here are intended to stimulate discussions among leaders and educators in Brazil about potential paths forward. However, as with our previous paper, we offer several caveats. The pedagogies and principles of professional development (PD) described below are shaped by the beliefs, values, and perspectives of researchers who identify as white, at a research center at a select private university in the United States. In addition, the practices of teaching are conceptually grounded in progressive ideals and a social-constructivist perspective of human development and learning. Although we have worked in a range of contexts around the world, we acknowledge that our ideas are culturally situated and limited.

The Citizen-learners Framework

In our previous paper, we argued that a promising pathway for creating excellence in 21st century education is through cultivating *citizen-learners*. We suggested that deliberately combining the civic and academic dimensions of learning supports three claims—that children should be viewed as citizens in the present, as well as the future; that learning takes place from birth and throughout a lifetime, both inside and outside of schools; and that the relationship between the individual and the community is mutually constitutive (and parents and other care-givers should not view children’s education as an individual pursuit). We proposed that citizen-learners come to both possess and value the following capacities in service of creating a more just, humane, and sustainable world—generating knowledge, navigating complexity, building relationships, and effecting ethical change. Below is a diagram of the Citizen-learners framework that addresses four essential questions: *Who are we as citizen-learners? What do citizen-learners learn? How do citizen-learners learn? What do citizen-learners do with what they learn?* Each question is accompanied by a list of related competences.

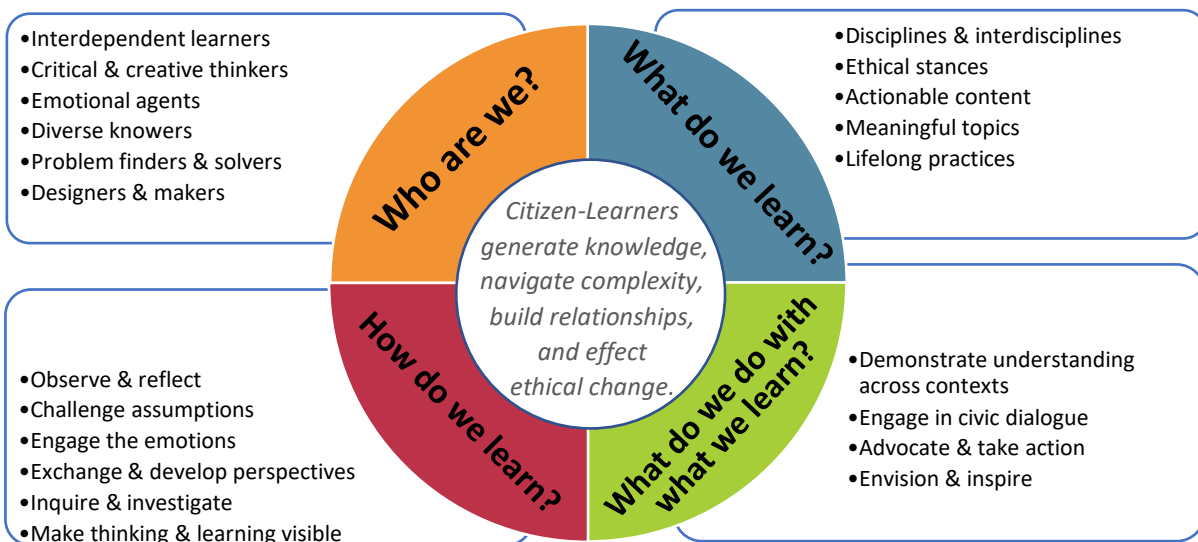


Figure 1: The Citizen-learners Framework

Embedded within this model is an important theoretical perspective on the nature of learning. Seminal research over the past half-century in the field of learning sciences, including at Project Zero, has led to new insights into the nature and theory of learning. No longer is higher-order learning understood as an individual, transmissive, and standardized process of receiving knowledge. Instead, this perspective views learning as an inherently social, complex, and active human process. Learning is socially constructed through relationships learners have with others in myriad cultural contexts. The process often unfolds in unpredictable ways; what is learned varies based on the experiences and intelligences of the learners. The learning process as well as product can be made visible and supported through the externalization of symbol systems, such as language, images, movement, music, and numbers, that reflect the knowledge and skills being learned. In contrast to mastery as memorization, learning is a socially performative process.

This distinction is worth noting because some theories of learning—what learning looks like and how it happens—may conflict with this perspective. Explicit discussion and engagement of teachers' underlying beliefs about the nature of learning and the capacities of children, teachers, and community members are vital in order to support the development of citizen-learner pedagogies. Successful change occurs only when individual beliefs, practices, and the larger societal and educational systems are in alignment (Wilson, 2019). Moreover, professional development approaches for supporting teacher learning should reflect theories of learning similar to those enacted in citizen-learner classrooms. In the next section, we address what pedagogical moves in the citizen-learner framework look like; in later sections, we discuss the implications for professional development.

Supporting Citizen-learning

What does supporting students as citizen-learners look like, and how do teachers plan for classroom learning experiences? Consider the following example.

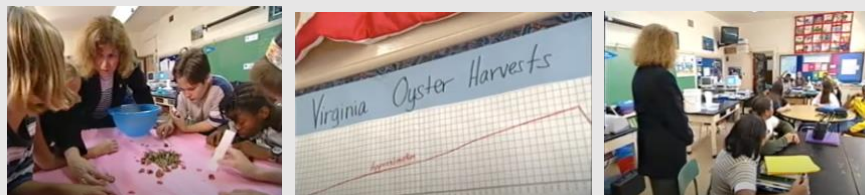
Supporting Citizen-learners: Discovering the Interdependence of Species



Each year, science teacher Judy Gulledge at the Northside Middle School in Norfolk, Virginia, brings her environmental science class on a field trip to the Chesapeake Bay as part of a curricular unit on oysters¹. Chesapeake Bay is the largest estuary in the United States—of critical importance to the ecologies and economies of the states of Virginia and Maryland. Five years ago, Judy brought her class to the bay where they observed and talked to the farmers who harvested oysters. Afterwards, the class listened to an environmentalist group tell them that the oysters should not be harvested and how they could be restored. Yet the watermen the students had met talked about the abundance of oysters and their importance for their ability to make a living. When the students asked Judy who was right, she did not know how to answer their questions. Teacher and students spent a great deal of time trying to find the answer, only to learn there was no single answer.



Judy's overarching learning goals for her students were to understand the impact of humans on the environment and the complex relationships among organisms within an ecosystem. She designed learning experiences for students not only to engage them in these questions, but also to practice close observation, encounter multiple perspectives, experience joy, and conduct experiments that would inform their opinions about a complex issue. Students discovered how oysters serve as food, filters, and fish habitats, through activities such as creating their own filters to compare them to oysters' ability to filter water.



Ultimately, students gained an appreciation of the nuance and complexity of issues in environmental science and deepened their understanding of the important role oysters play in their local habitat.

¹ To learn more about this project see <https://www.youtube.com/watch?v=QycVcvmDVvg&t=4s>

Judy made a variety of choices in her design and facilitation of the unit with her students. She identified two primary learning goals that guided her teaching—the impact of humans on the natural environment and the interrelationships among organisms in any one environment. She planned an annual trip that took students out of the classroom to explore the Chesapeake Bay. When students raised questions to which Judy did not have a response, both teacher and students were motivated to find the answers. Judy engaged students’ diverse ways of knowing by exchanging information verbally and in writing, leading a fieldtrip, and giving them a design challenge to devise water filters to test their hypotheses. Students carried out research in which they used their senses to carefully observe natural phenomena, gather and interpret data, and develop and exchange perspectives based on individual and group discoveries and discussion. Judy encouraged students to hear conflicting viewpoints that challenged their assumptions and further kindled their curiosity. Small- and whole-group discussions and displays of work in progress along with finished products made students’ thinking visible. Judy’s pedagogical choices exemplify the practices teachers engage in to develop the competences related to the four essential questions of the citizen-learners framework (see p.5). Below we describe Judy’s teaching in relation to each question and identify Project Zero tools and resources (see Appendix A) that can support teachers using the citizen-learners framework.²

Who are we as citizen-learners? Judy begins with an image of herself and her students as citizen-learners—interdependent knowledge-seekers and builders, who actively construct ideas for themselves and with others. She is constantly on the lookout for student wondering—questions about why something works or looks the way it does, or why it results in a certain outcome. Judy wants her students to be playful inquirers as well as critical and creative thinkers, who both enjoy and value learning from and with others about relevant and meaningful topics. A variety of practices and tools help to develop these identity-based competences. Thinking routines such as [See, Think, Wonder](#) offer students opportunities to reflect and make their observations, claims, and questions visible. Other routines such as [Think, Feel, Care](#) invite learners to consider the emotional qualities of their own and others’ thoughts, feelings, and values. Tools such as the [MUSE Quests](#) help teachers design entry-points for learners that allow for different ways of knowing and engaging based on their multiple intelligences (e.g. linguistic, aesthetic, logical/mathematical, etc.). Teachers can use the [What Can This Material Do?](#) tool to create experiences in which learners creatively explore, design, and create with new materials. Additional resources in Appendix A offer an array of approaches to support the development of learners’ identities as problem finders and solvers, interdependent learners, emotional agents, diverse knowers, critical and creative thinkers, and designers and makers.

