


Chapter 1


Computational Thinking and Social Studies Teacher Education: What, Why, and How

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ABSTRACT

Computational thinking is highly applicable to social studies education, particularly decision-focused social studies. To better fit the disciplinary needs of social studies and align with social studies standards, we adapt and group computational thinking skills into a heuristic of data, patterns, rules, and questions (DPR-Q). We then propose a four-step model for social studies teachers to follow when planning lessons that integrate computational thinking within their curricular instruction. Both the DPR-Q heuristic and the instructional planning model are explained with worked examples from social studies classrooms. Successful integration of computational thinking into decision-focused social studies can both enrich the social studies curriculum and provide a curricular home for teaching computational thinking, bearing out Wing's claim that computational thinking is 'everywhere' and 'for everyone.'

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INTRODUCTION

Computational thinking and social studies may appear to be an odd pairing. The social studies lessons presented in elementary, middle, and high school classrooms can serve many purposes (see, for example, Barton & Levstik, 2004), but none emphasize computational thinking. However, the work of social scientists—economists, political scientists, geographers, and historians—increasingly involves the application of computational thinking. Historian Ed Ayers has called for a new, technology-enabled approach to social history (Ayers, 1999). Geographers have identified a new construct of geo-computational thinking (O’Sullivan, 1999). In this chapter, we explore the rationale, means, and processes for integrating computational thinking within social studies instruction.

WHY?

For the past two decades, social studies have faced a crisis of relevancy, squeezed first by the pressures of the No Child Left Behind Act, then by the ascendance of perceived high-value fields such as STEM (Fitchett & Heafner, 2010). In the current policy climate, then, social studies are not seen as essential—it is not part of workforce preparation, it does not prepare students for high-stakes assessments, and it does not speak to the other parts of the school curriculum. In fact, in one of our local school districts, social studies have been subsumed under literacy instruction; it has become secondary within the district’s K-12 curriculum and not a priority in its own right. Our concern over this de-emphasis of social studies is further amplified by the fact that our current politics, news, and economy are in a state of tremendous confusion and polarization: Amid so many claims of “fake news” what is real news? In a time of economic mixed signals—low unemployment and high corporate profits versus stagnant wages and rising costs of housing and healthcare—which policies and parties should one choose to support? Do extreme weather events correlate with the onset of catastrophic climate change or are they merely outliers in the distribution of normal weather patterns? The many fault lines of contemporary politics demonstrate the truth of James Russell Lowell’s famous distillation, that American democracy is not “a machine that would go of itself” (Moss, 2017). Social studies is needed now as much or more than ever to help students make sense of the society they are inheriting, and computational thinking can play a vital role.

Computational thinking can assist social studies educators in at least two ways. First, computational thinking is a highly valued STEM skill that is central to 21st century education (Dede, Mishra, & Voogt, 2013; Voogt, Fisser, Good, Mishra, & Yadav, 2015). For example, the International Society for Technology in Education (ISTE) has published computer science competencies for educators (ISTE, 2018), the culmination of a long-running effort funded by the National Science Foundation to bring computational thinking to life in K-12 classrooms (Barr, Harrison, & Conery, 2011). The STEM applications of computational thinking can therefore make a case to an audience that might not be as influenced by social studies’ mission of civic preparation. Second, computational thinking can assist social studies teachers as they work in a curricular context which features expanding opportunities to use data and computing technologies. Examples abound: when studying the Great Depression, students can access a searchable database, posted at Lehigh University, of FDR’s correspondence with the public, mapping the interactions by population density, proximity to radio stations, and time period, all indexed by the themes of Roosevelt’s Fireside Chats (<https://gisweb2.cc.lehigh.edu/fdr/>). When studying terrorism, social studies teachers can make use of the Global Terrorism Database hosted by the University of Maryland (<https://>

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