

Technology

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For a list of all the ways technology has failed to improve the quality of life, please press three.

—ALICE KAHN¹

Of all my technologies, my smartphone probably brings with it the most blessings. I am ever appreciative that its map applications can guide me and my car to my destination with suggested routes if traffic piles up. It streams whatever music I choose and pulls up e-mails so I can be productive even at red lights. The apps, sites, and programs allow me to explore cities around the world within seconds. It delivers to me online gifs and memes that make me laugh, and I have even built meaningful professional relationships through its social media platforms. In my classes, the collaborative, digital, and virtual capabilities allow me and my students to transform our learning in innovative ways. Sometimes I sit back in admiration and warmly think, *thank you for being there, right in my pocket, whenever I need you.*

But, as in some relationships, the burdens—individual and social—become evident with time and reflection. I rely on my smartphone and when things are not working, I get frustrated quickly, particularly if a room full of students are waiting on me to fix the problem. At times, the array of apps can be distracting when I am trying to listen to someone else, fall asleep for the night, or read something longer than a tweet. The ways in which my smartphone beeps at me can cause anxieties when I want calm. And, I know my smartphone sends all my data to a variety of companies who then sell my information off for a tidy profit. I also know that my smartphone was likely created at a monstrous factory in Zhengzhou, China

by workers who make under two dollars an hour with components shipped from around the globe, which upon completion, were then shipped in a Boeing 747 to the United States (Barboza, 2016). At times, I want to technofast and *turn off, find zen, sign out*.

I guess I would describe my relationship with technology, in the lingo of Facebook, as: *it's complicated*. In 2018, our affairs with technologies are some combination of incredible, complicated, and troubling, but too often in the social studies, we approach the topic with a dispassion that accepts technologies on their terms, not ours. In this chapter, I am hoping to start a conversation about how social studies teachers might teach with and about *technology* so our students might make its uses and effects more compatible for democracy.

CH-CH-CH-CH-CHANGES (TURN AND FACE THE STRANGE)

Just like the apps on my smartphone, the word *technology* requires periodic updates. The term is rooted in the Greek *tekhnologia* and Latin *technologia* to “describe a systematic study of the arts or the terminology of a particular art” (Williams, 1976/1983, p. 316). This definition may seem strange when contrasted with the ways technology is often talked about in education today: “My technology isn’t working”; “Our district needs to keep up with changing technology”; “I learned about new technology at the conference.” The contrast between classical and contemporary uses of the term suggest changes across peoples, places, and points in time. Raymond Williams outlined at least three historical variations of *technology*.

The first variation dates to the 1st century and relates to the definition I just shared: *techno-* as a useful art (i.e., *technics*), systematic study of a topic, or the terminology of an art or craft that uses *technical* language. In describing craft or manufacturing skills, the term was often used in contrast to the fine or performing arts. Technology and art may seem to make strange bedfellows to us today, but the past is a foreign country (Lowenthal, 2015). For example, people of medieval societies did not view the world through binary or mathematical lenses that divorced technology and art as contrasting ways of seeing the world. Instead,

...the Earth was considered a living being, and the human artisan was an assistant or mid-wife to nature. Metals grew in the womb of the Earth. The miner, smelter, metalworkers and goldsmith engaged in the sacred tasks of helping nature reach perfection.... (Briggs & Peat, 1999, p. 148)

The objectivity of the scientific revolution and the efficiency of the industrial revolutions ushered in modernist worldviews and, consequently, uses of technology of which are more familiar today. Prior to the 19th century the term was lightly used in English, but this era saw technology represented as the practical application

of sciences like medical *technology*. Just as the printing press divorced words from their speaker, *technology* shifted from skilled method or jargon toward invented objects that exist separate from ourselves. Finally, the 20th century saw the rise of *technocracy* where government is run not by elected officials but specialized experts solving disjointed *technical* problems (see Postman, 1992 for more). Educators are intimately familiar with top-down directives of technocratic “experts” (rarely educators themselves) who aim to settle the social studies certification requirements, state standards and tests, and curricular frameworks and structures.

