Cell Phones as Instructional Technology in the Civics Classroom

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Paper prepared for presentation at the Annual Meeting of the American Political Science Association, Virtual Meeting, September 11, 2020.

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The use of digital technology has become increasingly prevalent in American elementary and secondary school civics classrooms. A 2019 Gallup study found that 65% of teachers use digital technology in the classroom daily, with history and social studies instructors among the most frequent users. The use of computers and tablets in civics classes has become routine. Cell phones increasingly have become a technology option for instruction as their availability among students is widespread and the affordances of mobile technology have become more sophisticated. However, cell phones have created a dilemma for educators that is more difficult and complex to resolve than for other technological devices. On the one hand, cell phones have the potential to enhance civics instruction, as they can be used to conduct research, access teaching apps, facilitate project-based work, advance active and innovative approaches to learning, promote off-site engagement with the curriculum, expedite assessment, and help students develop 21st century skills for political engagement. They offer the possibility of bridging the technology gap that exists between high-need students and their counterparts who attend well-resourced schools. At the same time, cell phones can distract students' attention away from lessons, constrain their development of wider research skills, and curtail their face-to-face classroom interactions. Evidence of their contribution to narrowing the educational disparities between rich and poor is unclear. These conflicting factors have resulted in wide variations in cell phone policies across and within schools, with some institutions and teachers fully embracing their instructional capacities and other banning their use.

Studies of the use of cell phones in schools have proliferated since the 1990s when students began to adopt mobile technology. Research has been conducted internationally, as the integration of cell phones into the classroom has been a global phenomenon. The literature to date generally has focused on the pros and cons of cell phone use in the classroom, cell phone policies in schools, applications of cell phones in learning contexts, and the effects of cell phone use on students' attentiveness and emotional well-being. Fewer studies have examined the effectiveness of cell phone use on academic performance and student outcomes, especially at the elementary and secondary school levels (Beland and Murphy, 2015). While a substantial body of research, as well as commentary and debate, on cell phone use in the classroom has been amassed, there is a paucity of studies dealing specifically with their use in civics, social studies, American government, and history courses. Much of the systematic research in this area has concentrated on cell phones in post-secondary school courses (Thomas and Munoz, 2016). The extant research dealing middle and high school students has focused more on the integration of cell phones into the STEM classroom than their used for civics instruction (e.g., Vogel, et al., 2012; Kamarainen, et al., 2013; Krishnamurthi and Richter, 2013; Jones, Scanlon, and Clough, 2013; Chacko, et al., 2015; Crompton and Traxler, 2015; Crompton and Traxler, 2016; Hergemoller and Laumann, 2017; Aldon and Trgalova, 2019).

A goal of this research is to address this void by contributing to our understanding of cell phone use by civic educators at the elementary, middle, and high school levels. This paper will explore the following core research questions: How universal is cell phone access for students in civics classes? How frequently do teachers use cell phones for classroom civics instruction? What are the characteristics of schools and teachers where cell phone use for civic education is

prevalent? For what purposes are cell phones being used in the civics classroom? Do schools and teachers have specific policies guiding cell phone use for learning in the classroom? Teachers' perceptions of the effectiveness of cell phones as a tool for achieving civic outcomes will be considered. How do teachers' perceptions of the effectiveness of instruction using cell phones on students' acquisition of civic knowledge, skills, and dispositions differ? This exploratory study will address the research questions empirically using original survey data collected on American elementary and secondary school teachers nationwide.

Data

This study employs data from an original survey of elementary, middle, and high school teachers that was conducted by Diana Owen and graduate students in Georgetown University's Communication, Culture, and Technology (CCT) program. The survey examined teachers' use of digital and conventional tools in civic education classrooms, their grasp of these tools, and how the technology affects their classroom teaching practices. It was administered online to civics, social studies, and American government teachers recruited from the networks of the Center for Civic Education (https://www.civiced.org/) and the Bill of Rights Institute (https://billofrightsinstitute.org/). The study was in the field from November 15 to December 6, 2019, prior to the COVID-19 pandemic. A total of 1,146 teachers who completed the survey were included in the analysis, consisting of 825 high school teachers, 271 middle school teachers, and 48 elementary school teachers. This distribution is in keeping with the general trend in civics offerings at each grade level. A 2018 Education Week Research Center report found that 3% of elementary schools, 23% of middle schools, and 54% of high schools offered stand-alone civics classes.

In this research, the term "cell phone" encompasses a range of mobile, digital, handheld devices that support the functions of a wired telephone as well as other services, such as voice calls, short message services (SMS), and Internet connectivity. Smartphones with advanced functionality largely have replaced basic cell phones, especially among younger people, and are included in this definition. These devices have multitasking capabilities and support functions that can readily be adapted for classroom instructional use, such as the ability to take and display photos, record and play videos, support email services, run computer applications, and sync data.

The survey included a battery of items specifically about cell phone use. Teachers were asked if all their students had access to cell phones, if their students used cell phones for learning in their classrooms, and if so, how frequently cell phones were used for instruction. Respondents provided information about the purposes for which cell phones were used in their classes. They indicated if they had students use cell phones to look up information, to conduct research for class projects, for word processing and note taking, to communicate with teachers and classmates via chat app (group me, etc.), and to access social media apps. They had the option of indicating other uses of cell phones in the classroom by responding to an open-ended item. Teachers recorded their policy for in-class cell phone use through an open-ended item. The responses initially were coded into twelve categories (see the Appendix) that were collapsed into five broader categories to facilitate analysis—no cell phones, cell phones for approved tasks, cell phones used with the permission of the instructor, cell phone use limited because of one-to-one

school policy, and no limitations on cell phones/students self-monitor their use. Finally, teachers were asked if they used any apps or digital tools to restrict cell phone usage to specific activities.

Cell phone use was examined in relation to school characteristics taking into account grade level (elementary, middle, high school), public or private school, school type (religious, charter, alternative, magnet, technical), Title I school status, one-to-one school, school size, and civics class size. 86% of the teachers surveyed taught in public schools and 14% taught in private schools. Title I schools receive financial assistance from the U.S. Department of Education and are designated as "schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards" (U.S. Department of Education, 2018). 49% of teachers in the study taught in Title I schools. One-to-one computing in schools (also known as 1:1) is defined as "all students have 24/7 use of an Internet-connected digital device, primarily laptops and tablets" (Bentley, 2017). Students in one-to-one schools are expected to use the devices both in an out of class. 58% of respondents taught at one-to-one schools. The survey also included measures of teacher characteristics, including their gender, age, highest degree earned, number of years teaching civics, teaching specialty (adult education, English language learners/English as a second language (ELL/ESL), special education, incarcerated students, vocational school, pre-service, Native American students), and whether they taught an AP or honors civics, social studies, or American government class.