What do citizen-learners learn? Judy’s learning goals for her students invite exploration into the complex interrelationships among organisms in their local environment. She selects a topic that provides opportunities for developing meaningful disciplinary understanding about scientific research and the roles oysters play as food, filters, and a habitat for fish. The topic also raises cross-disciplinary connections as students surface ideas and questions about the ethical impact on the community that are likely to come up in the future. Selecting rigorous content that is relevant, revealing, and actionable

² Appendix A provides a sampling of tools and resources developed at Project Zero to support teachers’ classroom strategies. The list is not comprehensive. While these resources were created in projects with distinct research purposes, we have curated and categorized them to illustrate how they might be used for the goal of teaching citizen-learners. Several resources appear in more than one category due to their scope and multiple connections to elements of the framework. Unless otherwise noted, the resources are applicable to students of any age or subject matter. Each resource includes a link, either to the tools and resources themselves, or to a related book, article, or website.

is a cornerstone of teaching citizen-learners. To assist such choices, teachers can draw on an assortment of tools and practices from Project Zero research. For example, the [Teaching for Understanding Guide](#) (Blythe, 1998) offers criteria and tips for designing Generative Topics that are meaningful to learners and that support powerful disciplinary or interdisciplinary understanding. To support students to grapple with complexity and ethical dilemmas in today's world, the [GoodWork Toolkit](#) provides classroom materials and lesson plans. The [Out of Eden Learn](#) project engages students in exploring planetary health and the complex connections between environmental changes and human health through a variety of activities. Appendix A includes a range of resources that help teachers select meaningful topics that develop disciplinary and interdisciplinary insights, ethical stances, and life-long practices.

How do citizen-learners learn? Judy engages students in an investigation of an issue they genuinely care about and of significance to the community. She supports them to observe carefully, collect information, and test their theories about the local ecosystem. As students confront their beliefs and perspectives about habitats and their relationship, new questions arise. Throughout the process, Judy creates opportunities for students to share their ideas, puzzles, and products as a community. Teachers of citizen-learners actively engage them in sustained, collective inquiry. Designing and supporting such inquiry requires careful planning as well as facilitation that can help students slow down, observe, and reflect. Project Zero's [Causal Patterns in Science](#) and [EcoXPT](#) curriculum challenge students' assumptions and misconceptions often embedded in thinking about complex causality in science (e.g., ecosystems and climate change). The [Investigate](#) module from the [Digital Civics Toolkit](#) also invites students to slow down and judge the credibility of online civic information and news. The [Circle of Viewpoints](#) is a useful thinking routine for surfacing different perspectives on contentious issues in classroom discussions. The [Visible Learners](#) book (Krechevsky et al., 2013) offers over a dozen tools to assist teachers in documenting and sharing the processes and products of student learning. These and other resources in Appendix A can aid teachers in supporting the development of students' observation, reflection, and perspective-taking skills, challenging students' assumptions, and engaging their emotions.

What do citizen-learners do with what they learn? Judy creates opportunities for students to use their knowledge about a keystone organism in the Chesapeake Bay to develop their own positions on oyster harvesting and restoration, and to engage in dialogue with community members with divergent viewpoints. In considering future actions, students debate potential solutions for and impacts on different parts of their community. Teachers of citizen-learners design ways for students to imagine multiple possibilities, engage other points of view, and take informed action. The [Digital Civics Toolkit](#) includes modules that support youth to develop their voice, engage in dialogue, and take action in relation to the civic opportunities and dilemmas of digital life. [Ten Questions for Young Changemakers](#) helps youth to become successful civic agents (i.e., equitable, effective, and self-protective) in a digital world. Global thinking routines like [Circles of Action](#) support students' abilities to contribute effectively to their family, friends, neighborhood, and the world. And the [Children Are Citizens](#) template helps teachers plan ways to engage young learners in democratic processes in their community. These and other resources in Appendix A assist teachers in designing opportunities for citizen-learners to demonstrate understanding across contexts, engage in civic dialogue, advocate and take action, and envision and inspire change with others.

Developing citizen-learner competences is not a standardized approach. Teacher practice must stem from teachers' belief that learners are active and agentic participants in the world. Teachers of citizen-learners need to know their students well, be proficient in their subject matter, and be aware of

contemporary and often contentious issues in their communities. Designing investigations that lead to meaningful action involves keen pedagogic skill. Alongside their students, teachers must also examine their own values, interests, and competences as citizen-learners. While some educators may naturally gravitate toward this type of approach, many others may struggle to participate in such an ambitious undertaking. Even the most motivated will need support from leaders and feedback from colleagues as they develop their professional practice to support citizen-learning. We acknowledge this may be a formidable challenge for many schools. With a better sense of what the practices and tools for supporting citizen-learning look like, we now turn our attention to what a framework for professional development might entail.

Professional Development for Citizen-learning

It is worth pausing to note the important qualities that distinguish “professional development” from other forms of occupational learning. While it may seem obvious, professional development describes the growth of those engaged in a *profession*. In their synthesis, Gardner and Shulman (2005) put forward several characteristics that define a profession, including a commitment to serve the welfare of others and society; a body of specialized knowledge, skills, and practices; capacity to render judgments under conditions of uncertainty; an organized approach to learning from experience both individually and collectively; and a community overseeing the quality of practice and education. Although law and medicine are often viewed as prototypical professions that illustrate these qualities, other vocations such as journalism and education are viewed as emerging or “semi-professions” due to lesser levels of generalized knowledge and variations in training (Darling-Hammond & Goodwin, 1993). However, whether education is a profession or a “semi-profession,” one’s development as an educator is not simply about supporting isolated vocational progress. It entails the expansion of one’s autonomy and practice within a defined domain with established social practices and norms.

One of Gardner and Shulman’s characteristics, an organized approach to learning from experience, differentiates the “development” of professionals from other types of vocational training. Adult development theory suggests that professional growth involves confronting assumptions and beliefs in the face of unexpected results, triggers, and experienced discrepancies (Center for Workforce Development, 1998; Kegan, 1982; Marsick & Watkins, 2001; Mezirow, 1991). Supporting effective adult development in the professions involves creating psychologically safe conditions for organizing individual and collective reflection on experience, surfacing often tacitly held theories, and creating actions and experiments to test and revise these theories (Argyris, 1993; Edmondson, 1999; Engeström, 2001). While work-based learning describes the development of vocational skills and knowledge, professional development is more expansive: it encompasses not just gaining new skills and knowledge to do one’s job better, but also the more difficult work of surfacing and recasting beliefs, theories, and assumptions that guide one’s work.

In sum, designing effective professional development for teachers requires an understanding of how to support adult development in the domain of education. It involves creating the conditions and an organized approach for transformative growth of adults within pedagogically established knowledge, social practices, and ethical norms. While professional development may include moments of training or technical skill-building, it must also be designed to enable deeper, more complex forms of individual and collective growth, developing teachers’ competences as citizen-learners themselves.

Based on decades of work at Project Zero, and drawing on the aforementioned research, below are several key design principles for effective development programs.

Immersed in reflective experiences. Teachers must directly experience the pedagogical goals, methods, and tools for classrooms. Professional development should actively engage teachers in “learning by doing” experiences that build pedagogical knowledge and practices such as project-based learning, alternative assessment, or differentiated instruction. Immersive experiences should be followed by opportunities for reflection that surface the underlying assumptions and beliefs that guide teachers’ practice. In order for teachers to confront their implicit theories about what it means to cultivate citizen-learners, teachers themselves need to engage in and reflect on practices in which they generate knowledge, navigate complexity, build relationships, and effect ethical change. Professional development should provide authentic experiences in which teachers develop their own citizen-learner competences, such as observation, critical and creative thinking, inquiring, perspective-taking, disciplinary or interdisciplinary understanding, and ethical stances.

Strengthens sense of purpose. Effective professional development focuses on what matters to teachers—their ideas, questions, and interests – as well as their ideals and aspirations. It situates teachers’ own goals within the wider civic and social purposes of education. By connecting personal goals with a higher calling, successful PD generates a sense of belonging to a community and profession that are larger than oneself. Motivation is cultivated through professional development that fosters agency and empowerment, in which educators are trusted to make choices that reflect their values and connect to broader professional purposes. While this is inherently difficult work, creating safety through

School-wide Inquiry into Playfulness³ International School of Billund, Denmark



Nine teachers at the International School of Billund (ISB) in Denmark gather in the school conference room, ready for their monthly session of the Playful Language Learning Study Group. This is one of a dozen groups in which teachers, administrators, and staff participate to develop their practice. The study group consists of educators who teach a diverse range of subjects, ranging from first grade to library to middle school Spanish. Mette, one of the teachers, facilitates along with researchers from Project Zero (PZ) who join via Skype.

