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Civic Reasoning and Discourse

Civic Reasoning and Discourse: Perspectives from Learning and Human Development Research

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CIVIC REASONING AND DISCOURSE: PERSPECTIVES FROM LEARNING AND HUMAN DEVELOPMENT RESEARCH

Abstract

The Learning and Development Panel seeks to document the extant research that helps us understand what is entailed in civic reasoning and discourse and how the knowledge and epistemological dispositions such work requires can and should be distributed across the subject matters taught in school (e.g., literacy, history/social studies, science, mathematics, literature). We have theorized that this problem space includes cognitive dimensions (knowledge, epistemological orientations), phenomenological dimensions (perceptions of the self, of others), moral dimensions (the moral and ethical dimensions of what we value), and issues of conceptual change and implicit bias. We posit that addressing the challenges of preparing students to engage in civic reasoning and discourse requires that any such preparation be grounded in a multi-dimensional understanding of human learning and development.

This paper articulates a conception of human learning and development that synthesizes core findings from multiple disciplines, including cognition, human development, social psychology, moral development, various fields of the neurosciences, and studies of ecological systems. This synthesis supports a conception of human learning and development as an outgrowth of dynamic relationships among perceptions (of the self, of others, of tasks and settings), knowledge, attributions of emotional salience as people at different stages across the life course engage in meaning making to wrestle with the basic tasks of development, including physical, emotional and psychological safety; as well as connectedness and a sense of belonging. These basic tasks of development are primary drivers of behavior as they are rooted in our evolution as a human species. However, how learning and development unfold in different cultural communities, at different points in cultural historical time, and at different points in the

life cycle involve tremendous variation, as people move within and across settings. This foundational variation is often a source of contestation. Of particular interest for this project is how sources of contestation are taken up in practices and policies over which people – particularly in democratic societies – have opportunities to take up in civic discourse and debate.

Moving from this articulation of foundational principles of human learning and development, we consider the knowledge component of development, specifically with regard to knowledge construction in the academic subject matters of social studies/history, mathematics, science, literature, and the literacy (reading, writing, speaking, and increasingly, computing and interpreting data) demands within these subject matters. Subject matter knowledge includes epistemological orientations, key concepts and big ideas, ways of using language, kinds of texts and ways of representing knowledge, and modes of reasoning (e.g., what counts as evidence). We view knowledge construction in the subject matters to also include the breadth of cultural variation in ways of knowing.

Considering that wrestling with complex civic dilemmas involves more than knowledge alone, we then transition to synthesize relevant findings from the following domains: human development, social psychology, and moral reasoning. We examine findings with an eye towards what must be addressed if schools are to be successful in preparing young people to engage in civic reasoning, debate and discourse. This includes understanding these complex demands for children, for adolescents, and for adult stakeholders – teachers, administrators, parents and guardians.

We conclude by applying these findings to their relevance around the civic topics we introduced at the beginning of the paper. We then make recommendations for practice across

academic disciplines as supports for preparing and engaging young people in complex civic reasoning and discourse, for research, and for policy.

Introduction

This report examines the issues, challenges and opportunities relevant to civic reasoning and discourse from the perspective of research on learning and human development. These connected fields of study have significant implications for the processes of formalizing and interpreting arguments, considering divergent community perspectives, analyzing complex processes and potential social outcomes, and developing solutions to ill-structured and far-reaching problems of civic scale, which lack a singularly correct and apparent answer (Torney-Purta, 1995). We do not propose that supporting the development of civic reasoning and discourse in K-12 schooling will in itself directly impact civic action through policy and practices in the broader society. Rather, this project seeks to better understand how we can prepare current and future generations with the skill sets and dispositions that increase the likelihood that they as adults will be active civic agents. At the same time, we anticipate that, if schools enable the kinds of recommendations made in this report, then there will be increased cases of young people in middle and high school who will indeed engage in civic action as youth, such as the recent anti-violence movement sparked by students at Parkland High School in Florida, the global Sunrise Movement of young people fighting to stop the climate crisis, the historical role of youth in the Civil Rights Movement of the 1960's and the nation wide protests (indeed international) following the killing of George Floyd by Minneapolis police.

We engage this complex problem space through the following strategies: first, we present definitions of civic reasoning and discourse and outline the basic learning and development principles entailed in these interrelated processes. We also offer an anchoring vignette from a complex, contemporary situation to which we return throughout the paper as an object of

analysis and practical application. We begin with an outline of key ideas from research in the sciences of learning that inform how we understand the cognitive demands of civic reasoning and discourse. We then explore how theories and research on human development, particularly with regard to identity, belonging, and moral development, are fundamentally involved in the work of civic cognition and debate. We move to highlight major theories and advances across the disciplinary approaches that may be of particular use to the tasks of civic reasoning and discourse, as informed by findings from the learning sciences and human development. We conclude with a discussion of research on learning and development, emphasizing strategies that core academic disciplines can take up to support the socializing of civic reasoning and discourse, including implications for future research and practice.

Importance of civic reasoning and discourse for a working democracy

Support for civic reasoning and opportunities for robust civic discourse are essential for a successful working democracy—a governance system in which the citizens themselves hold the power to make decisions, whether through direct participation or through election of representative officers, as in the United States. The ability to decide collectively a just and mutually beneficial course of coordinated action, and to acknowledge and correct previously enacted community harm requires deep historical knowledge and knowledge of our political system of governance, scientific and technical knowledge, logical reasoning ability, capacity to empathize with multiple social and psychological perspectives, understanding of economic principles and ecological systems, and skill at formulating and communicating arguments in multiple modalities.

The challenges of civic decision making in the U.S. are well established and hotly debated. Preparing youth to engage in civic reasoning and discourse has been viewed largely as

the purview of civics education, often reduced to a senior level civics course in high school and tests on the U.S. and state constitutions. Nationally, we examine youth's knowledge about civics as a domain in grades 4, 8 and 12 through the NAEP (National Assessment of Educational Progress) civics assessment every 4 years. The civics assessment examines what students know in terms of knowledge, skills and dispositions. The knowledge base concentrates on understanding our political system, its history, how it functions, and how citizens can engage it, and history and geography of the United States. The intellectual skills include identification and description, explanation and analysis, evaluation and argumentation. Civics courses typically work to support dispositions such as becoming an independent member of society; assuming the personal, political, and economic responsibilities of a citizen; respecting individual worth and human dignity; participating in civic affairs in an informed, thoughtful, and effective manner; and promoting the healthy functioning of American constitutional democracy.

While the NAEP assessment analyzes a national sample of students in both public and private schools, because the U.S. federal government leaves the power to individual states to legislate mandatory curriculum in schools, access to civic education is starkly uneven across the country. As of 2018, only 19 states required a civics exam to be passed as a qualifier for graduation, and only 36 mandated that at least a semester-long civics class be offered during a student's high school career. Just 8 states specified that students receive a full year of civics education (Education Week, 2018). Across the board, few districts provide the necessary training and materials for educators to effectively teach civic content and skills; when they do, the resources typically come from outside, non-profit organizations and considerably vary in quality.

Although some states have made civic education a legislative priority in recent years (for example, between 2015 and 2019 Illinois passed new civic education requirements for both high

school and middle school students), other states are still lagging behind. In 2018, 14 students ranging in age from pre-school to high school filed a lawsuit against their home state of Rhode Island for not providing them with adequate civic education (Goldstein, 2018). One of the plaintiffs, a high school senior Aleita Cook, claimed that the two required social studies courses she took at Providence Career and Technical Academy—World and American history—taught her "mostly about wars," failing to prepare her to understand the basics of the U.S. bipartisan system, participate in contemporary political debates, or file her taxes.

The impacts of these educational omissions are evident across the public sphere. Only a quarter of 8th grade students scored "proficient" or above on NAEP's civics assessment in 2014. There were no significant differences for 8th graders in the 2018 NAEP civics assessment. Earlier results from 2010 for 4th and 12th graders yielded similar results. The level of political polarization—the gap between liberals and conservatives – is the highest it has ever been in the 25 years since the Pew Research Center has begun tracking it (Pew Research Center, 2017). Polarized political identification correlates with divisive media consumption habits and distrust of politically contrasting institutional news sources (Mitchet et al, 2019), while the spread of "misinformation" – vague, false, and misleading facts – on social media is so rampant it earned the term the 2018 "word of the year" status on Dictionary.com. In 2019, the Gun Violence Archive recorded 418 mass shootings across the country, many of the deadliest ones occurring in schools, churches, and shopping centers, intentionally planned and executed as attacks on religious and ethnic minorities (Gun Violence Archive, 2020). These aggregated trends are evidence that the collective capacity for civic reasoning and discourse in the United States is not simply weak; it is catastrophically broken. The educational policy and research communities have a responsibility to facilitate access to the knowledge base that can inform children,

teachers, and the population at large in their efforts to effectively make sense of ongoing political conflicts and to learn to think and act reasonably and morally about ongoing social challenges.

Definitions of civic reasoning and discourse, and anchoring vignette

Throughout this paper, we will orient our discussion of the learning and developmental issues entailed in civic reasoning and discourse around the following definitions, developed by our colleagues Peter Levine et al.:

> ***To reason civically*** *is to ask what we should do, where "we" is a group of any size, outside the family, to which the individual belongs...The question always has an ethical dimension: which means and which ends should we choose?...And the question requires a rigorous empirical understanding of the situation, the most relevant institutions, and the likely outcomes of various decisions. Emotions—from empathy to righteous indignation—also provide input for civic reasoning and should be influenced by reasoning.*
>
> ***Discourse*** *is necessary because discussing with others is our best way of combating our individual cognitive and ethical limitations and biases. But discourse can go badly because of group-think, propaganda, bias, lack of empathy, exclusion of perspectives, and other dysfunctions. Thus education (broadly defined) should motivate people to feel part of groups that reason together about what to do and should strengthen their dispositions, skills, and knowledge so that they reason well. Putting the results of a discussion into practice and reflecting on the outcome is one way to learn civic reasoning, but it is also possible to learn from simulations, observations, data, history, and the lived experiences of students.*

The above definitions imply that civic reasoning and discourse inherently entail the application of knowledge, sensemaking abilities, moral principles, and communication skills within the context of a living and historically situated community — the same activities entailed in learning and human development more broadly. Our goal with this paper is to demonstrate how specific principles, theories derived from research can inform educational design and policy for civic reasoning and discourse.

We will also ground our discussions in an anchoring vignette drawn from a complex civics dilemma in the United States. We selected this situation for several reasons: (1) it is both current and historically implicated; (2) it involves competing interests, and (3) there is no single answer to the dilemmas it presents.

On a hot August day in 2019, the busy work routine of several poultry factories in Mississippi was suddenly interrupted by the arrival of 600 agents from U.S. Immigration and Customs Enforcement (ICE)—a federal agency overseeing immigration law. The ICE agents arrested 680 factory employees across multiple plant locations, citing their status as undocumented immigrants as grounds for detaining them and launching deportation proceedings. The workers had no choice but to follow the armed agents, and the factory management had no power to protect their staff from the raid. Some of the factories lost nearly half of their workers—many of whom had used fake names and social security numbers to access the right to work at the chicken plant and pay taxes on their earnings. The events of the ICE sting affected not only the detainees themselves, but practically all

190 *members of the town's community in a cascade of consequences: the workers' children,*
191 *who were left without parents; their extended family members who had to scramble to*
192 *take care of the children and the remaining responsibilities of the detained workers; the*
193 *factory employees who were left without trained colleagues to meet the already*
194 *exhausting daily poultry processing quotas; workers' neighbors and churches organizing*
195 *to provide aid to the affected families; landlords suddenly left without reliable tenants,*
196 *the town's teachers having to face classrooms of traumatized, abandoned children and*
197 *risking their own job security if school enrollments drop. As the ICE buses pulled away*
198 *packed with detained workers, a factory employee who was left behind suggested an even*
199 *bigger national impact: "This will affect the economy. Without them here, how will you*
200 *get your chicken?" (Reporting sourced from Jordan, 2019 and Solis & Amy, 2019).*
201
202 In taking up this situation and its consequences as an anchoring case for unpacking the
203 complexity of civic reasoning and discourse, we contend with the question: what is entailed in
204 the activity of deciding "what we should do" about "it"? As the definitions above suggest, a
205 primary ethical consideration is deciding who is included in the "we"—is it just employees of the
206 poultry plant, just residents of the Mississippi town where the raid took place, only legal
207 American citizens living in Mississippi or only adult ones who are eligible to vote? Or does the
208 "we" include the detained workers as well, regardless of their immigration status, and their
209 children, the teachers who might live in different towns but care for the children inside the
210 county's public schools? Does it include their families in other countries who depend on the
211 workers' earnings? Does the "we" include other residents of the United States—who do not live

in Mississippi or personally know any of the detainees? Does the "we" apply only to people who eat chicken processed at the plant or also those who ethically reject factory farming of animals?

What are means and ends that are available for reasoning and decision-making about this situation? Do "we" decide that our main priority is resuming normal economic activity in the plant and country—making sure "everyone gets their chicken" by whatever means necessary? Or do we decide that reuniting detained parents with their children is most important? What legal and political tools are available in pursuit of either end goal? Why does a federal agency have the jurisdiction to make a surprise raid inside a commercial plant in Mississippi? Is the company responsible for its hiring practices or the detained workers for forging identity documents in order to work? Is the U.S. government responsible for catalyzing economic policies that impoverish and destabilize its southern neighbors, motivating people to migrate to the U.S. illegally? Do "we" care most about punishing law-breakers or about modifying our laws and practices to ensure collective well-being?

In reasoning about this situation, how might we think about various outcomes of different decisions? For example, what might happen if the local residents organize a protest against ICE or other employees of the plant strike in solidarity with the detainees? What might happen if nothing is done and unattended children are left without their parents for an indefinite amount of time? What are the tools available for thinking through these complex sequences of events? Could we use historical documentaries or participatory simulations to play out and reflect on different strategies? What are the expectations for civic discourse in such a moment? The

urgency of such discourse? What does it mean to discuss policy decisions that hold children's lives in the balance?

Whose feelings and livelihoods should be taken into consideration, whether or not they are included in the "we" who get to decide what to do – those of children and families? Business owners? Potential abusers of immigration laws? Future generations?

And where might *civic discourse* about these dilemmas even take place? In an 8th grade social studies classroom? In a town hall or a church basement? What biases and information sources will be acknowledged and ignored? What historical cases will be brought up as precedents or alternatives? Will some young people have no opportunity to engage in discourse about these issues at all, because the teacher will be afraid of holding space for a controversial discussion or rush to cover content for the next state exam?

As this sampling of questions suggests, both understanding the issue and seeking to address the issue involve concerns around the moral and ethical dimensions of the problem space, and how perceptions of the self and others play out in influencing both how one understands the problem as well as how and if one seeks to engage in civic action to address the problem. Schools have a critical role in preparing students to grapple with such questions, and to develop the knowledge and dispositions that increase the likelihood they will engage in civic action.