The Debate Over Cell Phones in the Classroom

Even after decades of dealing with the issue, teachers hold vastly different views about the propriety and effectiveness of cell phones in the classroom. The issue is contentious, with teachers, school administrators, and students staking out strong positions. There is no easy answer to if and how cell phones should be used in schools. Arguments both pro and con for integrating cell phones into the curriculum are compelling. Schools often engage in a balancing act as they figure out the best way forward.

Proponents cite the advantages of learning with cell phones, including their ready availability, ease of use, the ability to customize content and personalize student experiences, and the potential to provide a holistic learning experience (West, 2013). Cell phones make it possible for students to quickly access information that is pertinent to class discussions and assignments. They can offer an antidote to students' lack of attention by facilitating active learning through educational learning apps, incorporating digital platforms into lessons, using social media and message boards to share thoughts and ideas, and supplementing lectures with digital materials. Students can use cell phones to communicate with teachers and peers, collaborate on projects, and work effectively in teams (Gikas and Grant, 2013; Kim, Lee, and Kim, 2014). Cell phones enable students to engage in seamless learning as they move from the classroom to outside environments.

The adaptive use of cell phones in the classroom can enhance social and emotional learning (SEL) that is important for productive engagement in civic life. SEL is defined as "the process through which people acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show

empathy for others, establish and maintain positive relationships, and make responsible decisions" (Atwell and Bridgeland, 2019:5). SEL skills developed in the civics classroom include the ability to handle conflict constructively, engage in perspective-taking, make responsible decisions, and handle changing situations effectively. Teachers can guide students in using cell phones to help them identify issues, asking questions, uncover facts, and thoughtfully converse on digital platforms with classmates who hold divergent views.

Empirical evidence of the positive influence of cell phones specifically, as opposed to digital devices more generally, is limited. Cell phones used for situated learning where students have greater control over their own learning goals and instructional pace can increase motivation to learn (Jones, Scanlon, and Clough, 2013). Integrating cell phone use into the high school curriculum has been demonstrated to positively impact students' tendency to collaborate and communicate with their classmates. It contributes to students' engaging in high-order learning, such as problem solving and critical thinking (Hwang, et al., 2017). Instant messaging apps on cell phones used in the classroom have been shown to positively effect collaborative learning processes and outcomes, facilitate teamwork, and enhance social interactions (Kim, Lee, and Kim, 2014). Students using cell phones in class could identify more content and make more sophisticated critical evaluations relevant to lessons while experiencing less boredom (Harley, et al., 2016). Further, teachers' ability to text parents about students' homework assignments and progress has been shown to improve attendance, classroom behavior, and test scores (Fryer, 2013; Bergman, 2015).

Opponents argue that any benefits that cell phones in the classroom may accrue are outweighed by the distractions and interruptions they create. Some teachers report that they experience "technological terror" when entering the classroom, especially when students become uncivil when asked to pay attention (Gilroy, 2004). Students check their cell phones at school on average eleven times a day (Oxford Learning, 2019). Many students are constantly on their phones, unable to put them away, and create disturbances when trying to hide them while texting friends, surfing the web, posting to social media, or playing games during class time. Ringing phones, cyberbullying, sexting, and cheating are other barriers to the use of phones in the classroom (Thomas and Munoz, 2016). Further, students' physical and psychological attachments to cell phones can cause emotional strains that distract from learning (Klein, 2019).

Critics contend that simply providing technology to students without sufficient attention to teacher professional development, implementation, and staff support does not improve teaching and learning. The successful implementation of cell phones in the classroom requires substantial effort on the part of teachers, who must revamp their pedagogies to fully integrate the technology. Differences in the technological competency of teachers and students in using cell phone features can result in frustration and create barriers to effective learning (Ozdamli and Uzunboylu, 2015).

Cell phones have the potential to promote individualized learning, where students work independently on problems at their own speed. However, overreliance on digital devices can impede learning, especially when the devices drain classrooms of the communal aspects of learning, create a disconnect from face-to-face activities, and substitute for teacher-student interactions (Jackson, 2009; Wexler, 2019). Many instructional programs are not truly

interactive, but simply repeat concepts that students may find difficult to comprehend. Relying on such teaching tools may be ineffective in the civics classroom, where many of the core concepts, for example democracy, separation of powers, federalism, and social contract, are abstract and complex. Students may memorize a definition but fail to understand what it means. A report from the Organization for Economic Cooperation and Development (OECD) articulates the importance of good teaching practices in a tech-heavy instructional environment:

> If students use smartphones to copy and paste prefabricated answers to questions, it is unlikely to help them become smarter. If we want students to become smarter than a smartphone, we need to think harder about the pedagogies we are using to teach them. Technology can amplify great teaching, but great technology cannot replace poor teaching (OECD, 2015: 4).

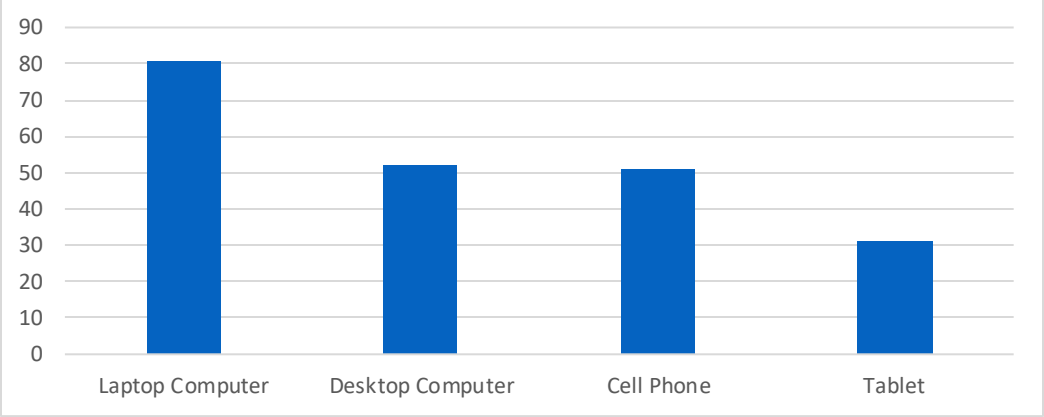
Some teachers, especially in resource-strapped schools, see cell phones as a surrogate for one-to-one devices when they have limited access to laptops and tablets. Cell phones can be helpful for filling in gaps on days when computers and tablets are not available to students (Graham, 2020). Advocates of one-to-one computing emphasize that providing access to technology to all students in a school levels the academic playing field and diminishes the gap between high-need and privileged learners. One-to-one computing encourages teachers to update and transform classroom pedagogies, provides the opportunity for innovation by both teachers and students, and allows for personalized instruction (Bentley, 2017).

