THE EFFECT OF CELL PHONE POLICY ON STUDENT ACHIEVEMENT

by

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in

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DEDICATION

I would like to dedicate my paper to two groups of people: the people who have gotten me to where I am today, and all of the children and adolescents that have been negatively affected by the technology of our age. There are many people who help you on your way, like your nameless ancestors that ensured your consciousness is in the body that it is, or people you meet for an ephemeral moment whose one line of dialogue or kindness changed your own mind or heart. But more than anything else, I would like to dedicate this to the group of people that have only ever had the best intentions for me in their hearts – my parents, my mentors, my grandfather.

My parents:

Mom - My life and primary care giver, she planted the seeds that all the good things in my life grew from. Without her, I would be nothing.

Dad – The person that I must continuously learn patience and dedication to detail from. He could outwait the mountains. I still have much to learn from him.

My mentors:

Coach Mike – Hands of stone, mind of steal. People like this are not factory made, they are forged, they are crafted. He was always tough on me when I needed it, even when I didn't know it. I would like to think I am a disciplined person, and that has much to do with his influence on me.

Sab – My teacher, my friend. An analysist and economist. He has taught me more than most people care to know. He has helped me see the world through many different lenses. He continues to challenge me and make me defend myself.

My grandfather:

The man with the purist intentions for me in heart. Every second I have with him is a blessing. One of the brightest men – both intellectually and spiritually. He is always teaching me whether he means to or not, either in direct dialogue, or just in the way he lives. I will never be half the man he is. I thank God I have had the ability to live into adulthood having him in my life.

The Children:

I knew from an early age that my life was meant to be lived in the service of others. The main goal of my research is finding out how I can change my behavior to better help my students. It is important that I find the light, so I can pass the torch on to the generations to come. I have been given so much in my life, and this is the best way I can conceive to return the favor.

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Madara – He helped me craft my methods for my research, and answers every question I have about education and content.

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ABSTRACT

Cell phones and their prevalence in the high school classroom has had disastrous effects on student attention and retention. Problems with cell phones and various forms of social media may have plagued classrooms, but in the wake of the COVID-19 pandemic induced social isolation, these problems have been exacerbated. Four different cell phone policies were tested to see which policy contributed to the highest student achievement on summative assessments. Surveys were conducted on teachers within the school to collect general thoughts on cell phones and cell phone policies in their own classrooms. Surveys were conducted to gather student opinions on cell phones and social media. A Likert survey was given pre and post a metacognitive unit on cell phones/social media, mental health, and circadian science that was taught to see if students changed their beliefs about cell phones and social media once they were presented with the science about them. The results of my study suggests that while no one cell policy to be the best amongst all classes, the policy which made students turn in cell phones but allowed them to charged produced either the largest jump in student achievement comparatively to their last unit, or the least amount of drop in student achievement amongst all classes. Other results include mass consensus amongst teachers with frustration related to cell phones in the classroom, and that students' opinions on how cell phones affect their health and their ability to live life without cell phones can be changed if presented on a metacognitive unit on effects of cell phones and social media on their health.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

Context of the Study

Due to the ubiquitous and extensive use of personal cellular devices, the way we intake information and communicate with one another has been changed forever. The world, and by extension, the classroom, is a fundamentally different place; students have access to information about pretty much anything at the tips of their fingers. Students are also constantly inundated and often mentally preoccupied with their phone which destroys concentration. My question is: How should we modify our classroom management skills, including cell phone policy, to better suit the modern student?

This study is important to my classroom because we are still fairly early in the era of cell phones, so our understanding of the effects of cellphone usage is still limited, and I still have a long time to go in my career. Cell phones are most likely going to get even more sophisticated as I progress, so I would like to look into this issue sooner rather than later. If I can lay some sort of foundation for how to handle cellphones in the classroom, I can help older teachers who are not sure how to adapt, and help younger ones who may not know where to start. This investigation isn't just important research for my classroom, but for all classrooms.