Complexity of the problem space from human development and learning perspectives

There is a breadth of knowledge, dispositions, ad identity orientations that are entailed in people engaging in the work of civic reasoning and discourse, including knowledge of a wide array of content and concepts across multiple domains, dispositions that are both epistemological

as well as moral and ethical, and identity orientations that involve perceptions of the self and of others. And this breadth of knowledge, dispositions, and identity orientations operate within ecological systems that are always dynamic. We seek to present a discussion of this breadth of knowledge, dispositions and identity orientations, documenting the research base from across relevant disciplines that help us understand both the nature of such knowledge as well as how they develop over time and the conditions to facilitate or challenge their development. We assert that because of this complexity, it is unreasonable to believe that the knowledge and dispositions for civic reasoning and discourse can be developed in one sector of our socialization systems—i.e., in the civics courses some students are required to take in public schooling – or only at certain points in life course development – i.e., adolescence.

We believe that our efforts to prepare young people for such complex problem solving must be informed by an empirically supported knowledge base. To the extent that so much attention to civics related learning has been deemed cognitive, it has been limited in its ecological validity. There is an emerging body of work that seeks to understand the dynamic intersections among thinking, perceptions, and emotions in human learning and development and how these unfold over time in terms of where people are in the life course (Osher, Cantor et al., 2018). This integrative frame draws from research in cognition, the learning sciences, human development and social psychology. We will describe foundational findings from these disciplines and their relevance for engaging in civic reasoning, debate and discourse. We will address not only broad constructs about human learning but also how these play out in terms of learning in core academic disciplines. Each content area can contribute to the breadth of knowledge people need to understand the complex civic dilemmas we face and analyze the range of responses we can collectively pursue. We focus on academic disciplines that currently

structure the primary units of public schooling: literacy, literature, history and social studies, math, science, and the cross-disciplinary role of discourse repertories in classrooms.

How People Learn

In 1999 the National Research Council commissioned an integrative study of human learning. The project produced the landmark report, *How People Learn* (Bransford, Brown et al. 1999), which outlined the foundational theories of the sciences of learning, including the processes of knowledge acquisition, organization and transfer across contexts, problem-solving, conceptual change, and the development and structure of expertise. The report emphasized the salience of learners' *prior knowledge*—intuitive and cultural understandings of phenomena—in the task of learning new concepts and approaching unfamiliar problems. Also emphasized was the significance in differences between novices' organization of knowledge—often shallow, fractured, and contradictory—and domain experts' organization of knowledge, reflecting a deep structure of conceptual and contextual relationships in a given field. Of particular challenge, then, is the facilitation of *conceptual change* in learners—the task of supporting individuals to both revise potentially existing misconceptions or partial understandings and construct new cognitive frameworks to accommodate new-to-them ideas (diSessa and Sherin 1998, diSessa 2002). *How People Learn* additionally emphasized that knowledge structures and learning processes are *social*—emerging and reinforcing through interpersonal interaction, *situated* in specific cultural settings and activity, *mediated* by cognitive and cultural tools including language and artifacts, and *distributed* across objects, physical representations, and relationships within the environment. Finally, the report and follow-up texts proposed recommendations for the design of learning environments to support learning in accordance with these scientific

303 understandings (Donovan, Bransford et al. 1999, Donovan and Bransford 2005). These include
304 anticipating, surfacing, and incorporating learners' prior knowledge, providing opportunities to
305 build varied repertoires of real-world problems in the domain, and supporting metacognitive
306 relationships to domain knowledge through collaborative and reflective activities.

307 In 2018, the National Academies of Sciences, Engineering, and Medicine issued a
308 follow-up consensus report—*How People Learn II*—that sought to expand the focus on cognition
309 to include greater attention to issues of culture and context, moving beyond the focus on thinking
310 as solely activity within the individual brain (National Academies of Sciences and Medicine,
311 2018). Incorporating emerging and complementary empirical findings from neurosciences
312 (cognitive, social, cultural), research on human development as well as two decades of advances
313 in Learning Sciences, the expanded view of learning emphasized how the thinking and problem
314 solving humans engage in is multi-faceted, richly cultured, and dynamic. This complex systems
315 perspective (Fischer and Bidell, 1998) further acknowledges that humans' foundational abilities
316 and dispositions for learning are inherited from our evolution as a species (Packer & Cole, 2020;
317 Lee, Meltzoff & Kuhl, 2020; Tomasello 1999, Quartz & Sejnowski 2002). These dispositions
318 include newborn humans' tendencies to explore their immediate physical and social world and
319 seek to impose meaning on their experiences in the world, and the structures for storing these
320 experiences and meanings as schemas embodied physically in the body and in neural networks in
321 the brain (Kitayama & Park, 2010). Humans' responses to experience in the world are initially
322 physically embodied through their senses (sight, hearing, touch, taste, smell), and taken up
323 through chemical responses that are transmitted to the brain. These chemical responses are
324 associated with the emotional salience human beings impose on experience, which are in turn
325 implicated in their decision-making and behavior (Damasio, 1995). Despite the capacities of

326 rationality, long-term thinking, and imagination that are unique features of the human species,
327 the evolutionarily inherited limbic system located in the amygdala can overtake systems in the
328 frontal lobe that drives cognition and goal orientation, particularly under perceptions of stress
329 (Adam, 2012). Thus the emotional salience attributed to experience is central to understanding
330 human thinking and action.

331 Humans' responses to experience are additionally influenced by *ego-focused orientations*
332 (i.e., who we think we are) that are formed not only by individually inherited dispositions but
333 also by the social relationships we have within and across contexts, with relationships in family
334 life as foundational (Spencer, 2006). Finally, our perceptions of task *relevance* and personal
335 *efficacy* always serve as filters for what we make of experiences in the world (Bandura, 1993).
336 Perception of relevance is both individual and social: sometimes we persist in problem-solving
337 because the task is personally relevant in terms of either a short- or long-term goal and
338 sometimes that goal is purely individual and sometimes it is related to our sense of social
339 obligation to others (Markus & Kitayama, 1991). We are also more likely to persist in complex
340 problem-solving when we feel a sense of efficacy—a belief in our ability to eventually find a
341 solution to the problem, even if we are failing in the moment.

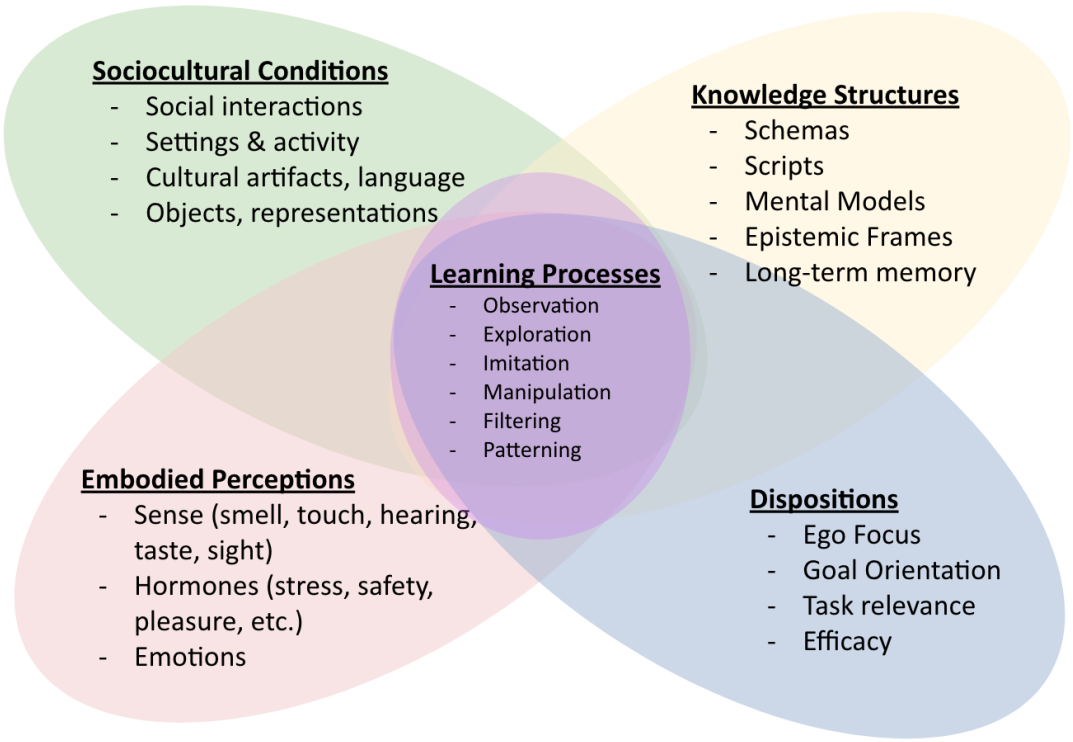
342 In summary, the new theories of learning acknowledge the dynamic complexity and
343 cultural and cognitive variation in ways people might represent and engage with the world,
344 storing and retrieving information, organizing social activity, and solving problems (Lee, 2017).
345 This "no best way" characterization of how people learn thus recognizes the underlying
346 importance of the species' physical, cultural, and neurological diversity. Consequently, our
347 considerations for developing learning environments need to extend beyond issues of knowledge
348 organization and representation, and attend to the design of sensory stimuli, cultural resonance,

embodied activity, and emotional safety. These multi-dimensional foci are especially important in the design of learning environments intended to prepare young people for the complex and potentially stressful challenges of civic reasoning, discourse and engagement.

Taking this complexity into account, we can see how the foundations of children's learning to reason about civic issues and engage in civic discourse begin at a very young age and are influenced by every aspect of the child's experience in the world. Small children learn about the world from observation, exploration, and imitation (Meltzoff, 1988: Meltzoff & Decety, 2003). For example, they learn intuitively about gravity as a force by picking up objects, letting them go and seeing them fall (diSessa, 1982). They learn intuitively about foundational mathematical constructs like "more" and "less" by manipulating quantities in goal-directed behaviors (Starkey & Gelman, 1982; Wynn, 1992). They know when they want more or fewer objects that can be quantified. They learn about language interactions even as infants, responding to linguistic and verbal inputs from caregivers and siblings even when they do not have the formal linguistic repertoires to respond (Kuhl & Meltzoff, 1996; Bloom, 2013). Infants are born with the ability to hear and discern all the sounds of all human languages, but prune their attention over time to those sounds they most routinely hear (Kuhl & Meltzoff, 1996; Ferjan Ramírez, Ramírez et al. 2017)—think about the difficulty that an English speaking adult has in hearing and producing sounds in Mandarin or Xhosa. They learn about narrative structures, listening to stories in which people engage in goal-directed behaviors well before they can read (Mandler, 1987; Bruner, 1990). And they learn about moral constructs of good and bad, by observing how other people treat one another and themselves treating others well or badly and experiencing the consequences of their actions (Kohlberg, 1964; Nasir & Kirshner, 2003: Turiel, 2007). They hear their immediate family, friends, strangers, teachers make statements about the

value of certain groups of people, ideas, and activities, and they seek to extrapolate patterns that they then test against future experience, leading to the embodiment of content and concepts that are stored in neural networks in long-term memory. Through this process, children develop epistemic frames that they later bring to making sense of civic arguments (Elby & Hammer, 2010). In other words, children are continuously forming and modifying a complex and dynamic picture of the world and social relations and they certainly do not come to their first civics course in 4th, 8th, or 12th grade as blank slates. This development of foundational knowledge suggests—and we know from experience—that even very young children can develop interpretations of the immigration case we have described, particularly to the extent that they have some direct experiences related to the case. For instance, children whose parents are undocumented who see the case presented on TV or who actually experience people they know being arrested and taken away from their families; or children who read stories about child separation may draw upon their background knowledge in sense-making about the case. In any of these contexts, even young children develop a foundational sense of right and wrong, of good and bad. Figure 1 captures the multiple dimensions of learning.

Figure 1 - Multiple Dimensions of Learning



However, children do not intuitively and organically acquire the ability to think about civic problems like experts of history, political theory, economics, ethics, climate science, or environmental engineering. We cannot reasonably expect schools to prepare students to develop professional expertise in all of these domains. Rather, we want to consider the specific educational imperatives involved in preparing students for civic reasoning and discourse, as we defined it in the introduction. Civic reasoning entails engaging knowledge of the history of the situation, consideration of relevant stakeholders, an ethical determination of responsible group(s), an analysis of available means and ends, and sense of individual and collective efficacy in pursuing them. Civic reasoning also goes beyond purely rational considerations to include awareness of emotional inputs, such as empathy or motivation. Discourse involves the norms for language use and interaction, as well as norms for what counts as evidence and warrants to

support claims. The complexity of these tasks requires that the training in the analysis and interrogation of evidence, discussion, perspective-taking and problem-solving is distributed across time, providing students with repeated opportunities from childhood through adolescence to develop capacities and dispositions to engage in these activities. It also requires that the educational experiences support students to do the necessary work to engage in conceptual change.

Issues of conceptual change are important for learning to engage in civic reasoning, debate and discourse for several reasons. First in many domains relevant to civic topics people develop knowledge and beliefs from their everyday experiences in the world. This knowledge and beliefs may be inaccurate in relation to a topic important in civic issues. Conceptual change is the process through which we learn new concepts, build new knowledge (diSessa, 2002). Because prior knowledge is so central to how we approach new problems, it is important to understand potential relationships between what we already know and targets of new learning. When our prior knowledge is in conflict with new learning targets, learning environments that seek to facilitate new learning must address those conflicts. If we hope to facilitate conceptual change, we need to consider both what are often intuitive understandings, derived from our experiences in the everyday social and physical world, as well as orientations around whether what we think we know is contestable or whether we think what we know is definitive.

For example, in the opening vignette, if young people approach the situation with the assumption that immigration hurts job prospects for US citizens, that intuitive understanding on their part may shape their uptake of alternative perspectives on immigration. It may also provide a starting point for a study of the historical and economic function of immigration in American society that might be undertaken in schools.

Intersections Between Learning and Issues of Development

The cognitive foundations of human learning help us understand only part of the complexities of civic reasoning and discourse. This is because engaging civic reasoning and discourse also involves moral and ethical reasoning and identity commitments. Historically and most heightened today are the ways that identity orientations influence political decision making. These identity orientations are connected with issues around race and ethnicity, around class, around gender orientations, and with regard to our relations with other countries, conceptions around national identity. In the U.S., identity orientations around race and ethnicity are deeply rooted in our history and reinforced by institutions, policies and practices. While people empirically belong to multiple cultural communities—with cultural communities being defined by routine participation in shared cultural practices (Gutiérrez & Rogoff, 2003), there are hierarchies among these communities such that they do not hold equal status for us and serve different functions. For example, our identification with our nuclear and extended families often form a foundation for how we see ourselves and how we define our most basic commitments. It is from our experiences in family life where we develop our foundational beliefs about morality. Early life experiences shape so much about us (JAMA, 2010; Osher et. al, 2018). At the same time, our participation in other related social networks—schools, community settings, peer and extended familial social networks—contribute substantially to our moral beliefs.

Specifically, we must consider how processes of *moral development* and *identity development* interact with learning processes and opportunities, and deeply impact young people's ability to engage in civic reasoning and discourse. Any treatment of instruction or

content learning without a deep consideration of the developmental needs of learning is likely to be a partial picture, and result in ineffective teaching. To effectively support young people in developing the kinds of critical and sophisticated skills they need to fully engage civic reasoning and discourse, and to understand what might prevent that engagement, we must attend to what we know from psychological studies of moral development and identity development.