A justification for the use of cell phones in schools is that they can bridge the technology gap between high-need and advantaged students and thus lessen the disparities in academic outcomes. The limited number of studies investigating the effectiveness of learning through mobile devices on low-income and underserved students have yielded mixed results. Some research suggests that cell phones can improve educational outcomes in developing countries where access to computing devices in schools is inadequate (Valk, et al., 2010). There also are indications that when teachers receive adequate professional development and support, high-need students who use mobile devices to access online content, create learning artifacts, and engage in personalized instruction experience academic growth and empowerment (Mouza and Barrett-Greenly, 2015). However, research in the U.S. and abroad gives little indication that teaching with digital devices, including cell phones, does much to bridge the knowledge and skills divide between advantaged and at-risk students. In fact, it may exacerbate it. Studies find that at-risk students, especially in high school, end up spending more time on cell phones when they are used in the classroom than their more privileged counterparts, as teachers in under-resourced school strain to educate struggling students (Wexler, 2019). Vulnerable students often do not receive sufficient instructional guidance when using phones, become frustrated, and ultimately fall behind (OECD, 2015; Wexler, 2019). Further, support for using cell phones for instruction with special needs students often is lacking (Oxford Learning, 2019). ELL/ESL students are better served by interacting with a live teacher who can communicate with them directly, share ideas, and correct errors on the spot than by interacting with a cell phone (Gikas and Grant, 2013).

Teacher Support for Cell Phones

Our study reinforced trends identified by Gallup showing that 96% of teachers support the use of digital tools in the classroom (Busteed and Dugan, 2018). Almost all the civics teachers (98%) responding to our survey used digital learning tools, defined as any learning aids used by educators and students that employ digital technology, in the civics classroom. Laptop computers (81%) were overwhelmingly the most common device used to support the use of digital tools for instruction. Tablets (31%) were used in the smallest percentage of classrooms. Desktop computers (52%) and cell phones were employed at nearly the same rate. 51% of teachers in our study reported that their students used cell phones for learning in their classrooms. (See Figure 1.) Of teachers who used cell phones for civics instruction, 5% did so in every class, 18% in most classes, and 77% in some classes.

Figure 1
Devices Used in the Civics Classroom



Cell Phone Policies

Students first began bringing cell phones to school in the 1990s, although they were rarely used for learning purposes. At the time, cell phones largely were considered a distraction that impeded learning. Many schools instituted policies to ban or severely limit their use on school grounds. In 2009, cell phones were banned in 69% of classrooms nationwide (Thomas, O'Bannon, and Bolton, 2013). Within a few years, teachers' attitudes toward cell phones began to shift as they weighed the advantages of student motivation and engagement against the detriment of distraction. Policies were modified or lifted by some schools as students' use of cell phones became ubiquitous and smart phone technology increasingly supported educational functions (Thomas and Munoz, 2016). In the wake of the Columbine school shooting and other tragedies, parents wanted their children to have access to cell phones in case of emergency (Earl, 2012). Today cell phone policies are still very much in flux. Some schools that had instituted more relaxed cell phone policies have been moving more recently to implement greater restrictions as concerns about sexting, cyberbullying, and phone-assisted cheating on tests have increased (Klein, 2019; U.S. Department of Education, 2019). A ban on cell phones in the classroom instituted in Ontario, Canada, in 2019, was apparently supported by 97% of parents, students, and teachers consulted (Rodrigues, 2019).

Schools face a difficult task in establishing policies for cell phone use in the classroom. They must weigh the benefits of the technology's instructional affordances against the distraction that cell phones can create for students. Policies run the gamut from zero-tolerance rules, no-phone zones, moderate use during defined periods and for specified purposes, and no restrictions. Some schools require students to place their cell phones upside down in plain sight on the desk. Others have students deposit their phones in pocket charts, cassette holders, and phone "hotels." Complex arrangements that attempt a compromise have been suggested, such as the "30 4 30" plan where students get a digital break every 30 minutes to use their phones for 30 seconds after which the phone is physically stowed (Grafwaller, 2018).

An April 2019 survey by Common Sense Media found that 80% of schools implement some kind of cell phone policy, but that 25% of teachers find them hard to follow (Rideout and Robb, 2019). High school teachers find it especially difficult to follow and enforce cell phone rules (Klein, 2019). In schools where cell phone policy is left up to teachers, students may experience several different cell phone policies in a single day. While many school administrators admit that it would be easiest to ban cell phones altogether, they are reluctant to institute restrictive cell phone policies, especially as the administrative hassles associated with regulating and enforcing policies are substantial.

Civics Teachers and Cell Phone Policies

In our study, teachers responded to an open-ended question that asked about their policy for in-class cell phone use. The responses were initially hand-coded into twelve categories plus "other" that were collapsed into five categories that encompassed most of the responses. The categories are: 1) no cell phone use/zero-tolerance; 2) used for approved tasks; 3) used with permission of the instructor; 4) limited use because of a one-to-one school policy; and 5) unlimited access/students self-monitor use. Some teachers provided responses that fit into more than one category. (See the Appendix for the initial coding and the number of cases in each category.) In response to a separate survey item, 14% of teachers reported that they used apps and/or digital tools to restrict cell phone usage to specific activities.