DEEP IN THE TEKS OF TEXAS

As these shifting and intertwined definitions suggest, the history of this keyword is about much more than the newest gadgets and gizmos. While students in some social studies classes may learn the *techniques* of historians or research *techniques*, they primarily learn technologies as objects from the past (e.g., cotton gin, telegraph) and present (e.g., tablets, interactive whiteboards). Take the official high school standards known as the Texas Essential Knowledge and Skills for Social Studies, (un)affectionately TEKS, that make mention of the prefix *techno-* in some form sixty-seven times (Texas Education Agency, 2010). Of these sixty-seven uses of *techno-*, I coded² forty-eight as pertaining to technologies (definition 2), three as techniques (definition 1), and none that touched upon technocracy (definition 3). Taken together, the TEKS tell a story not only of technologies as inventions and objects, but they convey a narrative of technological progress.

These standards primarily present technologies as positive by directly pairing *technology* with *innovation* (14 times³) or discussing technologies in terms of advancements, developments, or improvements to standard of living or quality of life. In 19 instances, references resided in what I considered neutral sentences that asked for descriptions, impacts, or effects of technology, or mentioned the term as part of a laundry list of considerations. There is not a single reference in the high school standards that specifically encourage students to critically consider negative effects and uses of technologies in the past or present. The TEKS for sociology and financial literacy do not even make reference to the term. The former is probably the discipline most inclined to ask critical questions about the effects of technologies on society and the latter is a field with digital banking, hacking, and currency. Students who study technologies as the TEKS present them will have little preparation in asking important questions about technologies in the present.

The narrative of technological progress presented in the TEKS is a familiar one that I have seen in my years as a social studies classroom teacher and teacher educator. While some teachers and students may abstain from using specific emerging technologies, they usually give in if others use them, a department adopts them,

or their institution buys them. The textbooks, educational technology conferences, and tweets I have viewed within and beyond the social studies collectively tend to look back into the past with a sense of nostalgia for the inventors, inventions, and associated benefits. And, the nostalgia is understandable. These technological innovations contribute to quality of life amenities many of us can hardly imagine living without (and others can hardly imagine living with). Technologies have unquestionably led to progress in some areas for some people. The problem with narratives of technological progress is not what is included, but what is excluded.

In an effort not to maintain a narrative of technological progress, the authors of the TEKS were forced to bend the wording of the standards in strange ways. There are no cases in the TEKS where students are asked to consider a negative aspect of technology even when such effects are obvious and important. For example, students are expected to learn “of significant technological innovations in World War I such as machine guns, airplanes, tanks, poison gas, and trench warfare that resulted in the stalemate on the Western Front” (n.p.). This standard takes dubious historical and moral stances. First, the standard directs our historical gaze on the military outcome of the Western Front with no mention of the impact of these “innovations” on soldiers, civilians, and societies. Second, by labeling these technologies simply as “innovations,” the standard authors do not seem to want us to deliberate on the technoethics of using such technologies in warfare. Asking such historical questions might cause students to ask similar contemporary questions about the use of unmanned drones or other technologies administered by their governments in the present. Instead, the message seems to be, *Invent things. Use them. Move forward.* Don’t stop to ask questions.

Do we not think the soldiers who battled in trench warfare as bullets whizzed by their heads asked ethical questions both during and after the war? Are we supposed to believe that soldiers and civilians subject to the horrors of poison gas would describe these technologies simply as “innovations”? How would the narrative change if students were asked whether the use of poison gas constituted a war crime? These questions encourage historical empathy about what is gained and lost with new technologies in the lives of people in the past (Davis, Yeager, & Foster, 2001). They are also questions students are likely to find interesting and valuable. The story the TEKS tell of technological advances and innovations from only positive or neutral places is a boring one where the outcome is determined and human drama, decisions, and intrigue are sucked from history.

That these vital historical and ethical questions are ignored is troubling considering the narrative of technological progress is not a story social studies educators even need to tell. *Invent things. Use them. Move forward.* Our Western culture whispers this story to us relentlessly. It is evident in the planned obsolescence of smartphones and cars; Once iPhone X is released your iPhone 8 Plus suddenly appears dated or your perfectly running car seems inadequate when compared to

newer models. The refrain in schools for more Smart Boards and iPads often lacks evidence, rationale, or plans for how they might improve educational experiences (see Cuban, 1986, 2001). And the ways in which we focus on the immediate benefits of technologies at the expense of associated problems is evident as schools adopt Google tools without consideration of the invasiveness of the corporate collection of students' data (Singer, 2017). This all begs the question, when are students afforded opportunities to question narratives of technological progress?