The Contribution of Moral Reasoning and Identity To Civic Reasoning and Discourse

Moral Development

Moral reasoning undergirds much of our civic decision making. Our conceptions of what constitutes good versus bad, our conceptions of what constitutes justice, our evaluations of the internal states of others, our abilities to empathize with others—all come into play as we wrestle with civic dilemmas. As we consider the moral dimensions of civic reasoning and their implications for K-12 education, we offer a brief review of moral development in children.

Moral sensibilities develop across cultures in predictable ways developmentally. Core moral concepts begin to develop very early and revolve around concepts of harm or welfare (avoiding harm and promoting benefits), fairness or justice, and rights. These are distinct from reasoning about social conventions such as the conventional rules and norms of classrooms and school systems (Turiel, 2015; Turiel & Gingo, 2017). For example, children understand that breaking various institutional rules (e.g., interrupting the teacher) may lead to punishment (e.g., being publicly reprimanded) but that arbitrary punishment or mistreatment is unfair.

Developmental research suggests that the focus of moral understanding shifts as children move from early childhood to adolescence. While young children's emerging moral

473 understandings seem to be primarily based on concerns with harm (physical and emotional), in
474 late childhood and adolescence understandings of fairness, rights, and social justice become
475 better crystalized (Nucci & Turiel, 2009; Turiel, 2015). These findings are important, and
476 relevant to classroom practice, in that they refute common perceptions that children's moral
477 thinking is dominated by concerns with punishment, self-interest, or the conventional standards
478 of rules and authorities. In fact, even young children have relatively sophisticated concepts of
479 morality, and can separate their own self-interest from universal moral judgements. This
480 provides a critical grounding for considering how one might organize learning environments and
481 teaching to support civic reasoning and discourse—there may be more to build on
482 developmentally that we might assume. It also means that these capacities can form a base for
483 discussion, learning, and perspective-taking in disciplines like literature or history.

484 Not only does moral reasoning occur relatively early, it turns out that the moral
485 judgments of children and adolescents constitute configurations of thinking that are distinct from
486 thinking about other domains of social thought—specifically, that of the conventional norms of
487 social system and areas of personal jurisdiction. *Moral thinking*, revolving around welfare,
488 justice, and rights, has the features that are not contingent on existing rules, authority dictates, or
489 cultural practices (Helwig & Turiel, 2017; Smetana, Jabon, & Ball, 2014). Emotions of a positive
490 nature are part of all this—including sympathy, empathy, and the general sentiment of mutual
491 respect (Turiel, 2015). An example of moral thinking is understanding the psychological harm
492 that cyberbullying does, and feeling empathetic with the victims. Children also form judgments
493 in the domain of *social conventions*, involving norms that serve to coordinate social interactions
494 within specified social institutions. Judgments about conventional norms are contingent on
495 existing rules, the jurisdiction of persons in positions of authority, accepted practices within

particular social institutions. An example of social conventional thinking is understanding that a teacher may construct certain rules in a classroom, designed to keep students safe and maintain order. The legitimacy of areas of *personal jurisdiction*, including concerns with choice and autonomy, is another domain of thinking relevant to social and moral decision-making (Turiel, 2003). An example of a topic that comes under the category of personal jurisdiction is that young people have the right to determine what they wear, in line with their personal preferences. All of this together suggests that moral reasoning is a complex domain, and one that suggests early developing abilities for young children to engage in civic reasoning and discourse in nuanced and rich ways. The complexity of these understandings facilitate young people in being able to reason in nuanced ways about historical events or actors, and in other disciplines, such as literature, as well.

Table 1 - Dimensions of Moral Reasoning

Building on these understandings, we argue that education for civic reasoning and discourse should operate from the presumption that most children and adolescents generally have formed sound understandings about many moral issues. Humans have a substantive capacity for social connection, empathy, morality and curiosity, and these are the very capacities that allow

515 for (and perhaps even nurture) civic discourse and equitable engagement (Way, Ali, Gilian, &
516 Noguera, 2018). Our questions about how to best prepare young people frequently start from the
517 assumption of deficit and we focus on what we need to "teach" children and how we can help
518 them "become" or "have more of" whatever positive outcome/capacity is of interest—in this
519 case, civic discourse. We can move toward the same end of raising children who are prepared for
520 civic discourse by asking different questions that start from a different place. Rather than only
521 asking what do we need to "teach" children in order for them to engage in equitable, empathic,
522 and generative ways, we can also ask *what disrupts* our desire/ability to engage in these ways?
523 This perspective encourages us to approach *civic discourse* as a process and capacity that
524 operates at the individual and social/structural/societal levels; we cannot understand one level
525 without the other. It also assumes the good of humanity; and recognizes the agency of children
526 and youth and what they bring to the conversation. Children are not empty vessels to be filled;
527 they possess the very tools (empathy, morality, interdependence) that will undergird civic
528 discourse, and we can learn from them. Indeed, Corsaro (2020) has written about socialization
529 not as a unidirectional process, but as a dialogic process where children exercise agency and
530 themselves shape the settings of which they are a part. This may mean that teachers and other
531 adults might productively make space for the sensibilities that young people bring about justice
532 and equality.

533 However, children's moral development is in tension with outside social influences, such
534 as the experience of growing up in a fundamentally hierarchical society where inequality, abuse
535 of power, and oppression constitute normative reality. These issues of moral development are
536 relevant to how children and adolescents intuit or formally learn about unequal treatment of other
537 human beings, especially human communities that have been historically stigmatized through

law and institutional practices. In other words, as children develop moral values and concepts as part of their socialization process, they see these values being unevenly applied across social groups and situations. Consider the concept of equality. Notions of equality can be traced back to at least the time of Aristotle and beyond and are embedded in the U. S. Declaration of Independence. In both instances, equality was strongly endorsed but not applied to large groups of people such as women and enslaved Africans and their descendents, Native Americans, or immigrants. Another example regarding the application (or lack thereof) of equality is seen in research conducted in patriarchal cultures, where males who often apply concepts of equality to other males, do not do so to females (especially within the family) (Okin,1996). A failure to apply the moral sense of opportunity and equal treatment is evident in contemporary democratic societies as well—including within school systems. When we consider how to foster civic engagement and discourse, this issue of variation of the *application* of moral concepts becomes a key challenge, and one that intersects with issues of identity development. Importantly, this challenge is a different experience for those in groups who are being left out in the way a society applies moral concepts.

With respect to our opening vignette, even young children might feel saddened by the thought of children being separated from their parents and recognize that as morally inconsistent in a society that values childrens' needs. However, they may need deeper support to make sense of that in relation to immigrants' positioning in the US economy and the complexity of anti-immigrant sentiments.

Identity Development

Identity development is a key developmental task, one which takes place over the life-course beginning in the early years, and which is particularly salient during adolescence (Erikson, 1968; Spencer, 2008). Both identity processes in general, and the development of ethnic/racial identity in particular, are relevant to our discussion of the cultivation of civic reasoning and civic discourse.

A core task of development is to make sense of who one is in the world, and who one is in relation to those around us. Identity has been the subject of study in psychology and philosophy since the early 1900's, with the early work of Charles Horton Cooley positing the concept of the "looking glass self," which articulated the important role of social others on one's conception of self (Cooley, 1902). Identity, then, is a negotiation between how others—parents, teachers, peers, community members, society—see you and the sense of self that develops from integrating and filtering those perceptions of others. This process is influenced by whether the perceptions are attached to groups with which you self-identify in terms of race/ethnicity, religion, gender, class, age or see as other, and which groups are considered culturally default, dominant, or desired. Conceptions of identity in turn influence perceptions of tasks, settings, goals and motivation.

Identity becomes especially salient in adolescence, as young people move from their families as their core social interlocutors to more centrally engaging peers and the broader world (Damon, 2008; Roeser, Peck, & Nasir, 2006). Identity issues are deeply tied to the basic developmental need for belonging (Haugen, Morris, & Wester, 2019; Nasir, 2012; Powell, 2012); to feel a part of a community or group and to feel valued and connected to others. This need for social belonging is an outgrowth of dispositions we develop by virtue of our evolution as a species (Tomasello, 2019). In adolescence this need for belonging, connection, and a sense

583 of self that gives one's life meaning and coherence is exacerbated, and important questions about
584 identity and purpose begin to surface. Adolescence is a particularly fruitful time for this identity
585 work to occur—it is a period in which young people are more aware of issues of personal
586 autonomy and personal choices; a period of greater moral defiance; and a period where young
587 people are seeking to sort out contradictions and tensions in what is expected of them and what
588 they desire. These wrestlings are part of a developmental process in which they are anticipating
589 future adult roles. The degree of anticipated personal autonomy moving into adolescence is
590 differentiated across cultures. In cultural communities where interdependence is historically
591 sustained, the anticipation of adult roles include how one learns to become directly responsible
592 for integrating personal goals with expectations of family. In cultural communities where
593 independence is historically sustained, the expectations of adult roles include anticipating
594 autonomy beyond the family (Markus & Kitayama, 1991). Thus the ways in which identity
595 processes are intertwined in ego-focused perceptions of the self and one's self as being a part of
596 social networks is relevant for how we think about identity and preparation for engagement in
597 civic reasoning and discourse. Civic engagement entails relationship with others; so who we
598 imagine the others are with whom we are engaged and connected is important.

599 Further, discussions of social and political issues often have at their core some factors
600 having to do with whom we feel the most affiliations and how we see ourselves. Because we
601 inevitably belong to multiple social communities, who we think constitute such communities, our
602 perceptions of access to such communities, and our beliefs about the perceptions of others who
603 may or may not be part of our perceived social communities add to the complexity of how
604 identity and civic reasoning and discourse intersect. Our families—including biologically
605 related, and the communities of caregivers who are primary agents of socialization as we grow

up with whom we may or may not have biological relations—have powerful impacts on our senses of identity. At the same time, there are social configurations of communities of practice that can have differential meaning in the broader public space.

In the U.S. conceptions of social and cultural community associated with conceptions of race and ethnicity are powerful and complex. Because conceptions of race and ethnicity have been so consequential in U.S. history, challenges of interrogating them are essential for development in both childhood and adolescence. We articulate the dilemma of conceptions of race and ethnicity for several reasons. First, race is a relatively recent conception of group membership in human history. Certainly in the U.S., there have been historical contestations of race– for example of who gets to be Black or White. Relatedly, developing a healthy ethnic/racial identity is an important part of identity development (Phinney, 1996; Umana-Taylor et al., 2014). Ethnic/racial identity refers to the part of one's sense of self that is connected to racial or ethnic group membership. Racial/ethnic identity involves both the strength of the felt sense of connection to other group members, as well as a sense of attachment to the group (Phinney, 1996; Sellers & Shelton, 2003; Worrell & Gardner-Kitt, 2006). Racial identity is complex, and involves many dimensions. Sellers and Shelton (2003) identify three dimensions, including *racial centrality* (which gets at the salience of racial group membership), *racial ideology* (referring to the qualitative meaning of racial identity), and *racial regard* (which gets at how one values of racial identity). Very young children have a strong sense of in-group and out-group dynamics, and can understand race and reinforce stereotypes through their interactions with one another (Brown, 2011; Van Ausdale & Feagin, 1993). Research has also shown that ethnic/racial identity development is connected to social context in key ways. For example, experiences of racial discrimination affect the nature and salience of one's racial identity (Kteily

& Richson, 2016; Sellers, Smith, Shelton, Rowley, & Chavous, 1998; Rogers & Way, 2018). Similarly, for immigrant students, ethnic identity is impacted by the attitudes towards immigrants in the local context (Brown & Chu, 2012; Phinney, Horenczyk, Liebkind, & Vedder, 2001). Also, the presence of various kinds of supports and challenges matter for how one's racial identity develops, and the types of adaptive or maladaptive coping mechanisms one develops (Spencer, 2008). As another example of the powerful role of context, we know that pedagogical approaches in classrooms can also provide new kinds of supports and possibilities for racial identity development, for example through an ethnic studies or history curriculum (Paris & Alim, 2018; Dee & Penner; 2017), or by providing opportunities for new kinds of relationships between teachers and students (Nasir, Givens, & Chatmon, 2019).

Indeed, race, culture, immigrant status, language, and social class and how these statuses are positioned—historically, politically, and culturally—matter greatly for how one experiences the world (English, Lambert, Tynes, Bowleg, Zea, & Howard, 2020; Rogers & Way, 2018; Suarez-Orozco, Yoshikawa, & Tseng, 2015). Skin color is a remarkably accurate predictor of discrimination, whereby the darker one's skin, the greater the degree of social exclusion and discrimination, and the less favorable educational, economic, and job outcomes become in societies such as the U.S. in which race is historically so salient (Hunter, 2007; Mills, 1997). In the US, there is a long history of racial oppression and domination of Black, Latinx, Asian-American and Native people's, which has left a legacy of deep social, political, economic, and educational inequality (Carter & Welner, 2012). Thus, the complex racial terrain in the U.S. poses great challenges for understanding justice and morality, and for fostering open, nuanced, and critical discourse on civic issues.

651 A key issue in the psychological literature related to this history of racial marginalization
652 and oppression, is the role of *resistance* as a healthy identity developmental process (Rogers &
653 Way, 2018; Rogers, 2018; Ward, 1996). Resistance is one of the ways individuals negotiate and
654 repudiate oppressive identity norms (Way & Rogers, 2017). As such, the development of
655 resistance is a key developmental task, related to healthy racial identity development, and that it
656 is important in understanding resistance stories to acknowledge the context of patriarchy and
657 racism that create the need for such resistance. Robinson and Ward (1991) also underscore that
658 resistance is not a singular and uniform process but one that is responsive to the context—some
659 strategies are self-focused and offer an immediate, short-term solution whereas other strategies
660 are more group-focused with long-term goals toward liberation. While not all forms of resistance
661 are psychologically healthy for an individual, it is important to recognize that the human desire
662 to resist oppression is normative and necessary for equality and justice (e.g., Freire, 2000; Turiel,
663 2003; Rogers & Way, 2018; Ward, 2018).

664 Given that young people develop substantive moral understandings, it is to be expected
665 that they would also be critical of social inequalities and social injustices and react with efforts to
666 restore justice. Such responses to social inequalities and social injustices then entail relationships
667 between identity development and moral reasoning. Developmental and anthropological
668 research has shown that moral resistance is part of people's (adolescents and adults) everyday
669 lives and not solely the province of political leaders or organized movements. *Moral resistance*
670 is the process of rejecting ideologies and norms that are harmful to the self, that undermine our
671 core needs and capacities of human connection (vulnerability, curiosity, emotionality, empathy,
672 morality, social connection). Such moral resistance is a normative and necessary response to a
673 culture of inequality and dehumanization (Gilligan, 2011; Rogers & Way, 2018). One way this

674 can be done is by providing learning experiences that help young people develop *critical*
675 *consciousness*—the ability to recognize and analyze systems of inequality and the commitment
676 to take action against these systems (El-Amin et al, 2017).