One-third of teachers reported that their school had a no cell phone policy. (See Figure 2.) Some teachers were adamant in their enforcement of the zero-tolerance policy as exemplified by this response: "A student uses his/her cell in my classroom they either get it confiscated or they hit the road." At the other end of the spectrum, only 5% of schools had no limits on cell phone use or allowed students to self-monitor. Some teachers hoped to teach students responsible cellphone use, as indicated by the teacher response: "I allow them to keep their cellphones because I believe they need to learn cell phone etiquette. We work very hard on when cellphones are appropriate and when they are not." Other teachers noted in their response that banning cellphone use was not helpful: "I allow it so long as they can justify the use. It's a waste of my time to ban them completely." Others simply asked their students to self-monitor: "Use it responsibly."

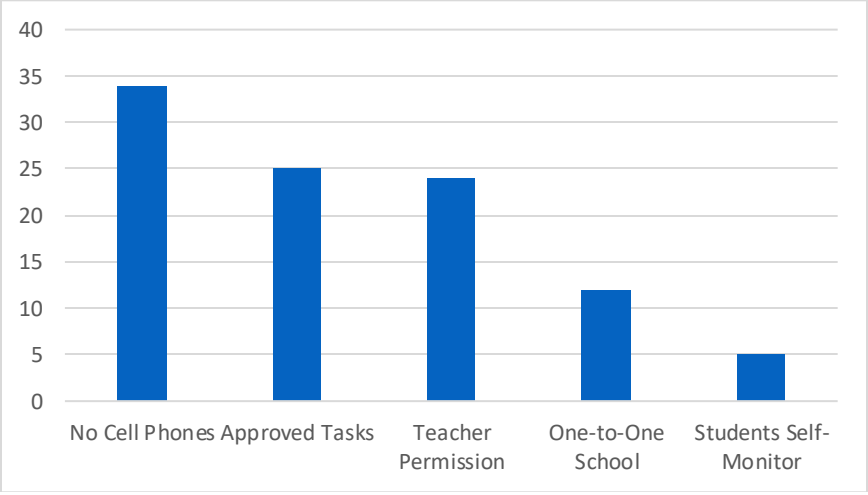
One-quarter of teachers indicated that students could use cell phones for approved tasks. Many teachers indicated that cell phone use was permitted for relevant activities: "Students are allowed to use their cell phones for class related activities." Other teachers noted that in addition

to using phones for class work, students were at times permitted to use their phones to listen to music while working in class: "Cell phones are only to be used for learning purposes or for listening to music while working on an assignment." Additionally, teachers indicated the type of specific approved tasks they deemed appropriate for cellphone use: "only used for in-class research, note taking, or assignment submission."

Another quarter of the respondents allowed cell phones to be used with the permission of the instructor. Teachers indicated that their policy permitted cellphone use with teacher approval, but that cellphones would be removed from student possession if seen otherwise: "Put it away until I give you permission to use it. I will take it if I see it out." Other teachers described their in-class method for approving cellphone use in class: "We use a color code system. If it's on green they may use their phones responsibly, if it's on red then phones must be silenced and placed out of sight and out of mind." Some teachers also gave students the opportunity to check/look at their phones for non-school related activities: "Only to be used when I direct them or for brain breaks."

12% of teachers specifically mentioned that their school supplied students with devices, such as Chromebooks, that they could use in the classroom which would curtail the use of cell phones. Many teachers banned cellphones, noting that students were able to use school-provided computers instead: "Students are not allowed to use personal cell phones in class. Students instead each have a Chromebook - we are a 1:1 classroom." Some teachers were more flexible with in-class cellphone use and allowed students to use their phones for school-related work if their laptop was unavailable: "Students have been issued Chromebooks. We use cell phones only in "emergencies," when students forget their Chromebooks or forget to charge them." Other teachers indicated that they allowed their students to use cellphones in a 1:1 classroom if a certain app/program functions better on the phone: "Students may use their cell phones with permission only. They have a Chromebook, so we use personal phones as a backup only. The only exception is when we play Kahoot. My students think that Kahoot is faster on their phones over their computers, so I let them use their phones."

Figure 2
Cell Phone Policies



Differences in cell phone policy were evident based on school characteristics. (See Table 1.) Over half of elementary school teachers (56%) banned cell phones in the classroom, while nearly one-third (28%) allowed cell phones for approved tasks. Nearly half (45%) of middle school teachers also banned cell phones in the classroom, while 22% allowed them with teacher permission. High school teachers had more varied policies: nearly a third (29%) banned cell phones in the classroom, while 26% permitted their use for approved tasks, and 26% allowed cell phones in the classroom with teacher permission.

Table 1
Cell Phone Policy by School Characteristics

	No Cell Phones	Approved Tasks	Teacher Permission	One-to-One School	Student Self-Monitor
Elementary School	56%	28%	2%	7%	7%
Middle School	45%	17%	22%	14%	14%
High School	29%	26%	26%	13%	13%
Public School	33%	25%	24%	13%	5%
Private School	36%	26%	22%	12%	4%
Religious School	41%	17%	25%	16%	1%
Charter School	39%	17%	29%	9%	6%
Alternative School	50%	29%	18%	0	4%
Magnet	29%	31%	24%	14%	2%
Technical School	17%	46%	11%	6%	20%
All Other Schools	33%	26%	24%	12%	5%
Title I School	38%	25%	22%	10%	5%
Not a Title I School	29%	26%	26%	14%	5%
One-to One School	34%	21%	20%	20%	5%
Not a One-to-One School	33%	30%	29%	3%	6%
School Size					
500 students or fewer	42%	21%	26%	8%	4%
501-750 students	35%	23%	24%	15%	4%
751-1,000 students	31%	22%	26%	16%	5%
1,001-1,500 students	34%	23%	23%	13%	7%
1,501-2,000 students	22%	36%	23%	15%	5%
2,001 students or more	22%	35%	18%	12%	12%
Civics Class Size					
10 or fewer students	42%	23%	25%	2%	8%
11-20 students	36%	26%	24%	8%	6%
21-25 students	37%	19%	24%	16%	3%
26-30 students	28%	24%	26%	16%	6%
31-40 students	31%	35%	20%	7%	7%
40 students or more	39%	27%	15%	12%	6%

All relationships have a χ statistical significance of $p \leq .01$ except public/private school which is non-significant.