“Ready for Hypothesis Charades?” a PZ-er asks, and Mette passes out a handout listing the group’s working hypotheses about what playful language learning looks like in classrooms. The activity is designed as a way to re-engage the teachers with big ideas that have been co-constructed over the course of several sessions together. The first team acts out the hypothesis, “In playful activities, participants are more comfortable taking risks, and risk-taking can lead to more learning,” pantomiming leaping from a height and cheering upon a successful landing. Giggles and smiles erupt all around. After the game, the group turns to a more serious conversation about the hypotheses, discussing classroom artifacts that offer additional food for thought. Watching a short video of Mette’s first graders reflecting on a playful story-writing activity sparks a conversation about the role of reflection in playful learning. Marisa, the school librarian, comments that the reflection seems to help students think about next steps in their learning. Jenna, a third-grade teacher, asks Mette if the reflection might “feed forward,” informing her next steps in teaching writing, and Mette agrees. Inspired by this conversation, the group agrees to add a new sentence to their hypothesis on reflection: “Reflection can ‘feed forward,’ informing next steps for teachers and students.”

Their inquiry culminates at the end of the year when all groups share their insights in a school-wide “celebration of learning.” Study group members prepare exhibits to share their inquiry and progress with colleagues; the school community uses thinking routines to make analytical connections across exhibits and reflect on next steps.

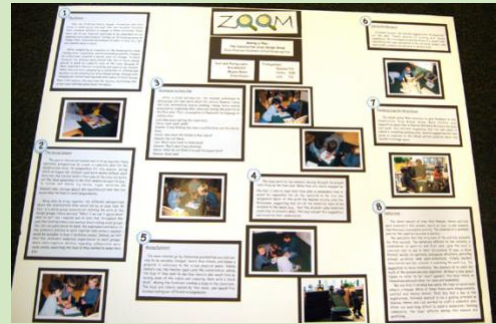
³ This vignette is drawn from [Baker et al., \(2016\) Playful Participatory Research: An emerging methodology for developing a pedagogy of play. President & Fellows of Harvard College: Cambridge MA.](#)

structured discussion protocols and group norms can lower unnecessary anxiety and fear. Individual and communal opportunities should be built into the process to mark and celebrate progress.

Grounded in expertise. A core component of the professions is the specialized knowledge, skills, and practices that serve the welfare of the community. For educators, expertise in pedagogy, disciplinary content, and their communities is essential. Effective professional development should be grounded in pedagogical expertise from the developmental sciences and cognitive psychology, as well as the pedagogical content knowledge, skills, and practices of the disciplines being taught, such as mathematics, the arts, or languages. Furthermore, because educators are preparing students to become effective citizen-learners in their local and global communities, they must also be able to respond to the evolving needs, values, and opportunities in these contexts. What matters most to the learners, families, and other stakeholders in the community? Effective professional development should afford opportunities not just to apply what is known, but to adapt it and create new knowledge and practices that can be shared with others in the profession.

Integrated with work. Decades of research have shown that professional learning is most effective when it is embedded in everyday activities and issues that professionals encounter with their colleagues. Study groups, mentoring, communities of practice, peer-observations, planning, and co-teaching are developmental, communal structures integrated into the work of what it means to be an educator. While formal workshops and lectures may provide important inputs to work, they are seldom easily integrated into the day-to-day flow of teaching and learning. Effective professional development creates and leverages informal structures as essential components of the occupation (Marsick & Watkins, 2001).

Zoom Panels: Artifacts that organize exploration⁴ Eliot-Pearson Children's School, Medford, MA



Teachers at the Eliot-Pearson Children's School regularly gather around "Zoom" panels to share and discuss what they are learning about pedagogy. The above Zoom panel conveys insights about what one kindergarten teacher has come to understand about issues of power and engagement in student learning groups. These 3' x 5' panels contain selected photographs, quotes from children's discussions, and examples of student work that, together, comprise a story of moments of children learning in groups in their classrooms. Each Zoom depicts episodes of learning that, along with the teacher's analysis, offer a window into the relational dynamics among children and how they participate in group learning. Throughout the year, the panels focus conversations in teacher teams and full staff meetings on what the teachers are learning. At the end of the school year, the panels are shared with families, colleagues outside of school, and incoming staff for the next year.

The Eliot-Pearson Children's School's mission includes generating new knowledge about teaching and learning. To achieve this, professional development is organized around individual, team, and school-wide collaborative inquiry. At the beginning of the school year, the staff selects an area of focus, informed by what they explored the prior year and the questions that emerged. While individual and team questions may differ based on interest, a common theme supports the development of shared understandings about their teaching practice. School-wide themes include children's exploration of light, child-directed small groups, and anti-bias education. One teacher serves as a part-time research coordinator who meets weekly with the director and teacher teams in order to facilitate the process. The Zoom panel format anchors the inquiry, serving as a concrete reference point to ground teachers' observations, interpretations, and puzzles.

The teachers report that collaborative inquiry enables them to deepen their understanding of the children's learning process, such as the role of emotions and conflict in collaborative learning experiences. The public nature of sharing Zooms with colleagues and families reinforces the school's culture of inquiry, where collective exploration into teaching and learning is an essential element of what it means to be an educator.

⁴ This example is drawn from [Mardell et al., \(2009\). Zooms: Promoting schoolwide inquiry and promoting practice. Voices of Practitioners. 11:1-15.](#)

Cultivates professional learning practices.

Professionals develop their technique by engaging in key practices that are grounded in the design principles and that support the education of citizen-learners.

- **Noticing:** Practices of slowing down, observing, identifying issues, and reflecting in order to make sense of experiences. Noticing offers opportunities to step back and see the unexpected or unexplained as opportunities for exploration and development.
- **Questioning:** Practices of wondering, probing, and curiosity. Questions can often challenge deeply held assumptions and beliefs that must be surfaced for development to occur.
- **Theorizing:** Crafting testable explanations that reveal systems of ideas, causality, and underlying governing principles.
- **Experimenting:** Practices of risk-taking, organizing inquiry, and scaffolding a process of intentionally trying something new and different.
- **Documenting:** Practices of gathering, interpreting, and sharing physical evidence of learning and growth.
- **Help-seeking/giving:** Practices of both asking for and offering help; includes deep listening and experiencing vulnerability and psychological safety with others.

Together, these principles can serve as a guide to designing approaches to professional development. For approaches that aim to support teaching citizen-learners, many of the principles connect to the citizen-learner competences. For example, competences such as observing, reflecting, and sharing perspectives

Integrating Online Learning with School-wide Teacher Development ⁵ The Summit School, Winston-Salem NC



As one of several teams at the Summit School, a Junior Kindergarten-9th grade independent school, four teachers gather at their weekly cross-grade meeting to share notes and images from their classrooms. They have gathered this evidence from experimenting with Thinking Routines with their students. Using a structured protocol, each teacher has time to share what they did and what they noticed about their students' thinking with the group. At the end of the meeting, the teachers reflect on the feedback they received from an online coach the previous week, and discuss what they are learning about their roles as facilitators of student thinking. One member of the team takes notes and uploads the group's collective reflections and selected classroom images to share with their coach and dozens of other teams engaged in similar experiments in classrooms all over the world. As participants in a three-month long Making Thinking Visible course offered by Project Zero, teachers at the Summit School are both learning from and with each other and educators from a range of cultural and educational contexts.

To sustain school-wide professional development, leaders and teachers at the Summit School have been enrolling teams for several years in Project Zero's 13-week, asynchronous online courses. These courses engage educators in applying and adapting research-based practices such as Teaching for Understanding, Making Learning Visible, and Multiple Intelligences. Course participants identify questions about their practice and engage in investigations with their colleagues in which they apply tools to better understand and support the learning in their classrooms. Teams are grouped with other teams from different countries to stretch their thinking and form connections across cultural boundaries. The courses are designed to complement traditional school structures, such as weekly planning time and staff meetings. Each two-week session begins by exploring a tool or practice, often by discussing readings and classroom examples. This is followed by a week in which teachers experiment with practices in their classrooms and discuss insights into their inquiry questions. The teams are supported by an online coach, often an experienced classroom teacher from a different part of the world, with topic expertise. The coach offers weekly written feedback to support the teachers' inquiry. Teams also get feedback from other teams as well as the course instructor, usually an expert researcher from Project Zero. The course culminates with teams sharing and celebrating their progress and inquiry plans for the future.