Overuse of cellphones and technology isn't just an issue that plagues classrooms, but the society at large. Most people have experienced the frustration of trying to connect and communicate with someone who constantly accesses their cell phone. If just one or two students are on their phone during class, this can bring meaningful classroom discussion to a halt. If this

happens multiple times a class over multiple days, the long-term flow of learning is disrupted. This is a problem that I have experienced in my own classroom and one that other teachers have described about their own classrooms as well.

Focus Question

Here I attempt trying to develop a cell phone classroom management plan and to determine what their existence means for education in general. My research questions are in Table 1:

Table 1: Research Question Descriptions

Question	Description
1	How should we modify our classroom management skills, including cell phone policy, to better suit the modern student?
2	What is the role of cellphones in the classroom and how do other teachers manage cellphone/internet usage?
3	What impact do cell phones have in my class?
4	How do students in my classroom feel about cell phone usage and prevalence after being faced with the science about cell phones?

CHAPTER TWO

CONCEPTUAL FRAMEWORK

Inspirations and Underpinnings

While we cannot dwell on the past or return to it, not everything archaic is bad. Faced with the uncertainly undulating waves of tomorrow may make us yearn for the familiarity of days gone by, but resistance to change more often than not results in the malfunction of men. In this study, I aimed to address how to balance the tried-and-true methods of the past with modern innovation. My question(s) lie in between past and future, and how much of each should we assimilate into today. I want to learn how technology should be used in education and society at large; I am coming from the basis of life-long learning, not just the one-two years my students spend with me. The ubiquity of personal devices and internet access allows anyone with them to learn things in real time. From the perspective of a student, this posits quite the valid argument of "why should we learn this; if we need it, can't we just learn it later?"

I worked with a population of students, that for all intents and purposes, were academically disinterested. Unlike me, the majority do not like to learn things for the sake of learning things. It has never been easier to pass a class without having to gain any knowledge on the given subject. If students are given access to their phones, they will just look up answers and will not get to know the material intimately. If they are not looking up answers but still have access to the internet, they are either much more likely to be disengaged from classroom activities (Young, 2006) and/or engage in cyber slacking. In a 2010 study it was found that "social norms, multitasking, and cognitive absorption directly and positively influence intent to

cyber-slack" (Gerrow, Galluch, & Thatcher, 2010, p. 17). Social norms refer to the domino effect, if one student sees another student cyber slacking, they are more likely to cyber slack. Multitasking is the use of school-related and non-school-related applications at the same time with the belief that focus can be paid to both. Cognitive absorption in this case is "an internal force that represents an individual's current absorption propensities as derived from their past experience from using Internet technologies" (Gerrow, Galluch, & Thatcher, 2010, p. 9). If the students have no access to their phones, there is a possibility for ensuing anxiety and symptoms of withdrawal from their devices (Cheever, 2014). Most students, and many people for that matter, have not developed skills for regulatory function and mindfulness for moderation. The results of my research are important to me because education is vastly different than even when I started my post-secondary education in 2016. I arguably have more skin in the game than most other teachers, at least in regards to how much time I will spend in the future in education, since I'm only in my second year of teaching. What I find out on my action research project I will apply to the rest of my career.

My main questions were focused on finding out what role personal devices/internet access should play in education, how that roll that effects learning, comprehension, and retention, and finding new methods of classroom management meets the needs of the modern student (given they live in a world of instantly accessible and infinite information). There are major pros and cons to allowing cell phones in the classroom; cell phones can be used as a teaching tool or derail to momentum of a learning environment (Klein, 2022).

A major inspiration for my paper was the work of a MSSE graduate Eric Etter, in which he decided to quantify the effects of cell phones in the science classroom (2019). With the

implementation of a specific cell phone policy, he attempted to display the varying ways the presence of cell phones can affect both student and teacher. The policy gave students the choice of putting their phones away in their backpacks or in a separate charging station, so that the device was physically removed from their vicinity.