TROUBLING TECHNOLOGIES: CLONED DINOSAURS, HUMANOID CYBORGS, AND PRECOGS

For better and worse, students gain large quantities of social studies knowledge outside of the classroom. Making connections between teacher lessons and the outside world can help students find, make, and enhance meanings. When it comes to asking ethical questions about technologies, the social studies has much to learn from science fiction. Even though there are plenty of contemporary and historical examples of technological conundrums, science fiction—a genre grounded in assumptions of technological advances—is far more effective at asking moral questions about the role of technologies in our lives. Michael Crichton's chaos scientist Ian Malcolm from *Jurassic Park* (1990) offers a particularly useful model of techno-skepticism⁴. When presented with a theme park of cloned dinosaurs, Malcolm argued that while gaining expertise in most fields requires years of discipline, “scientific power is like inherited wealth: attained without discipline. You read what others have done, and you take the next step ... You can make progress very fast ... There is no humility before nature” (p. 306).

What might it mean to show “humility before nature?” Answering this question requires educators and students to step back from the immediate benefits of technologies, particularly those with means, and consider their downside and unintended consequences. Returning to the language of war, *collateral damage* is not a term that shows up next to “military technologies” in the TEKS. It is a *technical* term used in the military to avoid describing, and thus humanizing, innocent civilians who are injured or die due to imperfect technologies or human error. Of course, technologies and the humans who use them are imperfect, but for those affected, such technical language is likely unpalatable. Instead of engaging in these important ethical dilemmas, the TEKS authors chose a framing where the only effect of poison gas is maintaining a strategic military stalemate.

My point is not to cast judgment on the morality of these technologies or the people using them. The effects around technologies, like my smartphone, are undoubtedly complex, but we must ask the questions. Students and teachers

should take a break from the forward march of technological progress that often defines the social studies and ask questions as science fiction authors do. When I consider the ethics of artificial intelligence (AI) or nuclear war, I vividly recall the ethical conversations between the Terminator, Sarah and John Connor, and Cyberdyne Systems engineer Miles Bennett Dyson (Cameron, 1991). When I hear of preventive crime efforts (e.g., the war on drugs), I consider lessons learned from the case of accused Chief of PreCrime John Anderton from *Minority Report* (Molen, Curtis, Parkes, de Bont, & Spielberg, 2002). All of these science fiction examples—cloned dinosaurs, humanoid cyborgs, and precogs—prompt the same ethical question that should be central to social studies discussions of technoethics, *even if we can, should we?* And if we do accept technologies in our societies, *how* should we use them as individuals and communities?

FOREGROUNDING TECH: TEACHING WITH AND ABOUT TECHNOLOGIES

The overarching question for the remainder of this chapter is, *how can social studies educators teach with and about technologies?* Teaching with *and* about technologies requires social studies educators and their students to first consider, what *is* technology? Just asking this question can foreground the technologies that surround us and spur us to interrogate our complicated relationships with them. Students and teachers should be awakened to see the array of Google tools, computer tablets, lighting, air conditioning and heating systems, beams and girders (that hold up the school), chalk or white boards, cars and pavement outside, and pencils, paper, and books as objects of study worthy of analysis.

When used well, technologies can allow us to amplify or transform educational activities, but they are almost always accompanied by a downside. Technologies like Google Earth or Expeditions offer obvious transformative benefits as they allow classes to digitally explore much of the world in ways that were impossible until recently, but they also threaten privacy and support unwanted surveillance. Similar to the TEKS, educators can tend to skip over important technoethic questions like, *should anyone in the world be able to see in your backyard by pulling up Google Earth on their smartphone or computer?* Yet, emerging technologies can be exciting. I love exploring street views of cities from around the globe during geography lessons with students. Students often need help understanding the excitement that surrounded emerging technologies of the past because they seem commonplace now. For example, Roberts and Butler (2014) explain how teachers are often surprised to read the following 1827 evaluation of the newest school invention, the chalkboard:

It is surprising and delightful to see the interest which it kindles in even the dullest scholar. By rousing the curiosity and holding the attention beyond all other means, it would almost completely banish that weariness which makes a schoolhouse a place hated to so many children and that *listlessness* and *idleness* which renders that time spent there so often worse than lost.... (As cited in Schechter, 2010, p. 32)

When we think of technologies in terms of their affordances (what a technology allows us to do) and drawbacks, we become less susceptible to educational fads. The chalkboard extended the visual field of students and teachers to include a shared place to write and read. Instead of solely relying on orality to convey ideas with each other, the chalkboard allowed teachers and students to easily display symbols, figures, and drawings to the entire class. However, as technologies give, they also take away.