⁵ For more information about Project Zero's online courses, see <http://www.pz.harvard.edu/professional-development/online-courses>.

are interwoven in several of the learning practices. Other competences, such as identifying meaningful topics and taking ethical action, are integral to strengthening a sense of purpose. However, any professional development program designed with these elements in mind will likely foster citizen-learner competences, if only indirectly. We now turn to a model that is explicitly designed to support the teaching of citizen-learners.

Collaborative Inquiry: A Model for Professional Development

The three examples of professional development in the preceding section exemplify the design principles of effective PD. They also share strong structural similarities. For decades, researchers at Project Zero have conducted research into effective professional development that features *collaborative inquiry* (Allen & Blythe, 2004; Aquiline & Krechevsky, 2020; Baker et al., 2016; Blythe, 2004; Burton et al., 2011; Krechevsky et al., 2013; Perkins, 2010; Ritchhart & Church, 2020; Weinbaum et al., 2004). There are many forms of PD with similarities to collaborative inquiry, such as professional learning communities, instructional rounds, action research, communities of practice, and lesson study. At PZ, we loosely define collaborative inquiry as *a process in which teachers come together to examine their practice over time, with a focus on looking at student work to better understand and enhance student learning*. Researchers have identified a variety of outcomes of collaborative inquiry and related approaches. For example, teachers who engage in collaborative inquiry demonstrate increased self-efficacy, motivation (Ciampa & Gallagher, 2016; Hargreaves, 2019), and job satisfaction (e.g., Ciampa & Gallagher, 2016; Reeves, Pun & Chung, 2017), as well as a shift toward more effective pedagogical practices (e.g., Cochran-Smith & Lytle, 1999; Ciampa & Gallagher, 2016). Collaborative inquiry also leads to a positive effect on student achievement (e.g., Darling-Hammond & Richardson, 2009; Darling-Hammond, 2017; Levine & Marcus, 2010; Ronfeldt et al., 2015).

We recommend that a citizen-learner professional development program for teachers use a collaborative inquiry model. Below is an overview of key processes of this model. The resources in Appendix B are designed to support these practices.

Forming ongoing inquiry groups

Collaborative inquiry entails immersing small groups of teachers in reflective learning experiences that challenge their conceptions about what learning looks like. It strengthens a sense of purpose and deepens collegial relationships by connecting individual goals to the educational aims of the community. Establishing the purpose of an inquiry group is a crucial first step. However, the purpose of the group will likely evolve as part of the inquiry process. Although group members typically share interests or goals, they may work with the same or different age learners, and teach similar or different subject matter. The inquiry may be carried out within or across schools. Group membership may change from year to year, but the group should remain together over time in order to build the trust needed to engage in experimentation, test assumptions, and share perspectives. The International School of Billund (ISB), the Eliot-Pearson Children’s School, and the Summit School all repurposed daily planning periods, weekly team time, and regular staff meetings to support personal, group, and schoolwide inquiry. While some schools began with voluntary participation, and then moved to a school-wide approach, others involved the whole school from the beginning as a way to unify the community around shared goals.

Focusing on questions of practice

Individual and shared questions of teaching practice fuel inquiry. Questions signal a need or desire to understand more about the learning of students. Sometimes these questions are intentionally framed to address an area of interest to the teacher, or to meet a particular need in the classroom. And sometimes the questions emerge from taking a step back, and adopting a stance of curiosity and wondering, without a specific purpose in mind. Regardless of its nature, the question should relate to a topic of shared interest to both the questioner and other educators, and be closely tied to student learning and teacher practice. When teachers at the Eliot-Pearson Children's School noticed that conflict and disengagement could derail the children's group learning process, they identified an inquiry question to better understand what power and engagement looked like in their classrooms. At the Summit School, the online courses presented research-based practices that spoke to the challenges teachers faced in the classroom. The Summit School teams were able to integrate outside expertise into the collaborative inquiry process, and take advantage of new information and contexts to inform their thinking.

Experimenting with classroom practices

Collaborative inquiry is sustained through the new actions that teachers take in their classrooms, whether through small adjustments to what they are already doing, or larger changes. Teachers' autonomy to design the scope of their experiments builds a sense of ownership and commitment. In either case, the changes are intentionally planned actions connected to their questions. At ISB, teachers agreed to capture examples of what playful learning in language looked like in their classrooms. After discussing a video of learners playfully reflecting on a story-writing activity, they decided reflections could be an important source for informing next steps in students' learning. Thus, teachers planned new ways to use reflections to determine where the class went next. This is not experimentation in a formal sense; rather, such informal experiments encourage teachers to identify concrete moves to test their hypotheses about what will enhance student learning. Planned actions are integrated into the everyday practice of teachers. Each member of the group learns from this cycle of identifying a question, experimenting in the classroom, collecting artifacts of student thinking and learning, and discussing interpretations with others.

Documenting learning

Inquiry is propelled through practices of documentation -- observing, recording, interpreting, and sharing evidence of student learning (Krechevsky et al., 2013). The quality of a teacher's inquiry depends in part on her skills of observing and gathering evidence of student learning in her classroom. The teachers at Eliot-Pearson developed "Zooms" to house their notes and photographs of students to better understand power and engagement in their classrooms. Each classroom became a source of information to better understand the students' learning experience. The documentation gathered provides data that enable teachers to craft provisional answers to and theories about their questions. Collected evidence is brought back to colleagues to discuss and interpret for meaning and potential insights for their inquiry. Group sensemaking is often facilitated by discussion protocols that guide the group to discuss the presence of learning (not just what was done), and the evidence for proposed interpretations. As new insights are developed, further questions emerge that guide teachers' future documentation with their students.

Reflecting on and celebrating progress

Successful collaborative inquiry creates a variety of formative and summative moments for teachers to take stock of what they are learning. After each group meeting, the teachers at ISB reflected on their

new insights and the implications for next steps. During staff meetings at Eliot-Pearson, teachers shared their Zooms with their colleagues to solicit feedback and ideas based on what they were learning. At the end of the online course, Summit School teachers shared their projects with dozens of other teams from around the world. Public moments in which teachers share their learning with their colleagues, students, families, and broader stakeholders are important occasions to mark communal progress. At the end of each school year, ISB hosts a “celebration of learning” in which inquiry groups create exhibits of their learning – their questions, evidence for their emerging hypotheses, and plans for future inquiry – for all to see and discuss. Such events create a sense of belonging, connection, and a meaningful, collective learning experience for a community. Annual or bi-annual events that deepen one’s own and others’ learning through noticing, questioning, and discussing with colleagues become integrated into what it means to be a developing educator at the school.

Collaborative inquiry is a proven path for teacher professional development (Darling-Hammond & Richardson, 2009), and a recognized and valuable form of educational research (Cochran-Smith & Lytle, 1999; 2009). The collaborative inquiry method is also conceptually consistent with the driving precepts of citizen-learners: *Who are we? What do we learn? How do we learn it?* and *What do we do with what we learn?* These are inquiry questions in which teachers of citizen-learners must also engage.

Practical considerations

Collaborative inquiry is a powerful mechanism for professional development because it both creates a learning community and contributes to the knowledge base of the field. However, many practical decision-points need to be addressed in order to carry out effective collaborative inquiry (Weinbaum et al., 2004). Below we describe several considerations for supporting teachers’ learning in the context of a citizen-learner professional development model.

Administrative Support Because inquiry is seldom part of teachers’ professional role, school and district-level administrators need to demonstrate ongoing practical and symbolic support. This support can take many forms, from recognition at a school-wide staff or community meeting, to providing time in the school day for inquiry group meetings, to celebrating teacher learning at yearly events. School leaders may also need to actively shield and defend this approach in the face of competing initiatives in order to protect teachers’ time for inquiry. Leaders must also create a supportive environment in which teachers feel safe taking risks. Collaborative inquiry can surface uncomfortable feelings and beliefs, whether related to issues of equity, or the vulnerability of sharing student work and professional practice with others. A variety of group norms and protocols are available to encourage trust, support, and openness. When possible, we advise administrators to join in the inquiry process and learn alongside teachers by identifying questions they are interested in pursuing. Finally, leaders may need to designate funding for costs such as substitute teachers, stipends for participation in after-school meetings, and materials like books and audio/visual recording equipment. Other forms of support or incentives include making professional development points or graduate credits available, facilitating cross-school visits or attendance at conferences, and providing the opportunity to coauthor or contribute to a publication.

External Partners Bringing in outside partners is another consideration (and possible expense) for enhancing the collaborative inquiry process. Such partners might come from a local university or school of education, a non-profit educational organization, or the district. They might provide facilitation

and/or train onsite facilitators, convene district-wide meetings, or offer other forms of expertise. It can be very helpful to engage an outside perspective at different points during the inquiry process, as long as both parties have a shared understanding of the goals and a commitment to open communication if or when priorities or timelines diverge.