The findings of his study were pretty conclusive. It was shown in the study that students who separated themselves from their phone and left it in the charging station achieved higher levels of learning; interestingly, the students who left their phones in their bag did not. Next, it was found that only if the students eliminated the distraction of their phones by placing it in the charging station away from them instead of putting the phone in their bags, did they benefit from the treatment. Eric believes instruction improved due to the fact he did not have to vie for student's attention and could focus on the material. Finally, he said that student-teacher relationships flourished due to the fact the empty moments of class weren't spent in the metaverse, but rather spent interacting with one another.

I wanted to observe the effect that technology had, namely personal devices, in the classroom in a larger and more general setting. The main focus of the study was to investigate how access to personal technology impacted academic performance. There were two hundred and sixteen participants that collected on average 56 days of data using an unobtrusive smartphone application. It was demonstrated that higher executive functioning can result in higher class performance while higher technological anxiety can predict poorer class performance (Rosen et al., 2017). This can be mediated with studying attention and classroom digital cognition.

I think that education and society at large have an overwhelming problem with personal devices and screen time. I read an article in the New York Times that was not based in research, but it did provide a philosophical underpinning for my research (Bowles, 2018). Personal devices are addictive: the article stated that between candy and crack cocaine, cell phones are closer in addictive potential to crack cocaine. While this article was dramatic, I quite liked it. It needed to be dramatic; it needed to feel like a slap in the face. During these last few years, especially exasperated with COVID, we spent so much time discovering what we COULD be doing with screens and technology and we didn't spend enough time asking if we SHOULD be doing it.

I wanted to make sure I had a qualitative portion of research as this is a very personal and students are sure to have opinions of their own. Since personal devices are just that, personal, there was many aspects of this research that were based on qualitative surveys. The study set out to find how many students thought that texting should be used in schools. Seventy-One percent of the two hundred and eighteen students surveyed supported texting in schools (Tulane et al., 2017). They expanded upon how technology could be used to form close social bonds with their peers and they could stay in close contact with their family if necessary. I think this article was beneficial because it is focused on student opinion and not just raw data on performance.

I have always had, and heard of students, that have said that listening to music helps them focus, or helps block out outside distractions. I liked to believe this as true, as I have also preferred listening to music while working than silence. However, it has been shown consistently that silence produces the best results in regards to cognitive performance (Dolegui, 2013). Dolegui also said that if one listens to music while they perform cognitive tasks, they volume of music is more

important than they type. Also, the commonly held belief that classical music boosts cognitive performance is an idealized falsehood.

The well-being of my students is my first and foremost concern, and is a prerequisite content comprehension. There were many alarming data to come out prior to, and even during my treatment plan. While I was in the midst of my cell phone policy treatment, data came out from the Center for Disease Control and Prevention stating that 57% of teen girls felt persistently sad or hopeless, and 29% of teen boys reported the same (2023). Why this wasn't a more talked about issue is still a mystery to me. How much were these reports related to cell phones/social medias usage? Other studies pointed to technology use as a cause of ill-being amongst teens, and highlighted tech's detrimental effects on sleep. Technology overuse can still negatively affect the health of children, preteens, and teens even if they eat a healthy diet and get adequate physical exercise (Rosen et al., 2014). In the same study, it indicated that for teenagers "nearly every type of technological activity predicted poor health." (Rosen et al., 2014, p.1). Sleep is known to be a crucial aspect of health, and in a 2008 study it was shown that "access to social media and especially a cell phone in teenagers' bedrooms is associated with a reduction in sleep time during the school week with negative effects on daily functioning and mood which increases with increasing age" (Royant-Parola et al., para. 1). Our younger generations health has been assaulted on many fronts, and aforementioned studies would lead me to believe technology overuse and access to social media may be the leading cause.