There were no statistically significant differences in cell phone policies between public and private schools. However, teacher cell phone policies in the classroom varied for particular types of schools. Half of alternative schools, 41% of religious schools, and 39% of charter schools banned cell phones in the classroom. A quarter of religious schools allowed cell phone use with teacher permission, while nearly a third of charter schools (29%) allowed cell phone use with teacher permission. Approximately a third of both alternative schools (29%) and magnet schools (31%) allowed cell phones for approved tasks. Notably, technical schools permitted cell phones more often than other types of schools. Only 17% of teachers in technical schools banned cell phones in the classroom. Nearly half (46%) of technical school teachers allowed cell phones for approved tasks. 20% of teachers allowed students to self-monitor their cell phone use, a much higher number than for other types of schools.

Teachers in Title I schools (38%) were somewhat more likely to ban cell phone use in the classroom than teachers in non-Title I schools (29%). Approximately a quarter of both Title I teachers (25%) and non-Title I teachers (26%) allowed them for approved tasks. Non-Title I school teachers (26%) were slightly more likely to allow cell phones with teacher permission than Title I school teachers (22%). Similarly, non-Title I school teachers (14%) were more likely to report that their school offered 1:1 than teachers at Title I schools (10%). Title I and non-Title I school teachers indicated that they allow students to self-monitor at similar levels (5%).

One third of teachers at both one-to-one schools (34%) and non-one-to-one schools (33%) banned cell phones in the classroom. Teachers at non-one-to-one schools were more likely to include policies that permitted cell phone use on occasion in their classroom. Teachers at non-one-to-one schools allowed cellphones for approved tasks (30%) more often than teachers at one-to-one schools (21%). Teachers at non-one-to-one schools (29%) were also more likely to allow cell phones with teacher permission than teachers at one-to one schools (20%).

The number of students in a school impacted cell phone policy in the classroom. As table 1 indicates, the percentage of teachers who outright ban cell phones in the classroom decreased as school size increased. 42% of teachers teaching at schools with 500 students or fewer banned cell phones in the classroom compared to 22% of teachers at schools with over 2,000 students. Teachers were also more likely to allow cell phone use for approved tasks in larger schools. 21% of teachers in schools of 500 students or fewer allowed cell phones for approved tasks, while 35% of teachers at schools with over 2,000 students allowed cell phones for approved tasks. Notably, teachers at schools with over 2,000 students (18%) were less likely to allow the use of cell phones with teacher permission than smaller schools. Teachers at schools with over 2,000 students (12%) were also more likely to allow students to self-monitor their cell phone use. Individual class size does not appear to indicate a trend in cell phone policy. However, teachers with 40 students or more (15%) were slightly less likely allow cell phones with teacher permission than teachers with smaller class sizes. Overall, school size, not class size, appears to influence cell phone policy in the classroom.

Cell Phone Access

The availability of cell phones for students is a prerequisite for their use in classroom instruction. Cell phone availability for students during class time is generally widespread. The Pew Research Center reported in 2019 that 96% of 18 to 29 year olds owned a smartphone while the remaining 4% had cell phones. A 2019 study by Common Sense Media found that cell phone access increased markedly from age 8 (19%) to age 12 (69%). Cell phone access was approximately 70% for middle school-aged students and over 80% for high school-aged students. In fact, the percentage of high school students with cell phone access has remained at over 80% since 2013 (Project Tomorrow, 2013). 59% of teachers in the Common Sense Media study reported that all of their students had access to cell phones. While most students, especially in high school, have access to cell phones, a significant gap exists in smart phone ownership by teens in lower versus higher income families (Rideout and Robb, 2019; Project Tomorrow, 2019). There also is great variation in the features available on cell phones which can create a disadvantage for students who have less sophisticated devices. Stable connectivity is another requirement for successful integration of cell phones in the classroom which may be difficult to attain at poorly resourced schools (Anshari, et al., 2017; Hwang, et al., 2017).

Access in the Civics Classroom

In the present study, 67% of high school teachers indicated that all students had cell phones available to this during class compared to 35% of middle school teachers and 48% of elementary school teachers. (See Table 2.) This finding comports with the general trends in cell phone access by age and grade. The lack of universal access to cell phones in schools serving high-need students was reflected in our study data. 51% of teachers in Title I schools with high percentages of low-income families reported that all of their students had access to cell phones compared to 67% of those in non-Title I schools, representing a 16-percentage point technology gap. The disparity in students having access to cell phones was especially apparent for public schools, where 56% of all students in civics classes had cell phones, versus 81% in private schools, or a 25-percentage point gap in universal access.

Teachers in one-to one schools (63%) were more likely to report that all students had cell phones than those in schools where students were not all assigned a device (54%). This finding is consistent with the fact that one-to-one schools often serve more advantaged students who are likely to have access to cell phones and other technology in addition to the devices the school provides (Topper and Lancaster, 2013). There were statistically significant differences in access to cell phones across specific types of schools, with technical schools (90%), religious schools (85%), and magnet schools (74%) having the highest percentages of access for all students. As the subsequent analysis suggests, however, having access to cell phones did not perfectly predict use of cell phones for classroom learning. Religious school students had high levels of access, but the use of cell phones for instruction is limited. (See Table 1).

As Table 2 indicates, there are patterns of student access to cell phones associated with school and civics class size, with higher percentages of teachers from bigger schools and those instructing large classes reporting universal access. Around 56% of teachers in schools ranging in size from fewer than 500 students to 1,500 students reported that all of the students in their

civics classes had access to cell phones. The number increased with the size of the school, as 64% of teachers in schools with between 15,001 and 2,000 students reported universal student access to cell phones as did 72% of teachers in schools with over 2,000 students. The relationship between civics class size and student cell phone access was not statistically significant. It is worth noting, however, that a higher percentage of teachers with large classes of over 40 students (69%) reported that all of their students had cell phone access compared to a smaller percentage of those with fewer students in class.

Table 2
Student Access to Cell Phones by School Characteristics

	Access to Cell Phones	Significance of χ^2
Grade Level		
Elementary School	48%	
Middle School	35%	
High School	67%	.00
Public School	56%	
Private School	81%	.00
School Type		
Religious School	85%	
Charter School	59%	
Alternative School	54%	
Magnet School	74%	
Technical School	90%	
All Other Schools	54%	.02
Title I School	51%	
Not a Title I School	67%	.00
One-to-One School	63%	
Not a One to One School	54%	.00
School Size		
500 students or fewer	57%	
501-750 students	55%	
751-1,000 students	55%	
1,001-1,500 students	56%	
1,501-2,000 students	64%	
2,001 students or more	72%	.02
Civics Class Size		
10 or fewer students	62%	
11-20 students	60%	
21-25 students	58%	
26-30 students	62%	
31-40 students	55%	
40 students or more	69%	n.s.