677 These interrelated processes of identity development suggest how young people may
678 reason about the anchoring case we set up in the beginning, involving the detaining of 680
679 immigrant workers. We hypothesize that the degree of empathy and civic responsibility
680 individuals in and beyond the immediate community will feel for the detained workers and their
681 families will depend on their own racial, ethnic, immigrant identity, and their community
682 connections to those who share similar constellations to identities to the detained workers.
683 However, because human identities are multi-dimensional, there may be multiple entry points for
684 empathy and identity connection. For example, women in the community who are mothers might
685 feel a particular understanding of pain to any of the workers who are also parents, since the
686 biological and social phenomena of mothers after giving birth typically lead them to prioritize
687 the needs and safety of their children. There is also research on identity orientations of what
688 some call the giving professions (e.g., the ministry, medicine, teaching, firefighters), whose
689 professional preparation/socialization for work in these focuses on ego-fulfillment/identity
690 expression through service to others (Shulman, 2005). In the stories following the ICE raid, the
691 responses from workers, church members and children's teachers were especially powerful,
692 including providing food, money, and transportation for separated family members of the plant
693 workers.
694

Affordances and imperatives of the academic disciplines to support civic reasoning and discourse

Above, we have summarized the major dimensions of human learning and development, including social settings and activities, knowledge, embodied perceptions, dispositions, moral and ethical reasoning, and the recruitment and interrogation of identity resources (e.g., who am I in relation to the tasks at hand). In this section we discuss how these elements come into play as children have robust experiences across their K-12 schooling, including their learning across all the core academic content areas. We argue that the work of preparing children and adolescents to engage in civic reasoning and discourse must be distributed across the entire span of schooling and not limited to civics courses, and that the design of learning environments across these content areas must be organized in such ways as to address the foundational dynamics of how people learn that we have identified.

Specifically, learning environments must:

- draw and build on students' prior knowledge,
- promote a sense of emotional safety,
- establish relevance through engagement with real-world problems,
- provide opportunities to develop personal and collective efficacy through scaffolded and iterative challenges,
- support students in questioning sources of information and beliefs,
- support students in interrogating their own assumptions,
- support students in wrestling with complex and contradictory ideas, and

- ensure access to a multiplicity and variety of cultural and ideological perspectives, including ones that resonate with students' own lived experiences and those that are less represented in the dominant culture.

We focus on literacy, literature, history/social studies, mathematics and science. However, we also recognize the highly productive role that the arts can play in these efforts as well.

Literacy

We define literacy as the ability to read, write and use language(s) for a wide range of communication goals, and across an array of media, including print, digital, visual, audio, and computational and interactive forms. Literacy is imperative for navigating the landscapes of the contemporary world, for seeking, accessing and analyzing information, and for participating in discourse with others. Literacy instruction begins early as part of schooling and is reinforced across academic disciplines and out-of-school contexts through expectations to engage with textual artifacts and produce work in text-dominant genres. Cross-disciplinary literacy skills require not only generic comprehension—the skills to make inferences, deconstruct complex sentences, and comprehend vocabulary and rhetorical structures—but also skills in understanding how texts within the disciplines are structured and the kinds of questions that need to be invoked to interrogate such texts (Snow, 2002; Lee &Spratley, 2009; Goldman et al., 2016). In order to actively prepare students for civic reasoning and discourse, we argue that literacy instruction needs to emphasize three core approaches: critical literacy, media/digital literacy, and computational and data literacy.

Critical literacy involves learning to engage with print and multimodal texts with particular attention to power, bias, and ideology embedded in the text and to the rhetorical

740 structure of particular genre forms, especially genres taken to be "legitimate" including news
741 sources, encyclopedias, and textbooks (Lankshear, McLaren & McLaren, 1993). Critical literacy
742 approaches can be leveraged across the disciplines, to foreground that texts are authored by
743 particular people in particular historical situations, that they embed and carry certain ideologies
744 and perspectives while erasing or distorting others.

745 *Media and digital literacy* expands a critical literacy approach to incorporate more
746 contemporary media and textual genres, including visual, film, interactive, and internet forms
747 (Hobbs, 2010). While still focusing analysis of texts on authorship and embedded ideological
748 positions, media and digital literacy approaches also consider the text's interaction with living
749 audiences and communities. Media literacy approaches invite learners to ask: how would
750 different kinds of people interpret this message differently? What techniques are used to
751 manipulate your attention? This set of instructional paradigms also emphasizes teaching learners
752 to remix and produce their own media, in order to deepen understanding of how messages are
753 created, circulated, and what impact they might have in the world. One approach that can be
754 integrated into literacy classrooms and that is especially conducive for the development of civic
755 literacy and reasoning skills is civic journalism production (Smirnov, Saiyed, Easterday & Lam,
756 2018).

757 Finally, we argue that *computational and data literacy* should be an urgent area of
758 attention for literacy educators across academic disciplines (Gummer & Mandinach, 2015). Data
759 representations, including simple and complex charts, graphs, and timetables dominate the ways
760 arguments are presented in the public sphere, and in their seductive reduction of complexity and
761 visually apparent legitimacy, can be easily used to manipulate citizens and information
762 consumers to believe inaccurate statistics or probabilities. Engagement with data can be

emphasized across the curriculum, from math to science to history classrooms. Recently, scholars (Li et al, 2020) have argued that a holistic model of *computational literacy* ought to be embraced across the disciplines as a way of interpreting, problem solving and building with different types of information, drawing on concepts from computer science such as abstraction and automation.

All of these literacy skills can and should be integrated in instruction across disciplines, certainly from the 3rd grade forward at which time children's basic decoding skills should be sufficient to critically examine texts.

Literature

An important dimension of civic reasoning, debate and discourse aimed at decision making in a democracy is the willingness to consider alternative points of view, to attempt to understand people and communities different from one's own. Such reasoning, debate and discourse are also enhanced by people's abilities to wrestle with complex human conundrums—nuanced experiences that can't be explained by simplistic notions of human intentionality. Literature provides unique opportunities to examine the human condition in ways that differ from expository descriptions of events and actions. In our conception of literature we include narrative texts that are both written (e.g., novels, short stories, plays, poems) as well as visual (e.g., narratives in film and television). As narrative worlds they share both structure and the invocation of rhetorical and figurative tools to invite the reader/viewer into fictional worlds that we experience as real (Tan, 2013).

Literature invites readers into narrative worlds. Just as we watch, for example, science fiction movies about worlds we know do not literally exist, we enter the narrative world as if it did exist. Thus, literature offers opportunities for readers to imaginatively engage worlds they

786 might otherwise not know. At the same time, great literature, literature that is sustained across
787 time and space, also wrestles with persistent conundrums of the human experience. What we
788 think of as archetypal themes embody such conundrums as wrestling with good and evil, with
789 loss of innocence, understanding prototypical kinds of people (e.g. the hero and the anti-hero),
790 and what constitutes courageous or tragic action. For example, as much as one can learn about
791 the enslavement of peoples of African descent from historical documents, in *Beloved* (1987),
792 Toni Morrison invites one to enter the human world as she explores what could lead a mother to
793 kill her infant daughter in order to save her from being taken back into enslavement and the
794 complex consequences of such a decision. Morrison's *The Bluest Eye* (1970), beyond
795 interrogating the consequences of a black girl evaluating her self-worth against a white standard
796 of beauty, also invites the reader to wrestle with understanding how a father could rape his own
797 daughter. Shakespeare invites the reader to consider the downsides of power in *Macbeth* (written
798 in 1606) while Dostoevsky's *Crime and Punishment* (1866) invites the reader to contend with the
799 nature of good and evil in ways that deeply resonate in the present day (see Denby, 2020).
800 We know that sensemaking through narrative is a human disposition, one we inherit from
801 our evolution as a species, a process through which we impute meaning to experience, our own
802 and those of others, seeking to understand goal-directed behaviors and consequences (Bruner
803 1990; Mandler, 1987; Van Peer, 1991; Tan, 2013). There are several implications of skill in and
804 dispositions to read literature, to read widely and to read about diverse communities. First,
805 literature offers us ways to engage with communities with whom we have no direct contact.
806 Because segregation based on race/ethnicity, immigrant status, and class is so prevalent in the
807 U.S., literature can offer opportunities to engage diversity, so necessary for our democratic
808 decision making processes. Second, literature socializes several epistemological dispositions

809 (Lee, 2011; Lee et al., 2016): wrestling with complexity, valuing engagement with the other,
810 using literature as a window into self-reflection. In addition, deep literary reasoning involves
811 attention not only to the surface features of literary narratives (e.g. who, what, when, where
812 questions) but also to the rhetorical and structural choices authors use to gain our attention and
813 influence the abstractions we take from the texts (Rabinowitz, 1987). This attention to rhetoric is
814 an important skill in civic reasoning as so much of the public discourse around contested issues
815 is embedded in emotional rhetoric intended to induce particular points of view.

816 There are a number of implications for how the study of literature in K-12 settings can
817 contribute to ways students contend with civic complexities. The most obvious is the range of
818 literature they are expected to read. Debates over what books students will read are long standing
819 and deeply contested (Applebee, 1993). There is one body of thought that privileges the idea of
820 literature by European and European-descent authors should provide the foundation of what
821 students read (Hirsch Jr, 1988). The argument is that there is a canonical tradition in literature
822 and that canon comes from Europe and European-American literary texts. It is still the case that
823 the literature taught in our schools is dominated by European and European-American literary
824 texts. Despite the fact that professional associations like the National Council of Teachers of
825 English call for cultural diversity in the selection of texts, the actual impact in schools is still
826 limited. There are long standing arguments about the value of multicultural literature—written
827 by authors from diverse backgrounds both from within the U.S. and by authors from around the
828 world. How teachers think about both the selection of literary texts and the sequencing of such
829 texts is important for the kinds of knowledge and understandings students are able to develop
830 that can contribute to their abilities to engage in civic reasoning and discourse. On the one hand,
831 literature units can be designed to interrogate different cultural communities associated with

ethnicity within or broad conceptions of national literature, or with pan-ethnic cultural communities where shared beliefs and practices span across national borders, or with communities focused on gender. Literature units can be focused on the experiences of particular historical moments. But literature units can also focus on shared rhetorical traditions (e.g., magical realism as taken up by William Faulkner and Toni Morrison in the U.S., Gabriel Marquez in Columbia, and Franz Kafka in Germany). They can also focus on archetypal themes which represent consistent conundrums—around morality, identity, vulnerability and resilience—with which we as humans wrestle across time and space.

There are consequences and opportunities in how literature units are organized that can contribute to both very young and older students' abilities to interrogate their own experiences and those of others, to consider that complex issues typically do not have simplistic answers and to engage with moral complexity. It is important to note here that children, regardless of age, who experience challenge (poverty, migrant status, refugees, gender and sexual orientation, presumptions of disability) can often be better positioned to wrestle with complexities than children of presumed privilege who have been overly protected such that they have not had to face risks (Spencer, 2006). For example, a 5th grader from a migrant working family may well have greater access to the conundrums in *The Grapes of Wrath* (1939) than a 9th grader from a wealthy suburban family, provided that they have the necessary skills to engage the text.

The skill set required to engage in literary reasoning includes basic reading comprehension skills (e.g., knowledge of vocabulary, sentence structure, literary text structures; metacognitive strategies including making and testing predictions, summarizing, asking questions). Literary reasoning also includes attention to rhetorical moves and structural choices made by authors, and the skill to extrapolate potential meanings from such authorial choices.

855 Advanced literary reasoning entails an epistemological orientation to understand that as a reader
856 you are not bound by what you hypothesize are the intentions of the author and to view literature
857 as an opportunity to interrogate the self and the social world. It is precisely these epistemological
858 orientations that lead people to become life-long readers of literature. K-12 education provides
859 an important opportunity to socialize children to love reading and to love the reading of literature
860 as a life-long habit.

861 However, there is a long history in this country that justifies a basic skills orientation
862 versus a focus on deep conceptual learning, based on deficit assumptions about life experiences
863 and learning repertoires that youth living in poverty (Payne, 1999) and youth from minoritized
864 communities bring as prior knowledge and abilities. We argue that deep disciplinary reasoning in
865 literature (and other domains) is accessible via a diversity of cultural and experiential repertories.
866 Meaning making processes entailed in literature analysis can connect to everyday meaning
867 making repertoires that students bring, including students from culturally diverse backgrounds,
868 in order to develop the kinds of critical competencies needed to wrestle with complex literary
869 texts. First, narrative sense making is endemic to the human species. All human communities
870 have traditions of storytelling. Whether oral or written, all human communities have evolved
871 traditions around strategic uses of language and narrative structures to convey meaning.
872 Variation in storytelling across communities is well documented (Champion 2003; Heath,1983).
873 It is also well documented how oral storytelling traditions are taken up in literary traditions
874 across the world. So even young children do not come into schools bereft of narrative sense-
875 making skills and dispositions.

876 Second, rhetorical traditions upon which authors of literature draw are rooted in language
877 uses across national languages and dialects (Lee, 1993; Lee, 2000). We tell stories that are

878 satiric, make comments that are ironic, and have traditions of attributing symbolic import to
879 objects and actions. These rhetorical moves are also taken up in everyday texts in print, multi-
880 modal and digital modalities: TV programs, movies, cartoons, advertisements, music lyrics,
881 works of art, internet memes. Thus it is reasonable to anticipate that students, from across diverse
882 cultural and linguistic communities, will have been exposed to and engaged in such language
883 practices (Lee, 2007). As discussed in the earlier section of this paper, scaffolding prior
884 knowledge and understanding relationships (connections and tensions) between prior knowledge
885 and new targets of learning is a basic principle of how people learn.

886 These implications are relevant both for the development of disciplinary skills and the
887 development of cognitive, epistemic, moral and democratic socialization around civic
888 engagement. Literature is a gateway for identity wrestling and for interrogation of the "other."
889 As Ralph Ellison (1947) powerfully notes: "fiction is but a form of symbolic action, a mere
890 game of 'as if', therein lies its true function and its potential for effecting change." Humans have
891 been exploring the many challenging issues facing us as individuals and collectives through
892 works of literature, whether historical, mythical, contemporary, or futuristic. Thus, literature
893 provides the opportunity to experience and integrate the lessons of prior cultural experiments, to
894 cultivate empathy for different kinds of suffering, to interrogate issues of moral complexity in
895 ways that inform the challenge we must wrestle with in our present public sphere.

896 We can return to the opening case of the raid of undocumented workers in the poultry
897 factory in Mississippi. How might the child or adolescent living in a wealthy suburban
898 community in the north imagine the experience of the parent who is arrested in that raid and
899 his/her child? How might the Native American child or adolescent living on tribal land that faces
900 great poverty imagine people living in that town who were not working and hoped they could be

hired to replace the undocumented workers who were arrested? How might all of our youth think about the competing goals of the power of the state, the economic interests of factory owners, and the human needs of families and children? Literature can offer fictional windows that when well crafted make us think we are in the shoes and inside the minds and hearts of all these competing actors.

History/Social Studies

The subject area of history/social studies is a vast domain encompassing history, geography, economics, and civics, and tasked, from its earliest formulation, with the daunting responsibility of preparing students to address and resolve social issues. History and social studies educators have disagreed about the best method to ensure this civic preparation, but a consensus has formed around the value of fostering in students the capacity for engaged, rigorous inquiry. This vision is captured in the published C3 Framework (NCSS, 2013), which lays out four dimensions for disciplinary inquiry: (a) developing questions and planning inquiries; (b) applying disciplinary tools and concepts; (c) evaluating sources and using evidence; and (d) communicating conclusions and taking informed actions. These disciplinary concepts, inquiry strategies, and evaluation and communication skills, and decision-making practices are understood to lay the groundwork for democratic decision-making.