Time Perhaps the most critical form of support is building in time for teacher inquiry. Ideally, small-group meetings would take place at least once or twice a month, for at least an hour (and preferably more). School leaders, in collaboration with other stakeholders, need to decide whether they will dedicate time for teacher inquiry during the school day, or whether teachers will be asked to meet after school. It is hard to overstate the power of setting aside time during the school day for teachers to review and reflect on student learning with colleagues. The symbolic and practical significance is enormous; introducing this kind of structure goes a long way toward creating a culture of thinking and learning for children and adults. At the same time, it requires creative problem-solving, such as repurposing funds or time slots already dedicated to professional development, and reconceptualizing staff, department, or grade-level meetings.

Differentiation More often than not, professional development takes on a “one-size-fits-all” model in which teachers learn the same content and participate in the same experiences year after year. However, this is often ineffective because not all teachers have the same needs, interests, and skills. A primary school art teacher will not have the same needs as a sixth-grade special education teacher, just as a first-year teacher’s needs will differ from those of a veteran teacher. Effective professional development and collaborative inquiry take these differences into account and differentiate learning opportunities for educators. Just as teachers differentiate instruction in order to reach a range of students, so too school administrators need to keep this diversity in mind when developing a professional development program.

Technology Given the disruptions of COVID-19, few schools are operating as they were before the pandemic. Teachers have been asked to shift their interactions with students to remote and virtual contact. While it is difficult to predict the long-term effects of remote teaching, it seems prudent to assume that the work processes of teachers, including their professional development, will increasingly involve virtual and digital technologies. Teachers and learners must have reliable remote access to the internet, hardware, and software. While many online platforms offer teachers the ability to share, connect, and discuss, few are designed with the professional development principles we describe in mind. Specifically, technologies should be carefully piloted and co-designed with educators to ensure that platforms facilitate collaborative inquiry and develop learning practices such as noticing, questioning, and documenting. The online courses at Project Zero offer one example of sustained opportunities for teaching teams not only to learn about new ideas and practices, but also to try them out in the classroom and discuss student responses with their team, as well as to learn from colleagues around the world. The teaching teams are supported both by a course instructor and by coaches who work with a small number of teams from a variety of contexts. Such hybrid models combine the reach of online learning with the classroom-based practice of collaborative inquiry. School leaders should not assume that new technologies, out of the box, will support professional development. Instead they will need to be curated in ways that fit the collaborative inquiry needs of their faculty.

Accountability and Evaluation For better or worse, systems of accountability and evaluation powerfully shape teaching and learning practices in schools. These systems can provide valuable feedback to teachers (and learners) when they offer evidence of progress that can be used to improve

performance, but not when they are used for punitive and comparative purposes. Making mistakes should be an opportunity for growth, not punishment; taking a risk by trying a new teaching strategy should be supported, not thwarted. Currently, Brazil lacks a teacher accreditation program and an organized form of teacher evaluation (beyond indirect claims based on students' PISA scores). Therefore, school leaders have an opportunity to create a local accountability and evaluation system that aligns with the citizen-learners framework, professional development principles, and model of collaborative inquiry. Gathering evidence from classroom observations by peers or administrators, self and peer reflections on progress, and exhibitions of teacher learning are all forms of accountability and evaluation that are consistent with the citizen-learners professional development framework. While not a replacement for student test scores, documentation practices such as these blur the line separating formative and summative assessment. They provide evidence of student learning not captured by standardized tests and can lead to more intentional and reflective teaching. Teachers become accountable to themselves by looking at what they intended to teach in relation to what students learned, and accountable to each other by engaging in a collective learning process. And schools are accountable to the larger community through the celebrations of learning, which engage families and community members in examining what citizen-learning looks like (Krechevsky et al., 2010).

Conclusions and Next Steps

The work of teachers in developing citizen-learners is twofold: enacting pedagogical practices in their classrooms and engaging in collaborative inquiry with colleagues. In this paper, we outline a variety of strategies educators can use to develop citizen-learner capacities and competences in their students. In these classrooms, teachers create and facilitate experiences in which citizen-learners actively navigate complexity, co-construct knowledge, build relationships, and work toward effecting ethical change in their communities. No teacher will get it right the first time, nor should they be expected to. Like all practices, teaching citizen-learners well will be developed over time in a community of like-minded colleagues. To support teachers, we recommend a collaborative inquiry model of professional development. At its core, collaborative inquiry invites educators to continuously examine and build their skills as part of a professional community. We see the classroom and professional development examples and resources shared in this paper as promising pathways for educators to consider how best to support their students, their colleagues, and themselves in becoming citizen-learners.

As we look ahead, a number of outstanding issues and questions remain. For example, how might professional development help teachers assess and evaluate citizen-learners? How can other key stakeholders, such as families and community members, be involved in citizen-learners' development (and their own development as citizen-learners)? How might a professional development approach scale widely across schools? And, looking back to our first paper, what would a more detailed curriculum for citizen-learners look like? While outside of the scope of this paper, these and other questions are critical areas to explore to further operationalize these ideas within a school, a state, or the national context of Brazil.

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Appendix A: Project Zero Professional Development Resources Matrix for Cultivating Citizen-Learners

This matrix provides a sampling, rather than a comprehensive list, of resources developed at Project Zero to support teachers' professional learning and classroom strategies. The resources are categorized by the essential questions and related competences described in the Citizen-learners Framework. Most of the resources are designed to support student learning, though some are designed to support teachers' learning and planning. Unless otherwise noted, the resources are applicable to students of any age and any subject matter. Each resource includes a link either to the tools themselves, or to a related book, article, or website. Some resources appear in more than one place. As a response to the COVID-19 pandemic, Project Zero has also developed 22 tools and thinking routines that support learning at home.

Glossary:

AbD = Agency by Design

AT = Artful Thinking

CAC = Children Are Citizens

CCI = Creating Communities of Innovation

IAoC = Inspiring Agents of Change

MLV = Making Learning Visible

OoEL = Out of Eden Learn

PoP = Pedagogy of Play

TfU = Teaching for Understanding

UCP = Understandings of Consequence

VT = Visible Thinking

YPP = MacArthur Youth and Participatory Politics Research Network

Who Are We?	
Interdependent Learners	<ul style="list-style-type: none"> • Visible Thinking Routines: Over 80 short, easy-to-learn <u>thinking routines</u> that cultivate students' thinking skills and dispositions and deepen content learning; in particular, see <i>Routines for Engaging with Others</i> in <u><i>The Power of Making Thinking Visible</i></u> (Ritchhart & Church, 2020) • Making Learning Visible Resources: Five tools for supporting group learning in the classroom, e.g., considerations for forming small groups, engaging diverse learners, and feedback discussion protocols (<u><i>Visible Learners</i></u>, Krechevsky et al., 2013, see pp.109-123)
Critical & Creative Thinkers	<ul style="list-style-type: none"> • Visible Thinking Routines: Over 80 easy-to-learn <u>thinking routines</u> that cultivate students' thinking skills and dispositions and deepen content learning, e.g., <u>Claim, Support, Question</u> (a routine for reasoning with evidence) and <u>What Makes You Say That?</u> (a routine that promotes evidential reasoning) • 20 Videos: teachers using thinking routines in a variety of settings (RonRitchhart.com) • Cultures of Thinking: Leveraging 8 cultural forces (<i>language, time, environment, opportunities, routines, modeling, interactions, and expectations</i>) to create a culture of thinking in the classroom (<u><i>Creating Cultures of Thinking</i></u>, Ritchhart, 2002)