An interesting corollary for today's chalkboard is Google documents, a web-based Word processor program that allows for multiple users to edit text synchronously or asynchronously. Like the chalkboard, Google docs can afford a shared learning experience, but it can come at the expense of the physical presence of sharing a common space or field of vision. Particularly in a one-to-one classroom where students all have individual computer tablets, students can narrow their gaze to the Google doc without looking at their fellow collaborators. In an age with nearly ubiquitous devices, where, why, and when students focus their attention should be an educational priority (Rheingold, 2012). Teachers can develop mindful policies with students for how and when class participants should focus on their devices and when they should turn and give attention to those with whom they share a physical space (Levy, 2016).

Teaching *about* technologies is challenging because if technologies are familiar, common, or relatively old (like the chalkboard), we tend to take them for granted. Teachers and students can often have vastly different experiences with technologies, particularly as they reflect on the technologies introduced during their lifetime or those which defined their youth (e.g., portable CD players and Nintendo Entertainment System in my case). Understanding what life was like before a particular technology or the role a technology played in youth culture can offer rich content for investigation. The NCSS (2010) Themes, which include numerous provocative questions in the "Science, Technology, and Society" section asks, *is new technology always better than that which it replaces?* Educators are wise to open the floor to students' questions, concerns, and ideas about technologies and their effects in the past and present. Social studies educators can encourage investigations of the various technologies present in their school and consider: *Who invented it? When and why did they do so? For what purposes is it used and how have they changed over time? What are its intended and unintended consequences? Who has access to this technology and does it privilege any particular group?*

Similar to the TEKS, students can passively view technologies as neutral, especially those invented in the distant past. To see a technology as mundane as the chalkboard as once innovative requires students to practice historical perspective and consider why an invention was disruptive at the time of its introduction. Considering what would be different in the absence of familiar technologies can be an effective and creative way to interrogate them. This might be accomplished by technofasting from commonly used technologies like social media and taking stock of how it changes our days (Damico & Krutka, 2018). Students can also examine obsolete technologies within their school, at local museums or via online exhibits, or bring them from home. Educators can assign students to create a classroom museum of technologies accompanied by information that answers the questions I offered at the end of the previous paragraph. Foregrounding the technologies around us and our experiences with them offers one way toward preparing students to ask important and ethical questions about *technology* as citizens in a democracy.

DISCERNING TECHNOLOGIES: BURDENS, BLESSINGS, AND CONTROL

Discerning among technologies, their effects, and whether and how they might serve the common good has never been more important than in the present because technologies have never arrived, spread, and shifted cultural practices with more speed than in the present era (Thomas & Brown, 2011). People and cultures used to be afforded generations to adjust to major technological innovations, but that is not the case now. As Mark Helmsing and Annie Whitlock point out in addressing *time* in this volume, we even rush to name generations, which can lead to mythical concepts that describe youth as *multitaskers* and *digital natives* without much evidence (Kirschner & De Bruyckere, 2017). Technological pessimist Neil Postman (1992) argued that when evaluating technologies, we are better off to err toward Ian Malcolm's type of skepticism. However, Postman stated, "it is a mistake to suppose that any technological innovation has a one-sided effect. Every technology is both a burden and a blessing; not either-or, but this-and-that" (pp. 4–5). Two questions will guide our efforts going forward: *What are the burdens and blessings of technologies?* And, *in what ways do we control our technologies or in what ways do they control us?* Attempting to answer these questions require us to challenge assumptions of technological neutrality and illustrate how technologies, often unbeknownst to their inventors and users, change *us* in unforeseen ways.