There is no question that knowledge of U.S. and world history, and knowledge of how political and economic systems are structured and unfold here and elsewhere and over time are important. The underlying logic of the U.S. constitutional government is complex and powerful. It anticipates pathways through which we can wrestle with conundrums around foundational human rights, over majority rule through voting and minority rights, around dialectic relations

924 between the purview of federal authority and local authority of states, and within the federal
925 realm relations among executive, legislative and judicial authority. The history of such debates
926 and the nation's evolving moral, economic, and social logic are recorded in the Amendments to
927 the Constitution and the historic Supreme Court battles of *Plessy v. Ferguson*, *Brown v. Board of*
928 *Education*, *Roe v. Wade*, and more recent *Obergefell v. Hodges*.

929 We asked a highly experienced history teacher with 50 years of experience to share her
930 reflections about the role of history/social studies in preparing young people to participate in
931 civic reasoning and discourse. While she discusses her experiences as a high school teacher, the
932 lessons and broad principles apply to the elementary sector as well. Adria Carrington reflected:

933 Preparing high school students to engage in meaningful civic reasoning and debate is a
934 natural fit for the social studies, particularly economics, history, and sociology. These
935 subjects and most of the social studies are also married to geography, and the two create a
936 union that is ripe with opportunities, fraught with tensions and conflict, and bound until
937 death tears them asunder. Civilizations have come and gone, but the land remains. In one
938 respect geography is the hand and history is the glove. Gloves wear out and like fashions,
939 change with the times, but by peeling back the glove, the contributions of geography
940 reveal and provide dimension and perspective for a broader understanding of the course
941 of events. Integrating and sequencing the teaching of geography with the teaching of
942 history is based on the simple premise that the land comes first, so we begin with
943 teaching basic geographical concepts and general map skills. Students may learn more
944 about the geography as they engage with the history. The lay of the land and the
945 surrounds are essential elements to the narrative. For example, the shape of ancient
946 Egypt was elongated, extending only a few miles out from the shores of the Nile. Its

population became denser as the river neared the delta. To the west lay miles of desert and to the east, the Red Sea, providing natural barriers that gave some protection from enemies. The seasonal flooding of the river, the warm climate, and natural resources created what Jared Diamond (1998) referred to as "geographic luck," in his book Gun, Germs, and Steel, provided an advantage to what became a flourishing society. What students learn by using geography as a source in their studies of ancient Egypt can provide a blueprint for them to use in their examination of other civilizations, and opportunities for them to compare and contrast differences they may not have otherwise noticed. More specifically, using this model can help reveal how the random nature and inequality of "geographic luck" help to define differences in development. In United States history students are introduced to the concept of Manifest Destiny. Most textbooks presented that movement as a noble and bold endeavor blessed if not ordained by the Divine. Americans were urged and enticed to go west, to stake out free land, to build personal wealth, and to spread their culture across the continent – from sea to shining sea. This dominant narrative does not include interrogation of indigenous nations, Mexican national borders, and British and Spanish colonial territories in the expansion. Native Americans are mentioned, but mostly as an obstacle to be overcome. Mexican holdings in the west were challenged, delegitimized and seized through wars and negotiations. My classes were introduced to this period in US history with a world map, because large events like this don't happen in a vacuum, not even one as large as the continental United States. We needed to know where the people came from and why they risked moving into a mostly uncharted territory, uncharted by European settlers, but inhabited by indigenous nations. Study of the push and pull factors of immigration and migration

provided data that students used as they examined more closely the global and national events of the times. We needed to know who the players were, and to understand that there are no supporting roles when lives, land and wealth were at stake. For example, push and pull factors like the economic and political turmoil in China, the rebellions and wars, large scale natural disasters, trade conflicts, and the enticements of American companies lured laborers to opportunities in the west. Most Europeans were persuaded to make the move because of internal influences, especially in Germany, Scandinavia, and the United Kingdom, countries that comprised the overwhelming majority of immigrants to this country. Landless and economically challenged Americans and speculators also seized upon opportunities in the west. The actions of all these players take shape in a place – on the land- and the questions of who has a right to that land and why they have that right required study within the broad context of history and geography. High school sophomores viewed these events through the lenses of their own backgrounds and prior learning. They were required to use historical thinking skills to further inform what they already knew, and help them tackle the essential question of who had the right to the land. This was both an historical and civic debate that raised questions about entitlement and ethics. It was for them to consider where the moral authority of Manifest Destiny came from, why it happened at the place and time it did, and who benefited from it. What I learned from teaching this lesson was the identities and cultural heritage of students I never would have perceived to be being Native American. A few of the Mexican descent students became more animated in the discussions. Some white students, while expressing regret over how the land was gained, balanced that with the position that it was put to more productive uses (feeding the nation through farming, cattle ranching, and

the building of towns and cities). It became clear to some students that land ownership and who possessed the ability to exploit its natural resources were essential markers of who controlled the wealth of an area or region. Also noted, but not dwelled on were the ramifications of this on the politics and economy of the regions. Standardized assessments measured whether students grasp historical details and could put them in sequences of change over time, cause and effect, and so forth. These required clear right answers. The civic debate, however, required them to consider the impact and ramifications of actions as revealed through a diversity of understandings, perceptions, and biases that emerge when everyone referenced the same source material. As teachers, we are charged with helping them hear and honor other positions and work toward an aspect of common understanding that continues to enhance their learning experiences. Today, we are confronted with a new challenge to the information we receive about the world, and to the interpretations of the past that we have long taken for granted (consider holocaust deniers). These sources intentionally defy the conventional understandings we have relied on from our histories. Information now comes like a blitz from multiple media sources that are broadcast on a 24-hour cycle. Terms like, “fake news” and disparaging descriptions of media with opposing points of views are becoming normalized. This fracturing of news sources has led to the creation of data silos where citizens reaffirm their thinking by tuning in to “designer” media that parrots their existing positions. It’s not hard to imagine that this presents a challenge for teachers. Opposing points of view are not new, but the amount of tailored news received today will require more debunking in the classroom in order to engage in meaningful civic debate.

1016 While Mrs. Carrington focuses on a high school illustration, the problems she raises
1017 apply across the grade levels. This teacher's observations reflect both how important it is to
1018 develop core understandings, for example, of how geography influences political and economic
1019 developments within and across nations and the frailty of national boundaries, and how such
1020 developments are also influenced by both internal as well as international contingencies.
1021 Understanding the complexities underlying both the establishment of the U.S. in the original
1022 thirteen colonies and its expansion both westward and beyond our geographical boundaries
1023 (consider Alaska and Hawaii as states and the territories of Puerto Rico, Guam, U.S. Virgin
1024 Islands, American Samoa, and the North Mariana Islands). Our current immigration issues and
1025 the relations along the U.S. – Mexico border must be understood in part from results of the
1026 Mexican-American War from 1846 - 1848. The U.S. involvement in the politics of the middle
1027 east are complex and need to be informed, at least in part, by the public's understanding of the
1028 complex histories and diversity in terms of ethnicity and religion in that part of the world.
1029 In Mrs. Carrington's illustration, students' interrogations of U.S. westward expansion
1030 were influenced by their ethnic identities. A fairly extensive body of research has shown that
1031 students' cultural, ethnic, racial identities inform their understanding of the past and are often
1032 strong enough to counter narratives presented in textbooks (Epstein, 1998; Ho et al., 2017;
1033 Goldberg & Savenije, 2018). At the same time, an equally robust body of literature continues to
1034 underscore the intransigence of dominant, school-sanctioned historical narratives (Epstein,
1035 2010). Mrs. Carrington was able to create an environment in which students were able to draw
1036 on their identity repertoires, interrogate complex factors at play in an important historical
1037 moment in U.S. history (one that still has ramifications today), engage in epistemic complexity,
1038 and have opportunities to engage with alternative points of view different from their own. We

1039 certainly cannot definitively predict what these experiences will mean for their future civic
1040 engagements. At the same time, it is hard to argue that the experiences of Mrs. Carrington's
1041 class are not a good unto themselves, but also it is useful to consider what it would mean for
1042 these students to have had similar experiences across their K-12 grades and across the content
1043 areas.

1044 Extrapolating from this intimate view into one teacher's classroom, we foreground
1045 several constructs from research on the teaching of history that ought to be attended to across
1046 students' careers in schools: sourcing and contextualization of texts (Wineburg, 2001; Reisman
1047 2012: Monte-Sano & Reisman 2016), historical consciousness (Clark & Grever, 2018), and
1048 historical empathy (Endacott & Brooks, 2018). These constructs represent efforts on the part of
1049 scholars to operationalize what is entailed in historical reasoning, and each has relevance to how
1050 we might use history and historical thinking in wrestling through contemporary issues.

1051 *Sourcing* involves questioning the authorship, purpose, audience, context, and reliability
1052 of a source and corroborating its claims with other pieces of evidence. Sourcing lies at the
1053 epistemological heart of a disciplinary approach to history. When one sources a document and
1054 considers the probity, authorship, purpose, and context of its message, one fundamentally
1055 acknowledges its human constructedness. For example, historians are cautious about blindly
1056 accepting propositions put forward in primary and secondary source documents. Primary source
1057 documents are ones written during the historical period and by actors engaged in the historical
1058 activity. Secondary source documents are those written outside of the historical time period, by
1059 actors not directly involved in the historical activity. Historians ask that we raise questions about
1060 the reliability of the source, the conditions under which the document was written, and in what
1061 ways the information in the document is corroborated in other sources. For example, a letter

1062 written by a low-level soldier during the civil war about the goals and intentions of particular
1063 military strategies may be called into question because although fighting in the war, he still may
1064 not have had access to the decision-making process of generals and politicians. It matters to
1065 understand that the House Divided Speech by Abraham Lincoln was a political speech when he
1066 sought the office of state senator for Illinois running against Stephen A. Douglas, but also at the
1067 same time must be understood in the context of the debates at the time around states' rights with
1068 regard to slavery. Research from the 1990s indicated that students were not likely to
1069 spontaneously source documents, and that they tended to accept the authoritative account of the
1070 textbook (Wineburg,1991). A flurry of interventions over the past two decades suggests that
1071 students can learn to source documents with the right instructional supports (Britt & Aglinskas,
1072 2002; Paxton, 2002; Wolfe & Goldman, 2005). A growing body of literature also examines
1073 students' critical analysis of online information and maps its similarities/ differences to
1074 disciplinary historical reasoning (Wineberg & McGrew, 2019; McGrew et al., 2018). The
1075 importance of preparing students to critically source information should be self evident in our
1076 current age of heightened polarization and misinformation.

1077 *Contextualization*, or the ability to locate a historical event or document in its historical
1078 context and appreciate the past as fundamentally different from the present, has been a more
1079 elusive skill in comparison with sourcing or corroboration. In part, that is because
1080 contextualization requires historical background knowledge. To situate an idea or event in its
1081 context, one must have a general understanding of the relevant chronology and historical actors,
1082 the general zeitgeist. Such background knowledge has also been found necessary for higher-level
1083 reasoning about contemporary events (e.g., Shreiner, 2014). When, for example, we consider the
1084 national reckoning about historical racism following the spring 2020 uprisings in response to

George Floyd's murder, we must acknowledge that many White Americans have been engaged in an extended history lesson, many learning for the first time about Reconstruction, housing segregation, redlining, police violence, in ways that have begun to chip away at dominant narratives about equal opportunity and the American Dream and possibly open the door to meaningful civic discourse. Contextualization, at the same time, requires holding at bay our natural tendency towards "presentism"—the assumption that we can transplant our understanding of how the world operates onto the past. Instead, contextualization asks that we acknowledge and identify what we do not know, and stretch ourselves to better understand this unknown (Wineburg, 2001). Likewise, civic reasoning requires that we muster a similar sense of humility in the face of the unknown, a willingness to understand perspectives and worldviews that differ radically from one's own.

Another construct from history education highly relevant to civic reasoning and discourse is *historical empathy.* One big debate among scholars of historical empathy is whether it is a process or a cognitive achievement. Those who embrace the latter conceptualize historical empathy as the end-goal in a developmental process in which students struggle to understand events and people from the past whose worldviews differ dramatically from our own, not unlike contextualization. Other scholars have operationalized empathy as a more affective process in which students identify with the motives or experiences of historical actors. These two constructs in many ways lie in tension with one another; one values the *analytic distance* that students place between themselves and historical actors and the other seeks to close that distance (Lee & Ashby, 2001; Lee, Dickinson & Ashby, 1997; Endacott & Brooks, 2018). However one conceptualizes historical empathy, it clearly holds relevance to fostering civic discourse with others across social, cultural, and ideological differences.

1108 Scholars of *historical consciousness* move beyond the procedural heuristics of academic
1109 historians to capture more broadly what it means to exist as a historical being in the present
1110 (Clark & Grever, 2018). For example, a great deal of scholarship related to historical
1111 consciousness captures the disjuncture between how alienated people are from formal history (as
1112 presented in school or other dominant narratives) and the myriad ways that they engage in
1113 "everyday" history through personal or community connections, family heirlooms and reunions,
1114 or visits to historical sites. From this perspective, academic conceptualizations of historical
1115 thinking miss the ways we encounter history through personal and collective memory, tourism,
1116 and popular culture. One way that historical consciousness manifests is in our assumptions about
1117 historical identities that are tied to any number of groups or institutions, each of which has its
1118 own history. Although research on student identity in history education is not typically connected
1119 to historical consciousness, a fairly extensive body of research has shown that students' cultural,
1120 ethnic, racial identities inform their understanding of the past and are often strong enough to
1121 counter narratives presented in textbooks (Barton & McCully, 2004, 2012; Porat, 2004;
1122 Goldberg, Porat & Schwartz, 2006). At the same time, an equally robust body of literature
1123 continues to underscore the intransigence of dominant, school-sanctioned historical narratives
1124 (Epstein, 2000; Santiago, 2019).

1125 At the same time, historical consciousness refers to an awareness and acknowledgment of
1126 our temporal existence as groups of people, a recognition of the impermanence and ongoing
1127 evolution of our institutional configurations and cultural commitments (Rüsen, 2004). In this
1128 sense, historical consciousness puts us in touch with the social constructedness of our lived
1129 reality. Scholars disagree as to whether the achievement of historical consciousness requires
1130 formal academic study. For the purposes of our current discussion, however, it's worth

1131 considering how a presentation of history that insists on the constructedness and impermanence
1132 of our current institutional structures might open the door for generative civic discourse.
1133 We can see how all of these constructs play out in the illustration of Ms. Carrington's
1134 history classroom as students learn about historical concepts like Manifest Destiny through the
1135 perspective of their own ethnic and racial identities, experience empathic responses to historical
1136 actors, and debate, in the present, the privileges and trade-offs of their own national identities.
1137 The development of the skills of critically examining documents of historical activity from the
1138 past and the present is especially important in this era in which there is such a vast array of
1139 representations and positions with regard to social, political, and economic issues in print and
1140 digital media.
1141 These dimensions of historical reasoning play an important role in youths' abilities to
1142 interrogate complex issues in the public domain. Conceptual and procedural understandings of
1143 how our system of government operates, its historical evolution, and view of it as a living,
1144 dynamic system are foundational. But it is equally important that citizens actively protect the
1145 constitution's foundational principles rooted in propositions around fundamental human rights,
1146 despite the fact that its history of addressing who has what human rights is deeply checkered.
1147 We hope in these illustrations from Mrs. Carrington's history class help to demonstrate how
1148 civic reasoning is recruited and built in the study of history, as well as how issues of identity
1149 affiliations, moral and ethical reasoning come into play, and and how the design of an
1150 instructional climate can be consequential in supporting students' sense of efficacy in their
1151 abilities to interrogate these complex questions, emotional safety to stretch themselves, to take
1152 on positions different from their peers, and engage in identity exploration by examining the

limits and opportunities of their perceptions of themselves as actors connected to historical events.