Would students like a world where they couldn't use smartphones? A small experiment suggested yes. A small Bay State boarding school decided that they had enough of smartphones after students were unable to interact properly and outright banned them on campus for the 2022-

2023 school year for both students and staffers (Grace, 2022). Students were given Light Phones, a brand of cell phone that allows for calling, texting, music, podcasts, calculator, and alarms, and were allowed to access social media via laptop computers at the end of the school day if desired. The school had overwhelming social success as students were able to more present in classroom and non-classroom time. The general morale and atmosphere improved.

Just prior to teaching my metacognitive unit on cell phone usage and social media, Bucks County, PA, where I live, decided to sue social media companies over the impact on the kids in its jurisdiction. The county officials cited the Center for Disease Control and Prevention's statistics on teenagers declining mental health as one of the main reasons for their lawsuit. One of the County Commissioners, Bob Harvie, who was a former social studies teacher at my school, and who taught me, said that during his time in the class room that, "I saw as phones became an appendage." The county officials said,

> The complaint alleges that, using mechanics akin to gambling, the platforms manipulate users with 'Intermittent Variable Rewards' (IVRs) that deliver addicting shots of dopamine as users browse continuous, algorithmic, personalized streams of content and advertisements. The suit says the platforms make frequent design tweaks aimed at maximizing screen time and promoting excessive, problematic levels of use (Sofield, 2023).

The county in which I teach acknowledging that cell phones are a problem made my research that much more important and worthwhile completing.

CHAPTER THREE

METHODOLOGY

Treatment

My research plan was multi-faceted. I implemented a new classroom management strategy, a new assessment method, and added a small portion of new curriculum focused on metacognition about cell phone usage. I implemented a variety of cell phone policies in my class to see how that affected student's achievement and moral. I tested four possible policies: (1) Cell phones must be away in bags/pockets and not used during active instruction or work, (2) cell phones must be out and on corner of desk and not used during active instruction or work, (3) cell phones will be collected at the beginning of instruction and given back after instruction and work, and (4) cell phones will be collected at the beginning of instruction and given back after instruction and work, but give the students the opportunity to charge their phones while they're taken away. Each of these policies were implemented over one unit. Each unit varied in length, but essentially was from the ending of one mandatory summative assessment, to the next. This time period varied anywhere from 10-12 school days, but due to our school's schedule (Demographics, pg. 12), the number of calendar days varied greatly. I attempted to find the best method of leveraging their devices against them, to create a synchronous environment where students will get the most out of their education and also enjoy their time in class. The summative assessments were physically recorded and then tabulated digitally using Microsoft Excel. A simplified version of what was just described can be found below:

Table 2: Cell Phone Policy Pattern Scheme

	Unit			
Class	1 Electrons	2 Periodic Trends	3 Bonding/Naming	4 Moles
1st	Wall	Wall +	Away	Table
2nd	Table	Wall	Wall +	Away
4th	Away	Table	Wall	Wall +
Not Used	Wall +	Away	Table	Wall

Table 3: Cell Phone Policy Descriptions

Policy	Description
Away	Phones were placed in either pocket or bookbag
Table	Phones were deliberately placed on corner of desk
Wall	Phones were placed in cell phone holder in corner of room
Wall +	Phones were placed in cell phone holder in corner of room and were allowed to be charged through duration of class

I discussed with my students that I conducted research in the prior school year as a preface for a few lessons on technology and beneficial metacognition that may help them be better students and live better lives. I created a few lessons, some discussing how cell phones lead to lower student success, and some brainstorming sessions discussing our experiences with cell phones and how we view them. There were also more serious lessons including data showing the correlation between cell phone/social media use and teen suicide. Like I said, more so than anything else, this research is for my students, so they have the tools and the knowledge to lead better lives. My metacognitive unit lasted 5 school days. The timing was each lesson was different for each class, as I allowed plenty of time for students to express themselves in classroom discussion. Details of the metacognitive unit can be found in Appendix A.