Cell Phones in the Civics Classroom

The issues surrounding the use of cell phones in school generally pertain to the civics classroom. The fact that cell phones can facilitate innovative pedagogies for civics and social studies classes that can engage students has made them an attractive technological tool for some civic educators. Cell phones can facilitate adaptive learning where students can approach complex topics using a range of techniques to improve comprehension without singling out low and high achievers. Wexler provides an example of a civics assignment in a classroom of students with different cognitive skill levels. All students are given a primary source document, such as the Declaration of Independence. However, the assignments can be differentiated as the cell phone technology makes it easier to group students by their ability, give them appropriate tasks, and assess their performance. More advanced writers might compose an essay while others outline key points of the document (Wexler, 2019).

Through their portability and power, cell phones can provide channels of participation that are especially conducive to civic learning (Oxford Learning, 2019). Mobile devices allow students to "learn in place," as they are untethered to a specific location (Berge and Muilenburg, 2013; Jones, Scanlon, and Clough, 2013). Students can use cell phones to collect data, compose photo and video essays, and engage in hands-on projects during field trips that take place off-campus (Kamarainen, et al., 2013). A study of cell phone activities integrated with field trips found that students more fully explored and enjoyably learned about past and present historical locations by contextualizing their visual representations. Students reviewed more relevant content and engaged in greater critical evaluation with less boredom than when mobile technology was not employed (Harley, et al., 2016).

Cell phones can be used to facilitate field work for project-based learning at the elementary, middle, and high school levels. For example, the Center for Civic Education's Project Citizen requires students identify and research a problem in their school or community, develop an action plan, and present a portfolio of their findings to leaders. Project Citizen students can use cell phones to document a community problem, such as a dangerous traffic situation, or conduct interviews with people about their views on an issue of concern. They can use their mobile devices to collaborate with their classmates to develop exhibits for their portfolio presentations.

Incorporating cell phones into the curriculum can help young people develop the skills and disposition that are essential for 21st century citizenship (Kong, et al., 2014; West, 2013), and to engage responsibly and effectively in civic life. They can keep current with news and events, connect to government agencies and officials, and use social media to express their views. Resources, such as the Digital Civics Toolkit, provide teachers with strategies for instructing students in how employ digital media for civic participation. The toolkit offers instructional modules on analyzing civic information online and identifying trusted media sources, navigating diverse perspectives and engaging ideas about civic issues, creating civic content and expressing political opinions, and taking action on civic issues (Harvard Graduate School of Education, 2018).

Teaching Civics Using Cell Phones

Differences in teachers' use of cell phones for classroom civics instruction were evident in our study based on the characteristics of schools. (See Table 3.) The grade level of the school was significantly related to teachers' use of cell phones in the classroom. 48% of elementary school, 35% of middle school, and 67% of high school teachers reported that they used cell phones for learning in their classrooms. The finding that elementary school teachers were more likely than their middle school counterparts to instruct with cell phones may appear surprising. However, there are plausible explanations for this trend. As more elementary school students were sent to school with cell phones, parents expressed an interest in having their children develop appropriate cell phone behavior early in their school experience (St. George, 2017; Rideout and Robb, 2019). In addition, the availability of quality civics applications for elementary grades that can be accessed on cell phones, such as those available from News-O-Matic, Social Studies Friendzy, and iCivics, has been increasing. As civics is not routinely offered as a subject in elementary school classrooms, it may be the case that teachers who provide such instruction may be willing to innovate. Using cell phones to access civics-related content may keep elementary school students more engaged than relying solely on textbook learning.

Public school civics teachers (52%) were more likely to use cell phones in the classroom than private school teachers (41%). This trend was apparent despite a higher percentage of private school teachers than public school teachers reporting that their students all had access to cell phones. Teachers use of cell phones for instruction also varied for particular types of schools. Religious school (34%) and chart school (45%) civics teachers were the least likely to use cell phones in the classroom. More than half of alternative school (54%) and magnet school (64%) teachers used cell phones for learning. Technical school teachers (71%) were the most likely to use cell phones in the classroom. Teachers in Title I schools (47%) were somewhat less likely to report that their students used cell phones for learning than those in non-Title I school (55%). However, there were no statistically significant differences in cell phone use based on whether or not a school served a high percentage of at-risk students as defined by the U.S. Department of Education,[1] including students provided with free or reduced cost lunches, far below grade level, living in poverty, served by Rural Local Educational Agencies, minority students, students with disabilities, English learners, students who are homeless or in foster care, disconnected or migrant students, and incarcerated students.[2] Teachers in one-to-one schools (45%), where all students are provided a digital device, usually a tablet or a laptop, to use for instruction, were significantly less likely than those in other schools (58%) to use cell phones in the classroom.

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[1]The U. S. Department of Education defines high-need students as: "Students at risk of educational failure or otherwise in need of special assistance and support, such as students who are living in poverty, who attend high-minority schools (as defined in the Race to the Top application), who are far below grade level, who have left school before receiving a regular high school diploma, who are at risk of not graduating with a diploma on time, who are homeless, who are in foster care, who have been incarcerated, who have disabilities, or who are English learners." Schools serving 30% or more of students in one or more of these categories are characterized as serving a high percentage of high-need students. https://www.ed.gov/race-top/district-competition/definitions#:~:text=High%2Dneeds%20students%3A%20Students%20at,left%20school%20before%20receiving%20a

[2] These data were not included in Table 2 because none of the differences in cell phone use was statistically significant.

The use of cell phones for civics instruction increased with the number of students in a school. 40% of teachers used cell phones for learning in schools with 500 students or fewer compared to 76% of teachers in schools with over 2,000 students. A similar trend was observed for class size. Teachers who had 10 or fewer students in their classes were far less likely to use cell phones for instruction than those with large classes. Slightly more than 40% of teachers with classes of 20 students or fewer used cell phones in their classrooms compared to 46% of those with 21 to 25 students per class and over 55% of those with classes larger than 25 students. The findings for both school and civics class size were statistically significant.