	<ul style="list-style-type: none"> • Inspiring Inventiveness: Tools that support inventiveness in early childhood and primary classrooms (ages 3-11), e.g., Reinventing Rules in Outdoor Games, Planning for Invention Student Worksheet, and What Can this Material Do? (IAoC)
Emotional Agents	<ul style="list-style-type: none"> • Spectrum Early Learning Activities: Nineteen activities for young children to explore understanding of oneself and others. Project Spectrum: Early Learning Activities (Chen et al., 1998; pp.169-94) (also in Portuguese) • Inspiring Inventiveness: Includes tools that support the ability to understand emotions and resolve conflict in early childhood and primary classrooms, e.g., Making Friends with Conflict or Do Over • Think, Feel, Care: A thinking routine to help learners consider different thoughts, feelings, and values held by people interacting within a system
Diverse Knowers	<ul style="list-style-type: none"> • Practical Intelligence for School: Discussion prompts to provoke students' conceptions of intelligences and inform their understanding of their intellectual profiles (middle school) [<i>forthcoming from T. Blythe</i>] • Multiple Intelligences: Project Zero Frameworks for Early Childhood Education: a three-volume set of assessment and curriculum activities that support the diverse intellectual strengths of young children. A Beginners' Guide to the Theory of Multiple Intelligences: basic description of theory and related links • Entrypoint Charts: "Engaging All Members of the Group" (Visible Learners, Tool #106, pp.117-119) • MUSE Quests: Questions that invite learners to look at, explore, and think about works of art or other artifacts based on entry points such as narrative, aesthetic, logical/quantitative, experiential, and foundational
Problem Finders & Solvers	<ul style="list-style-type: none"> • Artworks for Schools (Grotzer et al., 2001): Eight lessons that support students' problem-finding in the arts, with suggestions for transfer to other domains (grades 3-8, adaptable for other age groups) • EcoXPT: An immersive simulation in which middle school students discover an ecological problem, and use inquiry, observation, data collection and analysis, and experimentation to deepen their understanding of the causal relationships that contributed to the problem • Better Arguments & Good Work: A workbook that develops argumentation skills in service of solving complex problems (The Better Arguments Project and the Good Project) • PZ's Thinking Routine Toolbox: Over 80 easy-to-learn thinking routines that cultivate students' thinking skills and dispositions and deepen content learning
Designers & Makers	<ul style="list-style-type: none"> • Resources from Agency by Design that support close looking, exploring complexity, and finding the opportunity to see the potential for building, tinkering, re/designing, or hacking objects and systems, e.g.: <ul style="list-style-type: none"> • Memorable Making Experience: A conversation starter and reflective activity for introducing young people and adults to making • Take Apart: Mechanical dissections that allow learners to discover the often-hidden design of objects

	<ul style="list-style-type: none"> • Observational Drawing: This practice allows learners to notice features of an object that they may not have the vocabulary to fully describe yet. By doing several sketches, learners have the chance to take perspectives and to see details they might otherwise miss. • <i>Studio Thinking from the Start: The K-8 Arts Educators' Handbook</i> (Hogan et al., 2018) and <i>Studio Thinking 2: The Real Benefits of Visual Arts Education</i> (Hetland et al., 2013) (secondary): Books describing 8 studio habits of mind (develop craft, engage & persist, envision, express, observe, reflect, stretch & explore, understand art worlds) and 4 studio structures (demonstration-lecture, students-at-work, critique, exhibition) for use in K-12 classrooms • <u>What Can this Material Do?:</u> A tool to introduce children to new materials (primary) (<i>Inspiring Inventiveness</i>)
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What Do We Learn?

<p>Disciplines & Interdisciplines</p>	<ul style="list-style-type: none"> • <u>Teaching for Understanding:</u> The Teaching for Understanding (TfU) framework guides teachers in supporting the development of student understanding by offering criteria to help teachers decide what to teach, how to teach it, and how to determine whether students have understood. TfU suggests that teachers teach generative topics (GTs). GTs entail themes and concepts that provide enough depth, significance, connections, and variety of perspectives to support students' development of powerful disciplinary or interdisciplinary understandings. Examples of GTs in biology include: the definition of life, endangered species, and global warming; math: the concept of zero, patterns, and size and scale; history: survival, conflict, and power; and literature: interpreting texts, folktales, and humor. (<u>TfU Guide</u>, Blythe, 1998, pp.29-34) • <u>Interdisciplinary Understanding</u> occurs when individuals integrate knowledge and modes of thinking from two or more disciplines or fields of study in order to create products, raise questions, solve problems, and offer explanations of the world around them in ways that would not have been possible through a single discipline. Interdisciplinary understanding is purposeful, grounded in the disciplines, and integrative (Boix Mansilla & Gardner, 1996).
<p>Ethical Stances</p>	<ul style="list-style-type: none"> • <u>The GoodWork Toolkit</u> (Fischman & Barendsen, 2010): A flexible set of materials that engages individuals and groups in reflection and conversation about the meaning of good work. The toolkit includes vignettes of individuals who struggle to carry out good work, with accompanying questions and activities, and <u>value-sort cards</u> that prompt reflection on values. (secondary) • <u>Digital Dilemmas:</u> Engaging dilemmas about thorny digital topics, designed to deepen students' thinking, perspective taking, communication skills, and agency (middle and secondary school) • <u>Challenges to Navigating Cultural Complexities:</u> Overgeneralization (making comments about groups of people as if everyone's experience was the same); overconfidence (overestimating how much one knows about a phenomenon or

	<p>group of people, leading to a lack of curiosity or humility; and othering (implicitly or explicitly conveying that one does not consider people from another group to be quite one's equal) (OOEL)</p>
Actionable Content	<ul style="list-style-type: none"> • <u>Introduction to Planetary Health</u>: Four activities in which students explore planetary health and the complex connections between environmental changes and human health. The culminating activity invites students to create a resource that informs others about choice-points that affect planetary health and suggests a range of actions to consider. (OOEL) • <u>Causal Learning in the Classroom</u>: “Becoming Global Thinkers: Thinking about Distant Causes and Effects” 4 lessons that complement existing curricula in environmental ecosystems and climate change science; deepens student learning by revealing patterns of thinking that influence students’ ability to perceive, attend to, and reason about complex causal patterns in science • <u>Voice and Choice</u>: A protocol for looking critically at content, considering perspectives and representation, and then redesigning or reimagining the content from one’s own perspective (AbD)
Meaningful Topics	<ul style="list-style-type: none"> • <u>Participating in a Connected World</u>: Activities that invite youth to explore their face-to-face and online communities, and to identify civic issues that are relevant to people in their local communities and in the wider world. The goal is for youth to discover a civic issue that piques their curiosity and connects with their values and interests. • <u>Stories of Human Migration</u>: Four activities in which students explore stories of human migration and reflect on their own stories in order to develop a critical awareness of their own perspectives on migration, and the role of the media and socio-political contexts in shaping perspectives (OOEL) • <u>Goodwork Toolkit Lesson Plans</u>: Twenty sample lesson plans that support students in grappling with complexity, ambiguity, and their own opinions and beliefs about the working world (secondary)
Lifelong Practices	<ul style="list-style-type: none"> • <u>Circles of Action</u>: A routine to support students’ awareness of opportunities to act responsibly and intentionally deliberate about potential actions and their consequences. The routine distinguishes personal, local, and global spheres, and makes local-global connections. • <u>Here Now, There Then</u>: A routine that invites students to consider past perspectives and develop a better understanding of how thinking changes over time and across cultures. The routine helps students acknowledge that they may have strong stances regarding controversial issues, which are influenced by social and historical contexts. It also uncovers stereotypical perceptions and ethnocentric and presentist judgments. • <u>Educating for Global Competence: Preparing our Youth to Engage the World</u>: (Boix-Mansilla & Jackson, 2011), downloadable book) Provides a definition of global competence (“the capacity and disposition to understand and act on issues of global competence”) and a framework for preparing students to become global citizens; <u>How to Be A Global Thinker</u>: related article with global thinking routines

How Do We Learn?

Observe & Reflect

- **Visible** and **Artful Thinking** and **Agency by Design** routines that focus on observing and describing, e.g., See-Think-Wonder (a routine for exploring works of art and other interesting things) and Parts, People, Interaction (a routine for identifying how people connect to systems). AbD routines ask learners to use their senses to examine objects and systems in order to notice their intricacies and complexity.
- **Reflection routines**: e.g., Connect-Extend-Challenge, a routine for drawing connections between new ideas and prior knowledge) and “I used to think... Now I think...”, a routine for reflecting on how and why our thinking has changed

Challenge Assumptions

- **Causal Patterns in Science**: Activities that teach causal patterns and challenge students’ assumptions in science in order to deepen their understanding; includes general science and in-depth examples about ecosystems and density (See also Resources & Curricula) (UCP)
- **Causal Learning in the Classroom**: “Becoming Responsible Individuals: Understanding Distributed Causality” Four lessons that complement existing curricula in environmental ecosystems and climate change science; deepen student learning by revealing patterns of thinking that influence students’ ability to perceive, attend to, and reason about complex causal patterns in science

Engage the Emotions

- **Asking Unanswerable Questions**: A tool to encourage children to use their imagination and navigate uncertainty (elementary) (IAoC)
- **Inspiring Inventiveness with Literature**: A tool to engage children’s imagination and inspire empathy and curiosity (elementary) (IAoC)
- **Partner Explore**: A tool to encourage children to practice negotiating ideas and to identify new possibilities that may not emerge from working alone (elementary) (IAoC)
- **Planning Playful Learning Environments**: A booklet to help educators create a playful learning context (early childhood, PoP)

Exchange & Develop Perspectives

- **Out of Eden Learn**: An online learning community that accompanies journalist Paul Salopek’s 10-12-year walk around the world. Classes, after-school programs, and young people from around the globe form small, diverse learning groups who encounter cross-cultural perspectives, generating curiosity about the world and other people. Students engage in weekly learning experiences, post their responses, and read and respond to the posts of others. (see Educator Guide)
- **Perspective-taking thinking routines**: e.g., Step In, Step Out, Step Back; Circle of Viewpoints, Stories, etc.