Math

We require all students in K-12 schools to study mathematics. But just what mathematics content, practices, and pedagogies are appropriate for today's classrooms and relevant for supporting students' development as civic actors? The field's understandings have evolved in major ways over the past half century. For most of recorded history, when people spoke of mathematics, they meant the content that was taught--for example, numbers and operations on numbers, measurement, proportion and ratio, mathematical functions, statistics, and probability. Moreover, mathematics was typically taught as a body of material to be mastered: first demonstrated by the teacher, then practiced by the student. Research in the 1970s and 80s revealed that there was much more to *doing* mathematics than merely applying techniques one had been taught. The 1989 NCTM *Curriculum and Evaluation Standards* highlighted both content and processes, for the first time elevating the role of problem solving, reasoning, communicating, and making connections. This trend continued with NCTM's (2000) *Principles and Standards,* and then the *Common Core State Standards in Mathematics,* which call for the following practices:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.

- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning

More broadly, rigorous mathematics instruction seeks to socialize students into weighing evidence, exploring multiple explanatory models, engaging in argumentation (Schoenfeld, 1985; Schoenfeld, 2014). These represent powerful epistemological orientations which if internalized and developed over time can prepare young people to ideally invoke these dispositions beyond the requirements of schooling.

Concurrent with the evolution of the field's understanding, there have been some parallel changes in curricula, corresponding to uses of mathematics in the world outside the classroom. We use mathematics in our daily lives, particularly around issues of personal finances. In addition, mathematics is used as a tool in civic decision-making around a plethora of issues: uses of statistical data to capture patterns around distribution of resources, mathematical modeling to predict financial trends or political trends, evaluating numbers, percentages and averages, cost benefit analyses, use of graphs for data and modeling. The Covid-19 pandemic depends heavily on mathematical modeling to inform deeply consequential health, social and economic decisions. A civically engaged public needs to have the knowledge and dispositions to understand these public mathematical displays and arguments.

John Paulos (1995) offered compelling examples of how mathematical data are offered to make claims about social, economic and political problems. In an article entitled "Misleading Numbers in the News" for ABC News, he writes about discussions in the public arena, in this

case back in 2004, around recommendations to divert 2 percent of peoples' social security taxes into private accounts:

> Looking a little further, however, one can find a few stories noting that the 6.2 percent of the average American's taxable income that goes to Social Security taxes will be cut to 4.2 percent. That's a 2 percentage point cut -- not a 2 percent cut, but a 32 percent cut! This will leave a huge hole in Social Security revenues for present retirees. (http://abcnews.go.com/Technology/WhosCounting/story?id=300038&page=1)

Paulos raised similar questions about the logic used to estimate illegal border crossings and deaths in the Iraq War. In a recent announcement about employment numbers, President Trump put forward the number of people currently employed as the largest in U.S. history. However, providing the raw number does not take into account the growth in the population over time and so can be misleading. There are so many issues today around which policy decisions are being made that entail mathematical data as evidence (Tate et al., 1993). There are many opportunities for citizens to weigh in on these policy decisions through direct voting, participation in surveys, attempts to influence policy makers, and through individual decisions people make such as financial contributions to organizations. However, informed participation often requires robust understandings of mathematical concepts, such as percentages, data collection and analysis techniques, and skills for evaluating evidence. Curricula have evolved in recent years, and the Common Core now calls for aspects of statistics and probability to be taught throughout the middle and high school years, but these concepts are often oriented towards solving abstract, decontextualized problems, rather than discussed in relation to

historical and contemporary social issues where mathematical calculations have consequential effects, such as in immigration and environmental debates or healthcare and economic policies.

The study of mathematics has many relevant applications and does not have to remain so disciplinarily abstracted. The "math for social justice" literature shows how projects can be the "servant of two masters," maintaining classical disciplinary standards and also enfranchising students by drawing on their cultural heritage and making use of it in discipline-based inquiry. For example, professor Hyman Bass of the University of Michigan has developed an undergraduate course entitled "Mathematics and Social Justice." He describes the course as follows:

> … this course will foreground the public sphere, prioritizing some of the deepest challenges facing our society (for example wealth inequality, abuses of our electoral system, educational opportunity, the school to prison pipeline, information privacy, etc.), and, in each case, to study the ways that mathematics is implicated in these issues. Interestingly, this leads to exposing a different, and broader, range of mathematical ideas and tools, some quite sophisticated, than encountered in traditional QL [quantitative literacy] courses."

He emphasizes in the course the need for students to engage in respectful discourse, being willing to hear alternative perspectives, and to reflect on their own mathematical experiences and identity. It is also interesting that in this class students read texts about both topics around inequality but also texts from fields like human development to provide them with knowledge that can inform the kinds of questions they raise and issues they consider. This integration of reading and writing in a quantitative literacy course is also innovative and relates

to calls for reading in mathematics that is beginning to emerge in mathematics education in the K-12 sector (Adams, 2003). Some work on mathematics and social justice (e.g., Gutstein, 2006) has involved students doing project-based mathematical analyses grounded in data from their own local communities, thus providing them with mathematical tools for taking social action.

A second important strand of work in the field of K-12 mathematics education is *ethnomathematics.* As we have discussed, the extent to which students perceive learning in academic content areas as relevant to their lives is associated with engagement and therefore motivation and persistence. There are several stereotypes that have come to be associated with the fields of mathematics. One is that mathematics is primarily an outgrowth of European intellectual history. Ethnomathematics (Ascher, 1991) as a field documents not only how growth in mathematics has been distributed across time and space, across regions of the world, including the ways that interactions—political, economic and social—across different regions have contributed to the spread and evolution of mathematical ideas. Ethnomathematics also documents the everyday mathematical practices of diverse communities (Saxe, 1988).

Another important emerging area of mathematics education is what Tate calls *algorithmic justice.* Algorithmic approaches and computational models inform decision-making in healthcare, social services, the judicial system, electoral politics, and all across society. Tate (1994) asserted that the use of mathematics and statistics in our democratic society is often linked to an attempt by one group seeking to gain an advantage over another group. Situations are mathematized in order to maximize advantage. For example, Suri and Saxe (2019) remarked: "Enhanced by computer power, partisan gerrymandering poses a burgeoning threat to the American way of democracy. Workable standards based on sound mathematical principles may be the only tools to counter this threat. We urge the Supreme Court to be receptive to such

standards, thereby enabling citizens to protect their right to fair representation." The math of gerrymandering represents a potential facet of civic reasoning. Because algorithms often operate invisibly, embedded in proprietary and corporate software, the ways they manipulate our decision-making and external experiences are even more unsettling than other forms of manipulative information. Learning to analyze algorithmic manipulation will require new forms of math education, including computational literacy. Computation can constitute a genuine new literacy having impact for our civilization comparable to that of textual literacy.

We argue here that developing deep mathematical knowledge and epistemological dispositions and learning to use that knowledge and dispositions to interrogate social, political and economic issues before us can be a powerful preparation for thoughtful civic engagement based on critical reasoning. We do not suggest that such knowledge and dispositions will lead to inevitable common propositions about how to address problems in the civic domain, but can at least ground civic discourse in a shared epistemic orientation towards logical sensemaking. This kind of approach is buttressed by research that indicates that when people make predictions about the rate of occurrence of various phenomena (e.g., incarceration or immigration rates, or the frequency of abortions), and then are given the actual data, they will reconsider their previously firm opinions (Munnich, Ranney & Bachmann, 2005).

All of the above, however, still tends to focus on students as the objects of instruction, asking what kinds of information they should be presented and what kinds of techniques they should learn to use. That kind of focus places little emphasis on what the students themselves bring to instruction, and how that can (a) be built on, and (b) relate directly to students' conceptions of themselves as thinkers and learners, and their personal identities. Here we re-

emphasize that disciplinary reasoning, in this case mathematical reasoning, entails cognition, perceptions of efficacy and relevance, attributions of emotional salience, and can involve identity wrestling as the focus of mathematical reasoning is connected to experiences that are meaningful.

Not just in mathematics, but in all subject areas, there is the question of what kinds of classrooms consistently produce students who are knowledgeable, resourceful, and agentive thinkers and learners—who are capable of reasoning powerfully, and of engaging in the kinds of discourse that draws on and builds on knowledge in collaborative discourse. It can be taken for granted that if students do not have such opportunities, whether in mathematics or other content areas, they are unlikely to develop such skills and understandings. There is now an extended body of evidence under the umbrella of the Teaching for Robust Understanding (TRU) Framework (see, e.g., Schoenfeld, 2014; Schoenfeld et al., 2018) indicating that such learning outcomes correspond strongly to their learning in environments that:

- engage students in a rich mix of disciplinary (and if appropriate, interdisciplinary) content and practices;
- do so in ways that build on student knowledge and resources, broadly construed;
- provide meaningful opportunities to contribute to and refine collective understandings, building in careful ways on both the formal and informal understandings students bring into instruction; and
- do so in ways where such ideas and practices are made public, so that student thinking is revealed and the teacher can adjust instruction so that students are engaging in sense-making in their zones of proximal development.

Crafting these kinds of robust environments within classrooms will help students to develop both the skills and propensities to engage in such discourse outside the school walls.

We seek here to make the case that the study of mathematics in K-12 classrooms is not merely an exercise in cognitive-technical knowledge. As we have illustrated, mathematics offers resources for examining a complex range of civic dilemmas through mathematical reasoning. The robust teaching of mathematical reasoning requires attention to epistemic complexity (examining evidence and warrants for claims, considering multiple ways of addressing the same problem), can be powerfully applied to problems that entail moral complexity (e.g., distribution of shared resources, environmental impacts), and can support the development of self-efficacy and emotional safety as students learn to persevere in solving challenging problems.

Science

Science seeks to help us understand the natural world and the consequences of this understanding ought to help us design artifacts, policies and practices that enhance our general well-being and quality of life. People of all ages need a sound scientific understanding to reason about many issues that affect public life (e.g., health policies, environmental crises, the current covid-19 pandemic). However, many of the details and technicalities of the latest science are continuously emerging and evolving (e.g., the specifics of viral mutations relevant to the spread of zoonotic diseases, such as coronavirus), and don't make for a plausible prerequisite to engaging civic discourse-relevant thinking. Instead, science education can cultivate an epistemic disposition to inquire into that about which you have limited technical knowledge and the skills and tools to engage in such an inquiry with reasonable humility and efficacy. Additionally, some of the tasks

for engaging in civic reasoning and discourse can be embedded into the instruction of science itself. We view this as necessarily a collaborative project between those concerned with civic reasoning and discourse and researchers and educators focusing on science education.

According to the Committee on a Conceptual Framework for New K-12 Science Education Standards (2012), "Science, engineering, and the technologies they influence permeate every aspect of modern life. Indeed, some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options" (p.7). The New Generation Science Standards (NGSS) (https://www.nextgenscience.org/) offer a comprehensive framework for the teaching of science in K-12 settings to prepare students to become critical consumers of scientific information. The framework moves beyond a focus on content to emphasize deep conceptual understandings. The standards fall into three broad categories: scientific and engineering practices; cross cutting concepts; disciplinary core ideas. See Table 2 for a full list of these dimensions.

Table 2 - New Generation Science Standards (NGSS) Framework

BOX S-1

THE THREE DIMENSIONS OF THE FRAMEWORK

1 Scientific and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

2 Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

3 Disciplinary Core Ideas

Physical Sciences
PS1: Matter and its interactions
PS2: Motion and stability: Forces and interactions
PS3: Energy
PS4: Waves and their applications in technologies for information transfer

Life Sciences
LS1: From molecules to organisms: Structures and processes
LS2: Ecosystems: Interactions, energy, and dynamics
LS3: Heredity: Inheritance and variation of traits
LS4: Biological evolution: Unity and diversity

Earth and Space Sciences
ESS1: Earth's place in the universe
ESS2: Earth's systems
ESS3: Earth and human activity

Engineering, Technology, and Applications of Science
ETS1: Engineering design
ETS2: Links among engineering, technology, science, and society

(https://www.nextgenscience.org/)

The scientific and engineering practices identified above directly support the quality of epistemic reasoning we have argued is important to civic reasoning and discourse. The

crosscutting concepts are important because they represent underlying systems thinking principles and relationships that operate in the natural world. For example, in understanding the current COVID-19 pandemic, it is useful to know that the structure of the virus matters for how it functions in terms of stability and change, and to understand how this virus can both belong to a family of viruses about which we know something while simultaneously being a unique expression of that family and as a consequence pose new challenges. Knowledge of core biological processes in the life sciences is consequential for basic understanding of how the coronavirus operates within our physiological systems. These foundational understandings enable basic sensemaking about the underlying processes of a viral pandemic, even if one does not have deep technical knowledge about the actual virus spread through the COVID-19 pandemic. An interested person who has undergone mandatory science education in school should then be equipped to investigate further questions about the virus, to evaluate and comprehend a variety of sources, and to interrogate the validity of conflicting information they encounter. The public debates in the U.S. around the wearing of masks to mitigate the spread of the virus reflects the consequential importance of basic science understandings in the public.

There are many more plausible resonances between civic discourse and science education. As discussed in the section on *How People Learn* (Bransford et. al., 1999), we are committed to the idea that all students have rich pools of "spontaneous concepts"—intellectual resources that students intuit from their experiences in the everyday world (Vygotsky, 1986). For example, very young children develop a sense that there are some forces at work that pull objects downward. They know if they drop a ball, it will not go up into the air, but rather will fall to the ground. This is before they know anything about the formal construct of gravity or about the counter forces at work in addition to gravity when an object falls. These spontaneous

concepts can be leveraged in the construction of both scientific understanding, per se, and tied to developing competence in civic reasoning and discourse. The idea of spontaneous concepts—concepts we intuitively learn from our experiences in the everyday world—supports the broad proposition that robust learning occurs as people engage in activity or what in learning theory is referred to as constructivism. Constructivist theories of learning, stemming from ideas of Lev Vygotsky, Jean Piaget and John Dewey, privilege the importance of connecting knowledge and dispositions learners construct from their everyday experiences as scaffolds, important in part because as we learn from acting in the world, we engage in observations, struggling to make sense and impose coherence on experience, supporting our efforts to use what we know to learn new things. Constructivist pedagogies in education, particularly with regard to learning in mathematics and science, require students to actively engage exploring, observing, extrapolating and testing explanatory propositions. This pedagogical model resists passive learning where students are simply expected to recall things from teachers' lecturing or reading textbooks. More recent applications of constructivist principles are described as "strength-based instruction," in opposition to "deficit-based instruction." The latter model constructs students as empty vessels, or worse, containers of "false theories" or irrelevant-to-instruction "misconceptions."