Table 3
Classroom Cell Phone Use by School Characteristics

	Use Cell Phones	Significance of χ^2
Grade Level		
Elementary School	48%	
Middle School	35%	
High School	67%	.00
Public School	52%	
Private School	42%	.00
School Type		
Religious School	34%	
Charter School	45%	
Alternative School	54%	
Magnet	64%	
Technical School	71%	
All Other Schools	51%	.00
Title I School	47%	
Not a Title I School	55%	.01
One to One School	45%	
Not a One to One School	58%	.00
School Size		
500 students or fewer	40%	
501-750 students	44%	
751-1,000 students	47%	
1,001-1,500 students	52%	
1,501-2,000 students	64%	
2,001 students or more	76%	.00
Civics Class Size		
10 or fewer students	39%	
11-20 students	43%	
21-25 students	46%	
26-30 students	57%	
31-40 students	59%	
40 students or more	54%	.00

We estimated a binary logistic regression model to further examine the relationship of school characteristics to cell phone use in the civics classroom. The dependent variable, cell phone use, was scored 1 if teachers used cell phones for civic learning and 0 if they did not. Grade level was a categorial variable with elementary school as the comparison group. Dichotomous variables were entered for private school (scored 1) or public school (scored 0), Title I school (scored 1) or not a Title I school (scored 0), and one-to-one school (scored 1) or not a one-to-one school (scored 0). School type was a categorical variable with the reference category consisting of schools that were not religious, charter, alternative, magnet, or technical schools. School size and average civics class size were collinear. School size was used in the model as it was a better predictor of cell phone use in the classroom than civics class size.

As Table 4 indicates, grade level, school type, one-to-one school, and school size were statistically significant in the multivariate model. The one-to-one school variable was the strongest predictor in the equation, with schools that do not provide devices for all students being the most likely to use cell phones for instruction. For grade level, middle school teachers were less likely than elementary school teachers to use cell phones, while the opposite was the case for high school teachers. The school type variable was statistically significant in the model; however, only the alternative school and technical school categories were significantly different from the reference category. The Title I school variable approached significance. The private/public school variable was not statistically significant.

Table 4
Binary Logistic Regression Analysis
Cell Phone Use on School Characteristics

	B	Significance	Exp (B)
Grade Level		.00	
Middle School	-.638	.00	.528
High School	.377	.05	1.459
Private School	-.164	n.s.	1.178
School Type		.00	
Religious School	.417	n.s	1.517
Charter School	.018	n.s	1.019
Alternative School	.631	.04	1.879
Magnet School	-.515	.11	.598
Technical School	1.122	.04	3.070
Title I School	.227	.09	1.225
One-to-One School	-.520	.00	.594
School Size	.230	.00	1.259
Constant	-.830	.04	.436
Omnibus Model Chi Square Significance .00 Hosmer and Lemeshow Test Significance .227 Cox and Snell R^2 .116 Nagelkerke R^2 .154			

We examined whether teachers' gender, age, education, years teaching civics, teaching specialty (adult education, ELL/ESL, special education, incarcerated students, vocational school pre-service, Native American students), and whether or not they taught AP or honors courses was related to their use of cell phones in the classroom. There were no statistically meaningful differences based on gender, age, and years teaching civics. However, there were some statistically significant differences in the use of cell phones based on teaching specialty. (See Table 5.) Recalling that half of the teachers in the sample used cell phones for civics instruction, teachers of adult education (84%), ELL/ESL teachers (64%), pre-service teachers (67%), and teachers of Native American students (65%) were significantly more inclined to use cell phones in the classroom. It is important to note that the number of cases in some categories (incarcerated students, vocational school, pre-service teacher) is small, and the findings should be interpreted with care. Teachers of AP (60%) and honors (54%) classes were significantly more likely to use cell phones in the classroom than those who did not teach these courses (46%).

Table 5
Classroom Cell Phone Use by Teacher Characteristics

	Use Cell Phones	n	Significance of χ^2
Adult Education	84%	51	.00
ELL/ESL	64%	80	.01
Special Education	50%	94	n.s
Incarcerated Students	50%	10	n.s.
Vocational School	52%	25	n.s
Pre-Service Teacher	67%	6	.00
Native American Students	65%	40	.05
Teach AP Class	60%	402	
Teach Honors Class	54%	274	
Neither AP nor Honors	46%	551	.00

How Cell Phones are Used in the Civics Classroom

Teachers were asked how their students used cell phones for civic learning. (See Table 6.) Almost all respondents (91%) indicated that students use cell phones to look up information. Nearly 70% reported that students use cell phones to conduct research for class projects. Half of the students used cell phones to communicate with teachers and classmate via a chat app. Fewer students use cell phones for word processing and notetaking (32%) or for accessing social media apps (25%). One-quarter of the teachers indicated that their students used cell phones for other purposes.

Table 6
How Students Use Cell Phones for Learning
(% of those who use cell phones for learning in the classroom)

To look up information	91%
To conduct research for class projects	69%
To communicate with teachers and classmates via chat app	50%
For word processing and notetaking	32%
To access social media apps	24%
Other	25%

Teachers had the opportunity to elaborate on their students' use of cell phones in the classroom by responding to an open-ended survey item, and they reported a range of functions. The most frequent response was that students used cell phones in class to access websites, digital platforms, and apps that support civics quizzes and games, including Quizlet, Kahoot!, USA Test Prep, Inquizitive, Quizizz, Gimkit, Interactive Constitution from the National Constitution Center, SCOTUSblog, Goosechase, iCivics, Schoology, Youth Leadership Initiative, Google Expeditions, and SmartBoard interactive apps, like Shout It Out. Cell phones frequently were used to access classroom management systems, such as Google Classroom, Canvas, PowerSchool, Edmodo, and Infinite Campus, where students could retrieve course materials, readings, videos, PowerPoint slides, Nearpod, and Pear Deck interactive slides, check assignments, study for and take tests, and view their grades. Students accessed e-texts, podcasts, blogs, news sites, and current events via their cell phones. They used cell phone tools, such as the calculator, translators, QR code reader, vocabulary tools, and Noodle tools for documenting sources. Survey tools, including SurveyMonkey and Survey123 with ArcGIS, allowed teachers to poll their classes and to teach students to design and field surveys. Students used the photo and video functions to record class sessions, copy documents from the library, and create digital content for assignments. They worked collaboratively on documents and digital portfolios via their phones. Teachers used cell phones to communicate with students and to conduct formative assessments and testing.