	<ul style="list-style-type: none"> • Ladder of Feedback: An unusually versatile tool that supports children and adults in providing feedback. See also Austin's Butterfly for a powerful video story of the impact of feedback on student work.
Inquire & Investigate	<ul style="list-style-type: none"> • EcoXPT: An immersive simulation in which middle school students use inquiry to learn how ecosystems work, with an emphasis on observation, measurement, data collection and analysis, experimentation, and constructing claims based on evidence • Investigate Module: Activities that engage students in thinking about how to understand and judge the credibility of online civic information and news in the digital age; addresses four questions: 1) <i>Why is credibility important and how can I judge the credibility of civic information online?</i> 2) <i>How can I reflect on my biases when investigating civic issues?</i> 3) <i>How do I understand and analyze visual forms of civic information online?</i> 4) <i>How do I investigate a topic and present what I have learned?</i> (Digital Civics Toolkit) • Think, Puzzle, Explore: A routine that sets the stage for deeper inquiry
Make Thinking & Learning Visible	<ul style="list-style-type: none"> • Me-You-Space-Time: A routine to help teachers reflect on the visibility of thinking in the classroom; see also visible thinking routines (VT) • Making Learning Visible Resources: Fifteen tools for documenting learning in the classroom, engaging families in making learning visible, and making learning visible beyond the classroom. (<i>Visible Learners</i>, pp.136-171); see also resources from MLV Website

What Do We Do with What We Learn?	
Demonstrate Understanding In & Across Contexts	<ul style="list-style-type: none"> • Performances of understanding ask students to go beyond the information given to create something new by expanding, applying, or building on what they already know. Such performances help students develop and demonstrate their understanding, e.g., comparing different accounts of the same historical event; collecting data and representing them visually; and experimenting with lenses and drawing a diagram about how light travels through them. (pp.56, 62-70, Blythe, TfU) • Portable Knowledge: A set of thinking routines to foster transfer of content knowledge and 21st century skills
Engage in Civic Dialogue	<ul style="list-style-type: none"> • Digital Civics Toolkit: Five modules on exploring community issues, investigation, dialogue, voice, and action that support youth to explore, recognize, and take seriously the civic opportunities and dilemmas of digital life (secondary, but adaptable for earlier grades) • The Dialogue Toolkit: A toolkit of strategies to support slow, thoughtful comments and ideas in online and in-person discussions

	<ul style="list-style-type: none"> • Digital Civics Toolkit modules on dialogue (a toolkit to explore the qualities of productive dialogue in person or online) and voice (a toolkit to help students consider what, how, when, and why they might create, remix, repurpose, and share civic content and perspectives with others in online spaces) (middle and secondary) (YPP) • Value Sort Activity: A list of 30 values that can be sorted in terms of their relative importance. The Value Sort is an excellent way to reflect on what is most important to you personally, and to stimulate conversations with peers, colleagues, and family members.
Advocate & Take Action	<ul style="list-style-type: none"> • 10 Questions for Young Changemakers: Ten questions designed to help youth develop successful—equitable, self-protective, and effective—civic agency in a digital age. Successful civic action projects include 1) developing self-awareness and awareness about one’s communities; 2) issue identification; 3) research and investigation; 4) choice of action strategy; 5) implementation; and 6) reflection and documentation (YPP) • Digital Civics Toolkit Action Module: Invites students to carefully consider a broad range of possible tactics and strategies to take in response to issues they care about, and to rethink their definition of what it means to take civic action in a digital age • Circles of Action: A routine to support students’ awareness of opportunities to take responsible action and to prepare them for intentional deliberation about potential actions and their consequences. The routine distinguishes personal, local and global spheres, and makes local-global connections. • Children Are Citizens Project Planner: A planning tool to help teachers and/or students plan for projects that engage children as civic agents in their communities. (CAC)
Envision & Inspire	<ul style="list-style-type: none"> • Creativity thinking routines from VT, AT, AbD, e.g., <u>Imagine If...?</u> (a routine to find opportunity and pursue new ideas), <u>Color-Symbol-Image</u> (a routine for distilling the essence of ideas nonverbally), <u>Creative Comparisons</u> (a routine for metaphorical thinking), <u>Creative Hunt</u> (a routine for looking at parts, purposes, and audiences), <u>Creative Questions</u> (a routine for generating and transforming questions) • Inspiring Inventiveness: Tools that support inventiveness in early childhood and primary classrooms (IAoC) • Voice and Choice: A protocol for looking critically at content, considering perspectives and representation, and then redesigning or reimagining the content from one’s own perspective (AbD)

Appendix B: Resources for Supporting Collaborative Inquiry

(Note: Entries in italics are from sources outside of Project Zero)

Resources for Supporting Collaborative Inquiry	
Forming Inquiry Groups	<p><i>Resources to Support Teacher Inquiry</i></p> <ul style="list-style-type: none"> • Designing and Facilitating Adult Study Groups – considerations for launching and facilitating collaborative inquiry groups • Teaching as Inquiry Table of Decisions – a graphic of decisions for establishing and sustaining collaborative inquiry groups (Weinbaum et al., 2004, pp.35-36) • Facilitating Learning, Logistics, and Longevity – a graphic of the actions that facilitate the learning, logistics, and longevity of an inquiry group (Allen & Blythe, 2004, p.34) • Creating Communities of Inquiry: Inquiry Definition – guidelines for defining inquiry and developing an inquiry stance (CCI) • Creating Communities of Inquiry: Inquiry Rubric – a rubric for assessing inquiry-driven teaching and learning (CCI) • Forming Ground Rules – <i>a protocol for establishing norms</i> • What, So What, Now What – <i>a protocol for sharing and getting feedback on one’s work</i> • Ladder of Feedback – a structure for providing feedback for adults and/or children • Airplane Activity – an interactive activity in which adult learners take on the roles of group learners and documenters to explore the role of documentation in individual and group learning • School Reform Initiative Website – <i>useful website containing a wealth of discussion protocols</i> • The Creating Communities of Innovation Toolkit for Inquiry-Driven Instruction – an online toolkit for supporting educators in developing inquiry skills to pursue school-based innovation (Clapp, Dawes Duraisingh, & Sachdeva, 2019)
Focusing on Questions of Practice	<ul style="list-style-type: none"> • Choosing and Honing A Question – criteria for choosing a question for playful or other inquiry • Beginning to Document by Stepping Back – guidelines for observing and documenting with a sense of curiosity and wonder (<i>Visible Learners: Promoting Reggio-Inspired Approaches in All Schools</i>, pp.140-142) • Beginning to Document through Intentional Inquiry – a protocol for choosing a guiding question to focus observations while documenting (<i>Visible Learners</i>, p.139) • Collaborative Assessment Conference – a protocol for discussing student work or documentation through observation, description, speculation, interpretation, and reflection • Consultancy Protocol – <i>a protocol for thinking more expansively about a concrete dilemma</i> • The Tuning Protocol – <i>a protocol that invites feedback on teaching issues such as revising an assignment or determining learning goals</i>
Experimenting in the Classroom	<ul style="list-style-type: none"> • Individual Monthly Action Plan – <i>a planner for carrying out and evaluating a change in practice</i>