While a commitment to constructivist principles is fairly wide-spread in fields like the learning sciences, science education was arguably the earliest discipline to work persistently within a constructivist paradigm (Papert, 1988). As such, constructivism, per se, forms a strong resonance between civic reasoning and discourse and science education, in part because it calls on students to examine prior knowledge and dispositions developed through experience in the world. This suggests that when science learning involves active participation in the unfolding of scientific phenomena, students are more likely to view science as socially and hopefully

personally relevant, increasing the likelihood of sustaining interest over time and beyond formal schooling.

Another way science instruction can contribute to preparing students to engage in civic reasoning and discourse is through attention to epistemic dispositions. Epistemic dispositions have to do with how we think about knowledge: as simple or complex, as fixed or subject to on-going investigation (Chinn et al., 2011). Epistemic dispositions also include the criteria upon which we draw to evaluate evidence to support claims. Normative descriptions of productive epistemological judgments in the field of science are often described as the "nature of science" (NOS) (Lederman, 2006). "Personal epistemology" or "intuitive epistemology" in the science education world describe the common intuitive, informal, and cultural resources that students bring with them to the understanding of scientific phenomena. These terms suggest that intuitive epistemologies differ from experts', are often fragmented or contradictory. People's personal epistemologies tend to rely heavily on authority rather than on judgments of sensibility and coherence (Hammer, 1994), and are therefore prone to miscontrusion and overwriting by other "authorities," which can be easily feigned and manipulated.

Recent developments concerning epistemology in science learning seek to expand the terrain encompassed by the term. In particular, they have sought to include interest, affect, engagement, and identity. The latter three are particularly important as links to elements of competence in civic reasoning and discourse that were drawn out earlier in this paper. This arena is often termed "hot conceptual change." One example of this work is that by Levrini and colleagues (Levrini, Levin, & Fantini, 1018; Levrini, Levin, Fantini, & Tasquier, 2018), which seeks to foster and measure idiosyncratic and personal affiliation with science subject matter, which could be aptly called developing "scientific identity." This work is also notable in using

the history of science (multiple competing historical explanatory frameworks for understanding the same phenomenology) within up-to-date theories of conceptual change to study engagement and identity formation.

Social and ideological forces can also influence our personal epistemologies. An example might be learning about climate change, and encountering conflicting messages from fossil fuel lobbyists that seek systematically to undermine the power and legitimacy of scientific studies and conclusions. Science education can contribute to civic reasoning and discourse by taking into account how students' personal epistemologies have been informed by ideological beliefs and anti-science rhetoric in the media. The problems and possibilities entailed by existing ideological settings' strongly influencing learning might be called "ideologically fraught conceptual change."

More broadly, historical treatments of science offer a superb resource for thinking and teaching about the ideological settings of science. The history and philosophy of science have, at times, been strongly visible in science education, especially at the dawn of the field of conceptual change (diSessa, 2014). An early and visible innovation in physics instruction, Project Physics at Harvard (late 1960s to early 1970s), was based on humanizing science and increasing interest for less technically inclined students by introducing significant strains of the human history of physics. There is now a journal, *Science Education*, that concentrates on history and philosophy of science as it relates to education. At the same time it is important to acknowledge that the history of science has not always been benign. We can think about the syphilis experiments where accepted treatments were denied Black men and the history of scientific racism (Gould, 1981). We want students to be critical examiners of science and scientific findings and make grounded assumptions about scientific merit on the one hand; and

on the other hand not to reject scientifically accepted findings, especially those that impact policy and practices that directly affect our quality of life, simply because of ideological beliefs. We might argue that a grounding in broad democratic values provides a broad boundary in which differences in ideological orientations can be accommodated.

Some theoretical orientations in conceptual change highlight the role of ontology in learning difficulties (Chi, 1992). Ontology refers to basic and distinct categories of existence, such as matter, events, and ideas. Religious ontologies include both human ontologies and spiritual ones. It appears that ontologies are insightful in capturing some aspects of cultural or ideological backgrounds in learning. The Western tradition in the sciences typically employs hierarchies of existence (ontology) that place humans at the top of the hierarchy, with animal and plant life both lower and solely in service of human aims. In contrast, some indigenous traditions in the Americas and elsewhere take a very different ontological orientation, where humans, other animals, and plants are not hierarchically related, but stand as intrinsically related and interdependent. However, it is important to note that there is contestation over such orientations, even within the Western tradition. For example, consider that organizations such as PETA (Peta for Ethical Treatment of Animals) argue for "animal rights," while the dominant speciest ontology sees animals as "resources" similar to plants, and therefore categorically different from humans' claim to rights and protections (Newkirk & Stone, 2020).

Bang and others argue that ontological distinctions are important at the policy level, as well as the individual level (Bang & Medin, 2010; Bang et al., 2007; Bang et al., 2010; Bang et al., 2012; Bang et al., 2014). They lie beneath decisions concerning both the scope and basic patterns in how science is taught. These researchers call out the need to examine critically how public policy decisions are influenced by assumptions about, for example, whether humans are

categorically and uniquely at the top of hierarchies in the natural world. Broad cultural assumptions about ontology—and lack of attention to them—can marginalize the participation of students from particular communities. As part of a solution, Bang calls for epistemic and ontological heterogeneity in both science instruction itself and in research on it (Bang et al., 2013). This resonates with a long-term concern for "epistemological pluralism" (Turkle & Papert, 1991), which has been visibly present and influential for decades in some corners of the STEM instruction community.

While it has been slow to develop, science instruction is now actively experimenting with very different activity settings for science learning, in contrast to the usual "read and problem solve" mode. A simple example is the use of research-like activities in instruction. For example, Course-based Undergraduate Research Experiences (CURE) are now becoming very popular (Dolan, 2016). A similar shift, toward "inquiry in science" has had a much more evident effect at elementary school levels. Rationales for such innovations include that these courses engage both intrinsic interest, but also employ and develop some of the many "soft" skills that are important to science—and also to civic reasoning and discourse—such as collaboration, managing open-ended problems, student empowerment, and so on.

Another activity innovation that has strong face value in connection to civic reasoning is *Citizen Science.* Citizen Science involves everyday communities in participating in data collection, data monitoring, and policy development around problems ranging from environmental protection to sustaining biodiversity. This work sometimes includes organizing round table discussions among critical stakeholders around policy considerations, and it can concern sui generis problem selection—a problem focus that comes from students and has personal meaning to them. For example, a project at Aalborg University (Magnussen, et al.,

2019), Copenhagen revolves around organizing a community of both local residents (mostly children) and professional architects around the redesign of the physical surround of their community. Some of the general activity structure of Citizen Science (Lepczk, C. et al., 2020) has had a stable presence in science education that can serve as a mutually-resonant focus for communities concerned with civic reasoning and discourse in concert with those concerned with science education.

Scientific literacy through journalism is yet another new approach in science education that is particularly relevant to civic reasoning and discourse. Polman et al (2014) argue that engaging in experiences that mirror those of science journalists, rather than professional scientists, enables students to better use science information for personal decision making and helps them contribute meaningfully to public discourse long after high school graduation.

We agree with Gutman (1999) when she argues that public schooling is the only institution in a democratic society that can require preparation for civic engagement. We further argue that because of both the importance and breadth of such preparation, opportunities to learn to engage in civic reasoning and discourse should be distributed across the content areas and K-12 grades. Table 3 summarizes dimensions of civic reasoning across disciplines.

Table 3 - Dimensions of Civic Reasoning

	Knowledge	**Dispositions**	**Identity**	**Ethics**
Literacy	● Critically examine texts	● Engage complexity	● Filter problem	● Empathize with others

Literature	• Interrogate multiple worlds	• Examine multiple points of view • Weigh evidence • Examine warrants • Life-long research to expand knowledge • Critically examine point of view and authenticity of sources	solving through both self-interest and the needs of others • Wrestle with multiple overlapping identities • Examine ego-focused goals • Resist stereotypes and homogenizing others	• Privilege fairness for all • Use ethical principles to drive decision making
Mathematics	• Use of mathematical data & modeling			
Science	• Understand processes underlying natural world			
History	• Understand geographical, historical, economic & political processes and forces • Understand democratic values			

Civic Discourse

Much of this chapter has focused on what is entailed in civic reasoning—its underlying dispositions, its moral threads, and the possibilities of embedding it across academic disciplines in K-12 schooling. Learning is most robust when it involves action on the part of learners to observe, to explore, to test hypotheses. Ideally, in the context of schooling, learning should be an active process involving interaction with other people and artifacts. Talk is a powerful medium through which both self-reflection and consideration of multiple points of view unfold. Research on discussion or classroom talk has documented characteristics of and supports for rich discussion and these findings have implications for how we might organize open discussions across the disciplines to embody civic discourse. Michaels, O'Connor and Resnick (2008) make

1531 an important observation about how attention to dialogue and discussion contribute to larger
1532 civic goals:

1533 For many philosophers, learning through discussion has also represented the promise of
1534 education as a foundation for democracy. Dewey proposed a definition of democracy that
1535 placed reasoned discussion at its very heart. He spoke of democracy as a ‘‘mode of social
1536 inquiry’’ emphasizing discussion, consultation, persuasion and debate in the service of
1537 just decision-making (Dewey 1966, p. 56).

1538 Globalization, multiculturalism, and diversity—whether ethnic, racial, or
1539 socioeco- nomic—now require new approaches to decision-making. In an increasingly
1540 connected but diverse world, deliberations and discussion must be employed in the
1541 service of not simply communicating, but as importantly, in knowledge-building and
1542 negotiated solutions to complex political, medical, and environmental problems. An
1543 emerging body of work addresses these issues on both theoretical and practical grounds,
1544 drawing on Habermas’ (1990) notion of ‘‘deliberative democracy’’ and the ‘‘public
1545 sphere’’ as an idealized discursive space where debate and dialogue are free and
1546 uncoerced. (p. 284)

1547

1548 We explore civic discourse along three dimensions: knowledge, dispositions and norms.
1549 What are the underlying requirements regarding knowledge to participate in civic discourse?
1550 What dispositions are required to engage? And how might organizing and managing a structure
1551 and set of norms for discourse enhance the experience in ways that both build knowledge and
1552 nurture the necessary dispositions? This problem space of civic discourse requires that we think
1553 about both what students need to know and be able to do, and what teachers need to know and be

able to do and entails all the complexities we have discussed around conceptual change, the entanglements of identity orientations and complexities of moral reasoning.

Preparing students to engage in discussion has and continues to be a major topic in educational reform efforts. Researchers in this area draw from across multiple fields of study including sociolinguistics, philosophy, ethnography of communication, cognitive and social psychology. Most research in recent decades has addressed what has come to be called *dialogic discussion*, moving beyond traditional ways of organizing classroom talk referred to as IRE (Cazden & Beck, 2003; Mehan, 1985), where the teacher initiates questions, the teacher responds to and evaluates students' responses. In contrast, dialogic discussions (Engle & Conant, 2010; Michaels, O'Connor & Resnick, 2008, Lemke, 1990) are ones in which students themselves take the lead, where students pose questions and put forward propositions and respond to one another. However, even when students lead such discussions, they are an outgrowth of norms that teachers establish over time and that teachers coordinate. The patterns for developing such norms are not linear. Depending on students' experience with interrogating questions, learning how to listen, evaluate, and respond in ways that do not cut off others, different patterns of participation emerge and shift over time.

Current educational standards including Common Core Curriculum State Standards, Next Generation Science Standards, College, Career, & Civic Life: C3 Framework for Social Studies State Standards all call for classrooms in which dialogic discussion is the norm. Currently the McDonnell Foundation is sponsoring a multi-year major funding effort on research on how to support such dialogic discussions in classrooms and how to help teachers learn to plan and coordinate such discussions. Another major longitudinal effort on classroom discourse is the program Accountable Talk led by Lauren Resnick, Sarah Michaels and others (Michaels,

O'Connor & Resnick, 2008). Nystrand has conducted multiple large scale studies documenting that and how participation in rich discussions contribute to student learning. There are a number of pedagogical models for designing dialogic discussions: Collaborative Reasoning (Anderson, Chinn, Waggoner, & Nguyen, 1998), Paideia Seminar (Billings & Fitzgerald, 2002), Philosophy for Children (Sharp, 1995), Instructional Conversations (Goldenberg, 1993), Junior Great Books Shared Inquiry (Great Books Foundation, 1987), Questioning the Author (Beck & McKeown, 2006; McKeown & Beck, 1990), Book Club Raphael & McMahon, 1994), Grand Conversations (Eeds & Wells, 1989), and Literature Circles (Short & Pierce, 1990), Interpretive Discussion Haroutunian-Gordon, 2014) among others. (See Murphy et al., 2009) for a meta-analysis of the impacts of these models of discussion on reading comprehension). These families of pedagogical models focus on supporting students in engaging in critical analyses of texts, using discussion as a springboard and venue for exploring multiple points of view. And there has also been substantive work on the role of discussion in the teaching of science and mathematics (see Yackel and Cobb 1996; Resnick et al. 1992; Lehrer and Schauble 2005; Lampert and Ball 1998; Chapin et al. 2003; Warren and Rosebery 1996, among others).

The Accountable Talk framework articulates targets for discussion that are applicable across disciplines. These include organizing discussion in ways that privilege accountability to the community of learners (inclusion and respecting others), accountability to knowledge (expectation that discussion will be based on standards of accurate knowledge claims), and accountability to reasoning (expectation that discussion will support mutual privileging of logical and ethical reasoning). The framework includes exemplars of specific pedagogical moves teachers can use in supporting students' engagement and efforts to uphold the commitments to building a sense of community that values knowledge and reasoning.

With regard to civic discourse, we reiterate how civic reasoning can be and should be embedded in learning within and across domains, and not simply limited to work done in social studies, history and civics classes. This means that the knowledge demands of reasoning in the disciplines must be an important dimension of classroom talk. If students are going to reason about issues of climate change in a science classroom, or analyses of civic data sets in a mathematics classroom, or themes about resilience in the face of public health challenges such as a pandemic in a literature classroom, their talk must both recruit disciplinary norms and allow students to bring in their personal histories of and relations with topics to bear. These dimensions of classroom talk must embody both disciplinary norms and civic norms. Civic norms include listening to others, showing empathy for others, considering multiple points of view, showing respect for others, even when one disagrees.

There are a number of conceptual and pedagogical challenges to designing classrooms where robust dialogic discussions are the norm, particularly around questions in the public civic domain because such questions are always contestable. The first is the topic or problem being addressed must be of sufficient complexity as to warrant dialogic investigation, in which relations among interlocutors are essential to the work at hand. There is no need for dialogic discussion around a question for which there is a simple right or wrong answer. Sometimes, as in mathematics, there may be a right answer to a question but multiple pathways for getting the answer and dialogic discussions around the affordances and constraints of multiple pathways can be powerful.