Effectiveness in Achieving Civic Outcomes

Evidence of the effects of cell phone use on student outcomes is limited and somewhat mixed. Findings at the post-secondary school level suggest that integrating cell phones into college classrooms can enhance civic learning, democratic engagement, and development of leadership practices (Biddix, 2010). They also can contribute to the acquisition of skills pertinent to multicultural understanding and global citizenship (Fox, 2019). However, a study conducted by the OECD of millions of secondary school students in 35 countries found that students who used computers heavily at school do a lot worse in most learning outcomes, even after accounting for social background and student demographics (OECD, 2015). Research on the college classroom points to lower test scores on exams among students who were permitted to use cell phones and other electronic devices in the classroom (Carter, Greenberg, and Walker, 2016; Wexler, 2019). Diminished performance may be due to students' divided attention during lectures, social interactions and active, face-to-face forms of classroom learning, and study time as they switch to their cell phones (Glass and Kang, 2018).

Teachers were asked to assess whether they felt that the use digital tools for instruction was effective in conveying civic knowledge, dispositions, and skills. We correlated teachers' use of cell phones for classroom instruction with their views about the effectiveness of digital tools for achieving civic outcomes. (See Table 6.) The findings suggest that teachers, even those who use digital devices frequently in the classroom, are not overwhelmingly convinced that cell phones are effective in achieving civic outcomes. Teachers who used cell phones in the classroom more frequently are more likely to indicate that digital tools are effective for civics instruction. Teachers who used cell phones for learning in most classes perceived that the devices were effective in promoting civic knowledge (57%), dispositions (55%), and skills (54%). Civics teachers who used cell phones in some class were less likely to consider them to be an effective learning tool. They found them to be least effective in conveying civic dispositions (38%), and somewhat more effective in facilitating the diffusion of knowledge (44%) and skills (46%). The views of teachers who did not use cell phones in the classroom were similar to those of teacher who used them in some classes. These teachers were, however, significantly less likely to believe that cell phones were effective in conveying civic skills.

Table 6
Teachers' Perceptions of the Effectiveness of Cell Phone Use on Civic Outcomes

	Effective	Not Effective	Significance of χ^2
Civic Knowledge			
Most Classes	57%	43%	
Some Classes	44%	56%	.00
No Cell Phone Use	46%	53%	
Civic Dispositions			
Most Classes	55%	45%	
Some Classes	38%	62%	
No Cell Phone Use	39%	61%	.00
Civic Skills			
Most Classes	54%	43%	
Some Classes	46%	57%	
No Cell Phone Use	36%	64%	.00

Conclusion

The debate over the use of cell phones in the elementary and secondary school classrooms persists thirty years after the devices appeared on campus. There is little consensus about cell phone policies, which vary widely from school to school and classroom to classroom. The responses of the civic educators we studied reflected the broader controversy over cell phone use during instruction. One-third of teachers reported that their schools banned cell phones, half allowed cell phones to be used for approved tasks or with teachers' permission, and only 5% had no restrictions. While there is near universal agreement among civics teachers about the importance of digital tools for learning, the propriety of using cell phones to access these tools is highly contested. Still, half of the teachers in the study used cell phones when instructing their civics, social studies, and American government classes.

An argument for introducing cell phones into the classroom is that the technology is ubiquitously accessible. Cell phone use has been suggested a mechanism for narrowing the academic chasm between disadvantaged and privileged students. Evidence from the scant extant research examining this claim is mixed, especially with regards to improving student learning outcomes. The present study raises some doubts about deploying cell phones as a substitute for laptops, desktop computers, and tablets, especially as access issues persist. While one-third of teachers reported that not all their students had access to cell phones for learning, the highest percentage was among teachers in Title I schools. Consistent with this finding, a smaller percentage of Title I school teachers used cell phones for civics instruction. At the same time, teachers in one-to-one schools, where each student is issued a device, were the least likely to use cell phones in their civics classes.

This exploratory examination has revealed trends about the use of cell phones for civics instruction that suggest avenues for further research. Studies that specifically examine cell phones in the classroom, as opposed to other digital devices, are limited despite the fact that phones are used as often as desktop computers and are more prevalent than tablets. The unique characteristics of cell phones, such as their size and portability, as well as students' attachment to the devices and their skill in using them, warrant more intensive investigation into their presence in the classroom. Our study taps into the myriad ways that teachers are using cell phones for civics instruction. A deeper dive is warranted into exactly how cell phones are used at different levels of instruction, in particular types of schools, and in classes of different sizes. While high school teachers were the most likely to report that they used cell phones in the classroom, the devices also were used by a sizable number of elementary and middle school teachers. Differences were apparent in extent to which cell phones were used for civics instruction in specific learning contexts, as evidenced by the 70% of teachers in technical schools whose students learn with cell phones as opposed to the 34% in religious schools. Teachers in big schools with large classes, where resources may be stretched, used cell phone more often than those in smaller schools. These trends point to a need for greater specification of the best practices and pitfalls of using cell phones in various educational settings. Finally, this study provided a glimpse into teachers' perceptions of the effectiveness of cell phone use on students' acquisition of civic knowledge, dispositions, and skills. It revealed that a healthy percentage of teachers who use cell phones in most or some classes perceive that phones are not effective in achieving civic outcomes. This finding alone begs further explication. Even more essential is empirical research that objectively assesses the impact of cell phone integration into the civics classroom on student outcomes.

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APPENDIX

Cell Phone Policy

CODE		Number of Cases
1	No cell phone use/Zero-Tolerance	437
2	Use in case of emergency	9
3	Students turn in phones/phones are collected/stored in lockers, wall pocket, etc.	84
4	Infrequent use	43
5	Used when appropriate for specific/approved tasks	386
6	As directed by/with permission of the instructor	353
7	Tracked by Pocket Points or other app	8
8	Students self-monitor use	30
9	Unlimited access/No Formal Policy	18
10	Still being debated	2
11	Students have Chromebook or 1 to 1	161
12	Used during approved times for personal use	17
13	Other	31