Discerning the effects of technologies is a challenging task because we cannot view them from afar as objects separate from our uses of them. Individuals and groups can each have different and unique relationships with technologies that

lead to different effects and meanings. Still, we must develop some point of departure for discerning among technologies and their effects. If we consider *how* different technologies change what we can do in the world then we might begin to assign value as to whether, and for whom, technological benefits are worthwhile. Nicholas Carr (2010) categorized technologies in terms of their physical (the first three) or intellectual (the last one) effects:

1. Increase physical attributes: For example, the plow can increase strength, the car can increase speed, or the shield can increase resistance.
2. Enhance senses: For example, the microscope or telescope can increase vision and the microphone can increase sound.
3. Reshape nature: For example, a reservoir can prevent floods and provide water and birth control can reduce unwanted pregnancies.
4. Increase intellect: For example, a clock can change the way people conceive of time and organize their day.

Social studies educators can help students think about the different ways our technologies change our physical and mental capacities. These are important considerations because once a technology enters our culture, we often have little choice as individuals to participate and feel the effects.

A long-standing debate regarding the influence of technologies on human societies centers on the degree to which we control our technologies or they control us. Instrumentalists hold the former position and argue that our technologies are essentially value-neutral and in using them, humans control whether they are used for good or evil. This is the view that tends to be continually reaffirmed by a larger Western culture where almost any new technology passes into society with little resistance. Technological determinists stand at the other end of the spectrum in contending that our technologies are embedded with values that change us. Neil Postman (1992) argued that the United States has adopted the ethics of machines, namely efficiency, objectivity, and the rejection of human judgment. He cites as an example the late 18th-century *technical* invention of grading. He points out how this quantification of human thoughts took hold because of its technical nature and people are now unable to conceive of education without it. This perspective, whether ultimately right or wrong, allows us to step back and reconsider the trajectory upon which technologies take us. In Lance Mason's unsettling of the keyword *media*, he raises similar issues concerning media forms like books, televisions, and social media where he reconsiders *media as environments*.

This theoretical debate has played out throughout history as new technologies supported, challenged, or overthrew existing values and social structures. The famously maligned Luddites were 19th-century English textile workers who challenged the ways that weaving machinery undermined their bargaining

power as skilled workers. Luddites were not anti-technology, but as machines and de-skilled labor replaced their work and marginalized their social roles, smashing those machines became a method to preserve their livelihoods and dignity (Postman, 1992). While the embodied craftsmanship of Luddites was developed through years of sacrifice, the invention of machines to replace that work represented, as Ian Malcolm would put it, the “next step.” While instrumentalists would argue that humans had a choice in how these machines were used, determinists maintain that decisions concerning how to use weaving machineries were already made because, in the long run, our tools control us. We abide by *their* ethics. The English, and other peoples, reorganized themselves around the values of efficiency and profit inherent in the weaving machinery, not the other way around. Moreover, the Luddites offer a rare example of people rejecting the effects of a technology, and in doing so, their name has become synonymous with foolish resistance to technological progress. Social studies educators might ask students, how does the plight of the Luddites compare to contemporary debates about automation technologies, artificial intelligence, or driverless cars? Inventors and early adopters rarely pause to reflect upon the assumptions built into technologies. Social studies teachers might address the ways in which the rise of agricultural techniques and the invention of cars have yielded burdens, blessings, and control which merit interrogation.

An Agriculture of Control

Agricultural “advances,” as the TEKS refer to them, made way for a Neolithic Revolution that occurred, and is still occurring, gradually around the globe and did much more than produce crops; these new techniques carried within them an ethic of human control over the environment. Until approximately 11,000 years ago, all humans lived in nomadic gathering and hunting societies that generally abided by natural principles that governed all species on earth. Like all other species, bands of humans traveled in various geographic regions and succeeded or failed within the opportunities and constraints of the available food sources. However, through advancements in agricultural techniques, agriculturalists took control over nature (e.g., plant crops, domesticate animals) as they built cities with the necessary food surpluses to transcend nature’s limits. The ethic of control inherent in these innovations gave rise to social hierarchies and unchecked population growth as “civilized” agriculturalists assimilated or eliminated “primitive” hunting and gathering “savages” across the globe. Daniel Quinn (1996) argued that agriculturalists invoked a form of “totalitarian agriculture” in which the entire world is viewed as a source for unrestrained and and ecologically unsustainable human expansion. Our narrative of technological progress reminds us to skip over questions about the short and long term downsides of agriculture or what was lost from those nomadic

societies which dominated most of human history. *Invent things. Use them. Move forward.*