	<ul style="list-style-type: none"> • Getting Started with Making Learning Visible – a useful introduction to practices of group learning and documentation (<i>Visible Learners: Promoting Reggio-Inspired Approaches in All Schools</i>, pp.110-111) • Considerations for forming small groups – eight factors to keep in mind when forming small groups of children (<i>Visible Learners</i>, pp.115-116) • The What If School: The International School of Billund and our Pedagogy of Play (Pedagogy of Play at Project Zero and ISB, 2020) – booklet describing a pedagogy of play • Looking at Learning in Groups: Classroom Discussion Guidelines – an engaging way to launch conversations with students about learning in groups (<i>Visible Learners</i>, pp.112-114) • Entry-Point Charts: Engaging All Members of the Group – a structure to help teachers ensure that all learners are engaged in the learning (<i>Visible Learners</i>, pp.117-119) • Ten Suggestions for Getting Started with Thinking Routines in Early Childhood Classrooms (VT) • Adults as Members of the Learning Group – a tool for engaging other adults in the classroom as learners (MLV) • Project Zero’s Thinking Routine Toolbox – a toolbox of over 80 thinking routines developed across PZ research projects
<p>Engaging in Documentation</p>	<ul style="list-style-type: none"> • Documentation & Display: What’s the Difference? – considerations for distinguishing documentation from display (MLV) • Documentation Features in Practice – examples of what key features of documentation look like in practice (MLV) • Documentation: When Does it Make Learning Visible – questions that guide the creation, collection, and examination of documentation for one’s own reflection, for sharing back with learners, and for sharing more widely (MLV) • Me, You, Space, Time – a routine to help teachers plan for and reflect on making thinking visible (VT) • Making Learners’ Words Visible: Speech Bubbles – a way to make learners’ words and thinking visible through photographs and speech bubbles (<i>Visible Learners: Promoting Reggio-Inspired Approaches in All Schools</i>, pp. 149-150) • Making Learning and Teaching Visible FAQ & Tips – suggestions and tips for documenting and using thinking routines in secondary school • “When Do I Document?” -- an elementary teacher’s reflections on when to document (MLV) • Documentation Transforming Our Perspective – Reflections from educators in Reggio Emilia on documentation (video) • Listening to Learning: Conversation-guided Curriculum at the Hilltown (MA) Cooperative Charter School: Part 1 and Part II – story of how a teaching team uses documentation to support student learning, including meeting state standards (2nd-3rd grade) (video) • Quick Start Guide to Documentation – a brief guide to the how, when, what, and why of documentation (PoP) <p><i>Examples of Using Documentation to Support Group Learning</i></p> <ul style="list-style-type: none"> • Learning is a Team Sport: Kindergartners Study the Boston Marathon – the story of how a teaching team uses documentation and group learning to deepen and extend students’ investigation of the Boston Marathon (kindergarten) (video) • The Amazing Circus Act – two high school mathematics students’ efforts to make their thinking visible via a public display (video)

	<p><i>Engaging Families in Making Learning Visible</i></p> <ul style="list-style-type: none"> • Introducing Families to Making Learning Visible – different ways to introduce families to the power of group learning and documentation (<i>Visible Learners</i>, pp.152-153) • Refrigerator Reminder: Five Ways to Make Learning Visible at Home – a parent-created tool for documenting and encouraging group learning at home (<i>Visible Learners</i>, pp.154-155) • Making Learning Visible Family Survey – a short survey of options supporting children’s learning in the classroom or home (<i>Visible Learners</i>, pp.156-157) • Involving Families in the Learning Process – suggestions of ways to engage families in the learning process as well as product (<i>Visible Learners</i>, pp.158-160) • Documenting Learning at Home – ideas for documenting learning at home (<i>Visible Learners</i>, p.161) • 9 Apps for Parents – suggestions for parents to support children’s thinking and make it visible
<p>Reflecting on and Celebrating Progress</p>	<ul style="list-style-type: none"> • Creating Documentation for Public Viewing: Protocol 1 – a protocol for the early phases of creating documentation to be shared publicly (<i>Visible Learners: Promoting Reggio-Inspired Approaches in All Schools</i>, pp.132-133) • Creating Documentation for Public Viewing: Protocol 2 – a protocol for the later phases of creating documentation to be shared publicly (<i>Visible Learners</i>, pp.134-135) • Bulletin Boards that Make Learning and Learners Visible – guidelines for creating bulletin boards that make thinking visible (<i>Visible Learners</i>, pp.163-164) • Creating Exhibitions of Teaching and Learning – guidelines for creating an exhibition of teaching and learning for the community (<i>Visible Learners</i>, pp.165-166) • Anatomy of an Exhibit Panel – key components for making learning visible beyond the classroom (<i>Visible Learners</i>, pp.167-168) • Zoom Guidelines and Template – guidelines and template for creating a documentation panel that provides a close look at and analysis of one or more aspects of classroom life (<i>Visible Learners</i>, pp.169-171)
<p>General Resources</p>	<p><i>Books</i></p> <ul style="list-style-type: none"> • Building on Children’s Strengths: The Experience of Project Spectrum (Chen, Krechevsky, & Viens, 1998) • Creating Cultures of Thinking: The 8 Forces We Must Master to Truly Transform Our Schools (Ritchhart, 2015) • Disconnected: Youth, New Media, and the Ethics Gap (James, 2014) • Educating for Global Competence: Preparing Our Youth to Engage the World (Boix-Mansilla & Jackson, 2011) • Facilitating for Learning: Tools for Teacher Groups of All Kinds (Allen & Blythe, 2015) • Frames of Mind: The Theory of Multiple Intelligences (Gardner, 1983, 2004, 2011) • Future Wise: Educating Our Children for a Changing World (Perkins, 2014) • Inquiry as Stance: Practitioner Research for the Next Generation (Cochran-Smith & Lytle, 2009) • Inquiry-driven Innovation: A Practical Guide for Supporting School-based Change (Dawes Duraisingh & Sachdeva, in press)

- [Learning Causality in a Complex World: Understandings of Consequence](#) (Grotzer, 2012)
- [Looking Together at Student Work](#) (Blythe, Allen, & Powell, 2015)
- [Maker-Centered Learning Playbook for Early Childhood Education](#) (Clapp, Solis, Ho, & Laguzza, 2020)
- [Maker-Centered Learning: Empowering Young People to Shape Their Worlds](#) (Clapp, Ross, Ryan, & Tishman, 2016)
- [Making Learning Visible: Children as Individual and Group Learners](#) (Giudici et al., 2001)
- [Making Learning Whole: How Seven Principles of Teaching Can Transform Education](#) (Perkins, 2010)
- [Making Thinking Visible: How to Promote Engagement, Understanding, and Independence for All Learners](#) (Ritchhart, Church, & Morrison, 2011)
- [Making Teaching Visible: Documenting Individual and Group Learning as Professional Development](#) (Mardell et al., 2003)
- [Multiple Intelligences around the World](#) (Chen, Moran, & Gardner, 2009)
- [Project Spectrum: Early Learning Activities](#) (Chen, 1998)
- [Project Spectrum: Preschool Assessment Handbook](#) (Krechevsky, 1998)
- [Slow Looking: The Art and Practice of Learning through Observation](#) (Tishman, 2017)
- [Studio Thinking: The Real Benefits of Visual Arts Education](#) (Hetland, Winner, Veenema, & Sheridan, 2013)
- [Studio Thinking from the Start: The K-8 Art Educator's Handbook](#) (Hogan, Hetland, Jaquith, & Winner, 2018)
- [Teaching as Inquiry: Asking Hard Questions to Improve Practice and Student Achievement](#) (Weinbaum et al., 2004)
- [Teaching for Understanding: Linking Research with Practice](#) (Wiske, 1998)
- [The Creating Communities of Innovation Toolkit for Inquiry-Driven Innovation](#) (Clapp, Dawes Duraisingh, & Sachdeva, 2019)
- [The Facilitator's Book of Questions: Tools for Looking Together at Student and Teacher Work](#) (Allen & Blythe, 2004)
- [The Power of Making Thinking Visible: Practices to Engage and Empower Learners](#) (Ritchhart & Church, 2020)
- [The Teaching for Understanding Guide](#) (Blythe, 1998)
- [Visible Learners: Promoting Reggio-Inspired Approaches in All Schools](#) (Krechevsky, Mardell, Rivard, & Wilson, 2013)

Articles and Blogs

- [An ISB Staff Meeting: The Influences on Playful Learning for Adults](#) (Mardell & Uhre Fog, 2017)
- [Assessment Reimagined](#) (Krechevsky & Blythe, 2019)
- [Changing Our Skin: Creating Collective Knowledge in American Classrooms](#) (Krechevsky, 2012)
- [Frankly, It's a Gamble: What Happens when Middle School Students Compose their own Schedule](#) (Krechevsky et al., 2019)
- [From Zero to Fifty: Celebrating Five Decades of Project Zero](#) (8 articles, Creative Teaching & Learning, Special Issue, 2019)
- [Group-Worthy Tasks](#) (Lotan, 2003)
- [How Making Learning and Thinking Visible in Italian Secondary Schools Supports Transformative Learning in Teachers](#) (Aquilino & Krechevsky, 2019)
- [Inquiry is Play: Playful Participatory Research](#) (Baker & Davila, 2018)

- [Making Learning Visible: Redefining Learning Groups in School](#) (Rivard & Krechevsky, 2014)
- [Playful Participatory Research: An emerging methodology for developing a pedagogy of play](#) (Baker et al., 2016)
- [Popatplay](#) (a blog highlighting the Pedagogy of Play project)
- [Relationships of Knowledge and Practice: Teacher Learning in Communities](#) (Cochran-Smith & Lytle, 1999)
- [Too Many Rules on the Playground: Working the Paradox between Safety and Freedom](#) (Baker & Benavente, 2017)
- [Willing to Be Disturbed](#) (Wheatley, M. 2002).
- [Zooms: Promoting schoolwide inquiry and improving practice](#) (Mardell et al., 2009)

Videos

- [Introduction to Project Zero](#)
- [Concept of Thinking Dispositions](#)
- [Project Zero Thinking Routines](#)