Instrumentation

I conducted student and teacher surveys as well as student interviews. I had several informal student interviews about cell phone policies. I sent out a survey to all of the teaching staff in my school, which including academic and technical teachers that participated by responding to the Google form. Finally, I took notes, mental and physical, throughout the duration of my treatment plan. I relied heavily on both qualitative and quantitative data for my project. I didn't want to overlook morale in pursuit of results.

I implemented the different cell phone policies on my three Chemistry classes, 49 students in total. I included my environmental science classes for interviews and surveys but did not include them in assessment-based data. I conducted class interviews, and conducted informal smaller group interviews. I used my 11th grade chemistry students for assessment results and in opinion-based research

I included all of the teachers who filled out the survey, and I sent out, a total of 68 surveys to teachers, 51 were academic teachers and 17 technical teachers. I conducted this research over two full marking periods, or half of the school year. I conducted the research over four units, a new cell phone policy for each unit.

I collected data via surveys, student work, and my own notes. Surveys were conducted via Google forms for ease of access for both the surveyor and surveyed. Student work I collected and held onto in folders until I needed to pull the data from it. My own notes are fairly self-explanatory, I used them mainly to not forget key points or specific phrasings of thoughts.

This is my list of question and a matrix showing which methods will be used to answer each question:

1. How should we modify our classroom management skills, including cell phone policy, to better suit the modern student?

2. What is the role of cellphones in the classroom and how do other teachers manage cellphone/internet usage?

3. What impact do cell phones have in my class?

4. How do students in my classroom feel about cell phone usage and prevalence after being faced with the science about cell phones?

Table 4: Research Question Matrix

Research Question	New Cellphone Policies	Metacognitive Curriculum	Teacher Survey Form	Student Surveys/ Interviews	Teacher Notes
#1	X	X	X	X	X
#2	X		X		X
#3	X	X		X	
#4		X		X	X

I have included teacher and student surveys in the Appendix B.

Demographics

The school that I conducted this research at and continue to teach at is the Bucks County Technical High School, located in Fairless Hills. Pennsylvania. As a technical school, we house both regular academic and technical classes on our premises. Students alternate between academics and technical sides, where they also take a gym class and possibly a language, for six-day rotations. This would be six consecutive school days on academic side, and then six days on technical side, then repeat. Ninth and twelfth graders are on academic side first, and tenth and eleventh graders have tech side first. We have a Free and Reduced lunch rate of 44.34% as of the 22-23 school year. In my school, 76% of students White, 14% are Hispanic, 8% are Black, and 2% are Asian. The school provides students with both a good opportunity to attend

traditional four-year university, or enter the workforce immediately using the technical skills they've honed after three plus years in their technical shops. I specifically teach the lower end of student when it comes to motivation and performance. There are three academic levels at my school, Honors, academic, and foundations – I teach the latter. The majority of the teachers at my school are white between the ages of 40-60. We have a few teachers of color, and a few that are LGBTQ+.

All of my instruments have been looked over by my colleague Jake Madara, and other members of my team. I used input from my colleagues and my professor on my research instruments. Triangulation was heavily utilized in research. All of this helped to insure the validity and reliability in my instruments.

This study was approved for exemption by the IRB Board at Montana State University which is located in Appendix C.

CHAPTER FOUR

DATA AND ANALYSIS

Cell Phone Policy and Student Achievement

The results of the cell phone policy testing dictates that no one policy increases student performance more than another, however the class starting the treatment cycle with the worst conceived policy consistently did the worst over all four units. A policy that allows cell phones within both sight and reach, is most distracting, and due to the cumulative nature of Chemistry, is most detrimental as lack of knowledge will snowball causing worsening achievement overtime (Figure 2). Students throughout all classes were more “okay with” and receptive to giving up their phones if they were able to charge them.