Second, students need to have had adequate preparation regarding the requisite body of prior knowledge needed to access the problem. How teachers think about questions of requisite prior knowledge is complex. Assumptions about requisite prior knowledge can be used to

assume that some students are not ready to engage in rich dialogue because they do not have requisite prior knowledge. Such assumptions contribute to deficit attributions and low level instruction. These assumptions are more often than not attributed to students from particular ethnic minority communities and communities living in persistent inter-generational poverty. The extent to which requisite prior knowledge can also include students' experiences in the world, the array of language and meaning making repertoires they have developed robustly outside of school will also contribute substantively to rich dialogic discussions. The relevance of life experiences to the problem at hand can also contribute to civic discourse in that it invites participants to learn about one another, ideally finding some sources of resonance in their life experiences or at least getting some opportunities to wrestle together with sources of difference.

Third, talk no matter how rich, is ephemeral. From a pedagogical standpoint then it is important that teachers and students are able to create some kind(s) of external representations of the big ideas, lines of argumentation, points of convergence and dissonance emerging from the discussion. Such external representations constitute an object of inquiry and reflection for both students and teachers moving forward. Such representations may be charts, graphic displays, annotations, or essays, as examples. As students move from one discussion to another, they are ideally accruing a body of knowledge, an evolving argument or set of arguments that can become internalized knowledge. The practice of using knowledge accrued across such dialogic discussions for some public purpose in particular enhances relevance to civic action.

Another important dimension of planning for discussion is the availability of diverse language repertoires as resources. There are important relationships between students' developing skills in academic language to convey ideas in the academic disciplines. Academic language includes vocabulary and syntactical features that are typically not part of people's

1646 everyday language. For example, in regular everyday oral discourse, people are not likely to use
1647 the passive voice or compound/complex sentences. (E.g., "Although the viral particles can be
1648 dispersed through the air, masks can mitigate their dispersal and social distancing also plays a
1649 significant role"). They are not likely to use word forms where they translate from a noun form
1650 to an adjectival form (e.g. familiarity to familiar). What are called tier 2 academic languages
1651 include specialized words and syntactical and rhetorical forms that are associated with
1652 disciplines (e.g., "the class of mammals and the order of carnivora") (Lee & Spratley, 2009).
1653 Learning academic languages bears some relations to learning a new language. In other words, it
1654 takes time and practice.

1655 At the same time, we inevitably learn how to take on new language registers (i.e., levels
1656 of formality or informality assumed to be appropriate for different social contexts) by being able
1657 to explore new ideas through our existing language repertoires. Language repertoires include the
1658 range of knowledge of ways to speak or communicate that an individual has developed. For
1659 example, Carol Lee grew up speaking African American English Vernacular and learned to
1660 speak several varieties of Academic English as she pursued university and doctoral studies.
1661 When with close family and friends she will speak one variety of English and with professional
1662 colleagues another.

1663 This means there are important roles for students' everyday language repertoires in the
1664 enactment of dialogic discussions. The use of everyday language repertoires invite engagement.
1665 These everyday language repertoires can include different dialects, such as African American
1666 English, as well as other national languages (e.g., students' whose home language may be
1667 Spanish or Hmong). Studies have shown the positive impacts of recruiting students' everyday

languages as a medium of discussion in classrooms (Brown, 2019; Warren, Ogonowski, & Pothier, 2005).

Finally, there are important developmental dimensions to designing for and coordinating dialogic discussion. The differences in discussions in middle school or high school classrooms are less about the structure of such talk and more about the appropriateness of the topics being discussed. With regard to civic reasoning, we need a developmental lens on the accessibility of particular topics for youth of different ages. At the same time, as we have discussed earlier, even very young children bring dispositions around moral dilemmas that can be explored appropriately.

Overall, dialogic discussion is a practice that socializes knowledge and dispositions that are central to civic reasoning. The affordances of dialogic discussion play out regardless of subject matter and across the K-12 grade spectrum. The challenge is how to create infrastructures for teacher learning, curriculum design and assessments that make this pedagogical practice ubiquitous. It is important to recognize that planning for discussion is not simply about tactics (e.g. teachers' re-voicing student inputs, structures like pair talk, etc.). Such planning requires knowledge about the multi-dimensional nature of language in use (e.g. the ways that ideas, points of view, indicators of engagement or not may be implicit rather than explicit), about the multiple dimensions of conceptual knowledge that are the target of instruction (what Shulman calls pedagogical content knowledge) (Shulman, 1986), of the social, emotional and identity entanglements that come into play as students talk and potentially disagree with one another. One can learn about these domains of knowledge in the abstract, but learning how to deploy such knowledge in the particular contexts in which one is teaching requires what Hatano calls adaptive expertise (Hatano & Oura, 2003). Such expertise evolves across one's teaching career.

Thus support for teacher learning communities in schools and across communities is one of the most generative systemic supports. Examples of such learning communities include the practice of Lesson Study in Japan (taken up also in the U.S. and other parts of the world) (Lewis et al, 2006), the National Writing Project (Lieberman & Wood, 2003) that has supported across the nation communities of teachers studying their literacy practices for decades, Che Che Konnen headed by Beth Warren and Ann Rosebery (Rosebery, Warren & Conant, 1992) from TERC as a collaboration between teachers and researchers around bottom up identified problems of practice, to name a few.

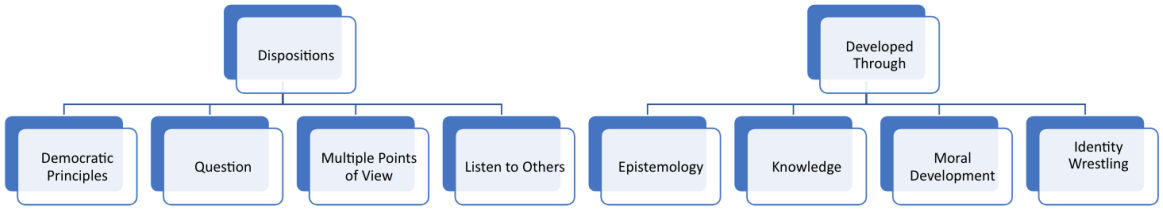
Summary

The prior sections have made clear how issues of civic reasoning and civic discourse are at play in the multiple academic disciplines that young people learn in school. Attending to robust teaching and learning of those disciplines will provide important opportunities for young people to engage with the core skill sets and habits of mind that will foster the kinds of civic reasoning sensibilities that young people need to reason about complex civic and social issues. If we consider how disciplinary learning might contribute to youth's reasoning about the case presented in the beginning of this chapter involving the deportation of meat plant workers in Mississippi, learners might draw upon experiences with literature in which they read about the family challenges of a mixed-citizenship status or immigrant family, or could connect to what they'd learned in history about the long history of immigration and reliance upon immigrant workers in their history or social science course. Students might also make use of what they are learning about data representations in mathematics to consider the scope and scale of the problem, or might connect to digital literacy understandings to assess what reliable sources of

data might exist online. Thus, robust and critical disciplinary learning is key to preparing young people to reason civically.

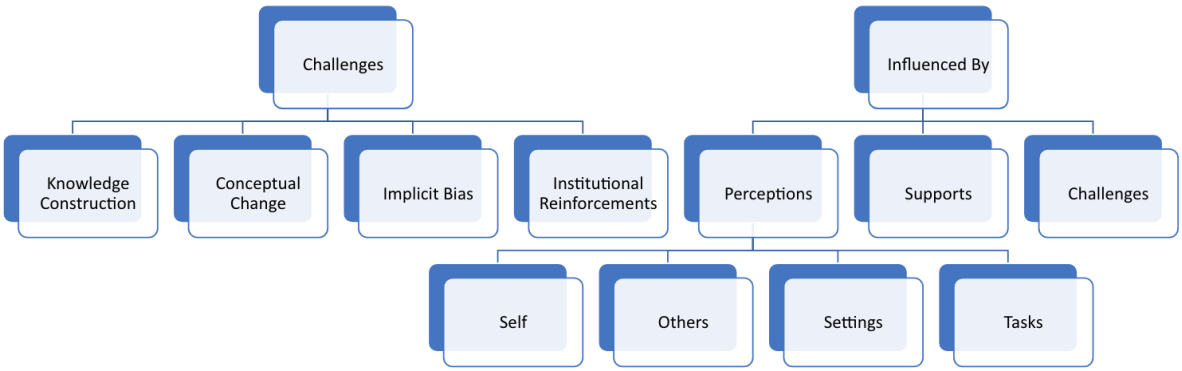
We have argued that civic reasoning and discourse recruit multiple resources. Some resources include knowledge, including content and conceptual knowledge within the content disciplines that represent the major focus of K-12 schooling. While knowledge of history, political and economic systems are essential to robust civic reasoning and discourse, such knowledge in itself is insufficient. Some resources include dispositions. These dispositions include moral reasoning, ethical concern for both the self and others, epistemological commitments to wrestling with complexity and weighing competing evidence. They also include identity commitments that involve critical interrogations of the self as one inevitably considers positions in relation to self-interest and assumptions about the interest of communities with which one affiliates. Civic reasoning and discourse must also be grounded in democratic values, values that are sufficiently broad to withstand contestation and difference. Figure 3 summarizes the argument about what is entailed and to be developed to support civic reasoning and discourse.

Figure 3 - Developing Civic Reasoning and Discourse



With this complex problem space of civic reasoning and discourse, we must also acknowledge the challenges of learning to engage in such work. While we have identified resources that the individual recruits in engaging in civic reasoning and discourse, these resources are developed within and unfold in response to social interactions with others, within systems that distribute resources, often inequitably, and that reinforce ideologies and metanarratives. Public schooling exists within these systems and is influenced by socially distributed ideologies and metanarratives about what is "normal." Certainly in the context of public schooling, there will be instances where children and especially adolescents will face tensions between either their existing beliefs or their perceptions of what is accepted as the norm. Schooling is fundamentally concerned with building new knowledge by drawing on prior knowledge, the challenge of conceptual change. But when the process of shifting and critically examining existing knowledge and beliefs entail tensions and contradictions, these challenges of "hot conceptual change" are perhaps even more difficult for teachers as adults. Children develop at an early age an appreciation for harm to others, and fairness to others even in light of their own ego-focused self interests. These moral moorings become more nuanced and complex as they grow into adolescence, particularly as they come to understand the ways that society positions those deemed as "the other," which can lead to the development of what is called implicit bias (Payne et al., 2017). Implicit bias involves assumptions about others we categorize as part of some kind of social group, assumptions that are not explicitly stated but implicitly assumed. Figure 4 below identifies the range of challenges to developing strong capacities to engage in civic reasoning and discourse, as well as influences their development.

Figure 4 - Challenges to learning to engage in civic reasoning and discourse



The point is there are risks associated with both learning to engage in robust civic reasoning and discourse and with being active in civic reasoning and discourse. The action itself is risky because it requires engagement with others who bring different positions, beliefs and commitments. Because this is a risky endeavor, it is essential that efforts to prepare young people must be informed by what we know about robust learning environments. We must recognize that robust learning involves more than knowledge. We draw here on Spencer's (2006)PVEST model (Phenomenological Variant of Ecological Systems Theory). PVEST is a model to account for outcomes of risk or resilience in light of challenge. Spencer argues that it is not simply exposure to risks that matter, but rather the relationships between the sources of vulnerability and the nature of supports available. The model is phenomenological because it is rooted in people's perceptions of themselves, of others, of settings; perceptions of what is available to them as relevant to their perceptions of risks.

Finally, we take from our integrated review of research on how people learn and develop (including how issues of identity inform learning, how perceptions of self, others, tasks and settings, how attributions of emotional salience infiltrate action) the following core principles to inform the design of robust learning environments (for children and for adults):

- Draw and build on prior knowledge
- Provide a sense of emotional safety
- Establish relevance through links to real-world problems
- Provide opportunities to build individual and collective efficacy through scaffolded challenges
- Support questioning sources of information and beliefs
- Support interrogation of own assumptions
- Support wrestling with complex and contradictory ideas
- Ensure multiplicity and variety of cultural and ideological perspectives, including students' own and those that are less represented in the dominant culture

The goal is to socialize people, especially young people, to wrestle with complexity, to consider multiple points of view, to interrogate their own assumptions, to empathize with others, and ultimately to aim their lives toward doing good in the world, good for themselves but also good for others. When we look at the many examples of people reaching out to help others with the aim of public service during this coronavirus-19 pandemic, we can see the best of what citizenship and understanding our interconnectedness as humans can be, in light of challenge. This noble goal cannot be restricted to the work in civics classes in 8th grade and high school.

Recommendations for research, practice, and policy

One of the key arguments we have made in this paper is that all the core academic disciplines and their specific ways of knowing and building knowledge are necessarily entailed in the kind of robust civic reasoning and discourse required for a working democracy. However, disciplinary knowledge is constructed and reproduced by experts and is coordinated by discipline-specific

organizations, who might not see relevance to civic concerns among the priorities of their work. We call for disciplinary educational organizations to talk within and across their boundaries to consider and articulate how they should contribute to civic learning, reasoning, and discourse across the curriculum and lifespan. We also need to foster dialogue between professional communities seeking to support civic discourse in schooling and community-based institutions, both to promote mutual learning and to develop opportunities for academic learning and research to contribute to the needs of local communities.

We have also argued that while civics course requirements are a positive growing policy effort, a single semester- or year-long civics course is not adequate to support children and youth to engage civic reasoning and discourse. Such reasoning and discourse entails wide scale knowledge reflected across the academic disciplines and epistemic dispositions necessary for engaging with complexity. Equally important are considerations of identity orientations and moral/ethical commitments. These forms of knowledge and dispositions evolve early in child development, including children's evolution of moral reasoning. We know that humans at a very early age begin to construct notions of fairness, morality, identity, and community that need to be surfaced, nurtured and at times challenged in a safe and supportive way. We call for research, practice, and policy that deals with creation and maintenance of innovative and cross-curricular civic discourse spaces across grades that might allow students to connect the moral values they are developing in their world experiences with the content and forms of reasoning they are practicing in disciplinary classrooms, and apply them to the local and global challenges they hear about in the news or media, encounter in the lives of their extended family, or overhear on the street or playground. Ultimately socialization efforts toward developing empathy for others,

including others with whom we disagree, stands as a foundational goal for moral development that can be taken up in schooling across the disciplines.

Students need spaces for trans-contextual sensemaking (Bateson, 2016) that promote seeing the deep relevance and interrelatedness of literacy, literature, social studies and history, science and math to young people's lived experiences. Imagine a space like that existing in Mississippi schools the days after the ICE raids described in our vignette—a space where students of different ages together with their teachers could actually ask "what should *we* do?" How they might share personal stories, consider historical precedents, calculate potential consequences, and debate possible strategies for community response? While that discussion might have happened in church basements and living rooms across town, it ought to have been available for young people in their public schools.

With respect to research, we need to better understand how identity, moral thinking, and knowledge domains come together as people reason about civic issues, and how these are not simply individual processes, but also take place in relation to communities and to societies (Nasir et al, 2020). Researchers also might have something to learn from studying places where this kind of disciplinary learning is already happening alongside learning to engage civic discourse and reasoning—in classrooms and schools, but also in formal and informal community settings.

The kinds of work we are calling for requires a collaborative spirit, and the acknowledgement that we must come together in new ways towards new kind of ends in order to bring about the kinds of transformative change that would allow to most optimally support young people in engaging deep and rich civic discourse and reasoning in multiple aspects of their lives.

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