A Sprawling Automobile

While new techniques charged agriculturalists with control over their environment, automobiles followed by bringing about more control over more space. The built environment of human cities had always been built around the original form of transportation—walking. Walkable cities and communities have long been defined by density, shared public spaces, and mixed-use neighborhoods where exercise and interaction were inherent in daily living. Daily activities regarding food, work, and play often kept people within walking distance of home. However, the rise of the automobile enabled a restructuring of the human built environment into what Jeff Speck (2013) called America’s worst invention, suburban sprawl. With the help of significant highway investment, the car enabled people to separate from those different from themselves (e.g., white flight, redlining), exacted a larger per person toll on the environment, and contributed to a variety of health maladies. Building cities around cars created a reliance on driving to accomplish daily activities and alienated people from their surroundings. With increased driving and decreased walking, Americans have seen incredible spikes in obesity, diabetes, asthma, car crash deaths, and a lowering of overall lower life expectancies for the first time in centuries (Speck, 2013). If the ethic of the automobile was the individual conquering geographic space then sprawl was the enactment of that ethic. Yet, even though this issue is one of public debate, it is often invisible in official U.S. history curricula that either ignores, or treats as neutral, the urban organization of the first U.S. cities along with the rise of “innovations” like cars, highways, and sprawl without consideration of the intended and unintended consequences.

Both of these cases offer examples of historic technologies in the social studies curriculum that might be further troubled. They are both interesting because imagining life without agriculture or cars yields very different worlds. They are informative because gathering and hunting societies and walkable communities offer lessons about sustainable and healthy communal living that are relevant for the present. They are both relevant because many of us are born into a society dependent on agriculture and cars to the point that most of us have no choice but to participate in the systems that resulted from these technological innovations. Yet, our standards and textbooks often present each of these developments as either positive or neutral whispering to us to accept blessings of each “innovation,” but bypassing burdens or questions of who is really in control. *Invent things. Use them. Move forward.*

LOGGING OFF

In an era of rapid technological change, social studies teachers should help students foreground, discern, and trouble the effects of technologies in the past and present. As technologies become ever more powerful, active and engaged citizens who are able to assess the burdens and benefits of *technology* may be our last line of defense against cloned dinosaurs, humanoid cyborgs, and precogs. By discerning technologies and their effects in the present, past, and future, students might initiate dialogues, habits, and even laws to mitigate the downsides of our beloved smartphones. While I often see my smartphone for the immediate benefits and burdens it brings, I hope we can begin to see our smartphones as a social studies investigation waiting to happen. If our students are to disrupt the drumbeat of *Invent things. Use them. Move forward* long enough to ask questions about where technology is taking us, then social studies educators might need to act a little more like a chaos scientist in a dinosaur theme park and ask: *Even if we can, should we?*

DISCUSSION QUESTIONS

1. How has the term *technology* and related terms changed over time and place, and what can that tell us about the technoethics of societies in the past and present?
2. Identify technologies present in your school, home, or community and answer, what are possible burdens of this technology?
3. Choose several major technological inventions in your curriculum and ask, in what ways do these technologies enhance or diminish our physical or intellectual abilities?
4. Identify historical or contemporary technologies and explore, in what ways would we and our societies be different if these technologies were never invented? What are the blessings and burdens for different technologies? And, in what ways do we control technologies and in what ways do they control us?

NOTES

1. Of the many gifts of the Internet, the endless array of unattributed and misattributed quotes is one I wish I could return. When searching for a possible epigraph I came across this quote, supposedly attributed to Alice Kahn, but I could not verify it. Still, I liked the quote and decided to keep it.

2. Due to the size of the codebook and the nature of this chapter (i.e., theoretical, not empirical), I did not include it in this volume as the TEKS are only meant as an illustrative example. Contact me via electronic mail if you would like to see my data analysis.
3. In the high school TEKS, the term *technology* was directly paired with another word 34 times: innovation 14 times; electronic 6 times; transportation 3 times; communication, computer, current, and military 2 times; information and medical 1 time each.
4. As skeptical scientists, paleobotanist Dr. Ellie Sattler and paleontologist Dr. Alan Grant are also excellent exemplars.

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