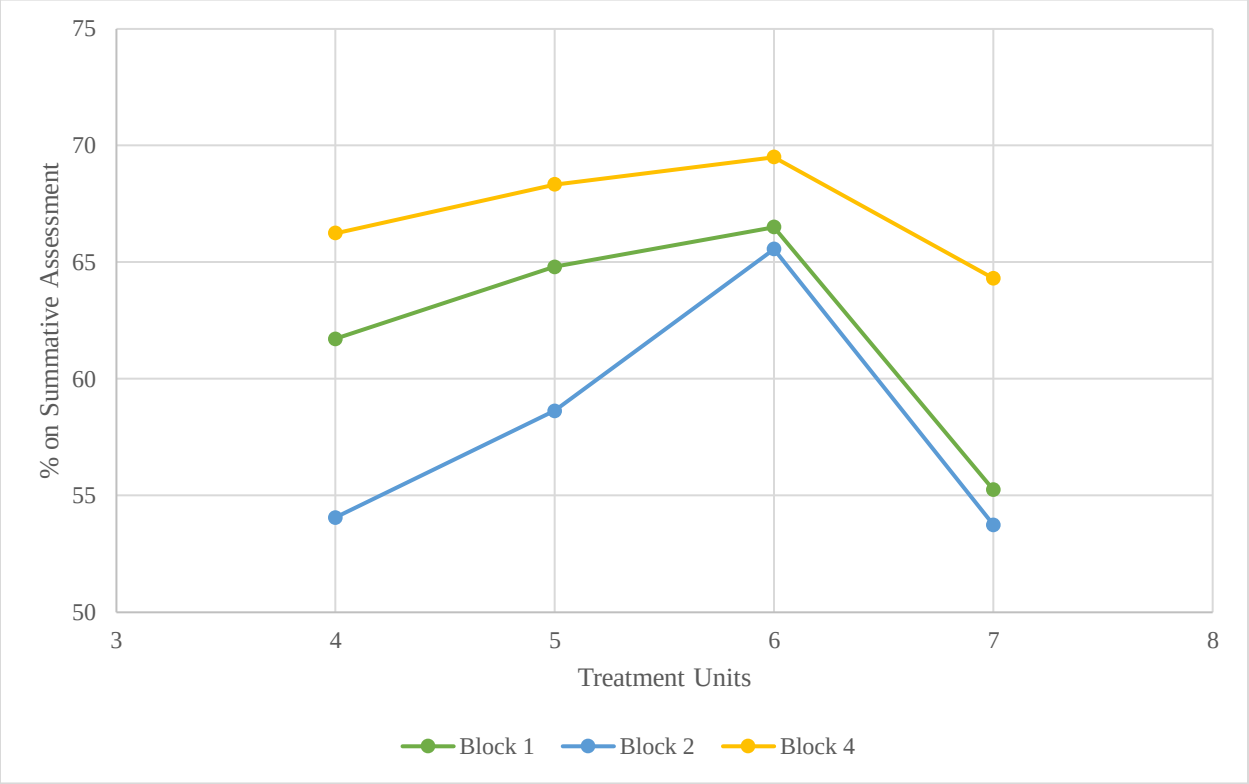


Figure 1: Student Achievement Over Duration of Treatment, Block 4 (*n*=14), Block 1 (*n*=18), Block 2 (*n*=18).

No one policy consistently suggested to be the best amongst all four units for each class (Figure 1), but I noticed that the biggest improvements in achievement were between the wall and wall + policies for each class compared to themselves. Again, the wall policy is cell phones in a cell phone caddy on the wall, but wall+ is the cell phones in the same caddy allowing the students to charge them if they want to. Block One's largest jump was by three percent, and block two's jump was by seven percent. When block four went from wall to wall +, they followed the trend of doing worse, but their drop was much less than the drop of the other two groups. Blocks one and two dropped by 11% and 12%, respectively, while block four only dropped by five percent.

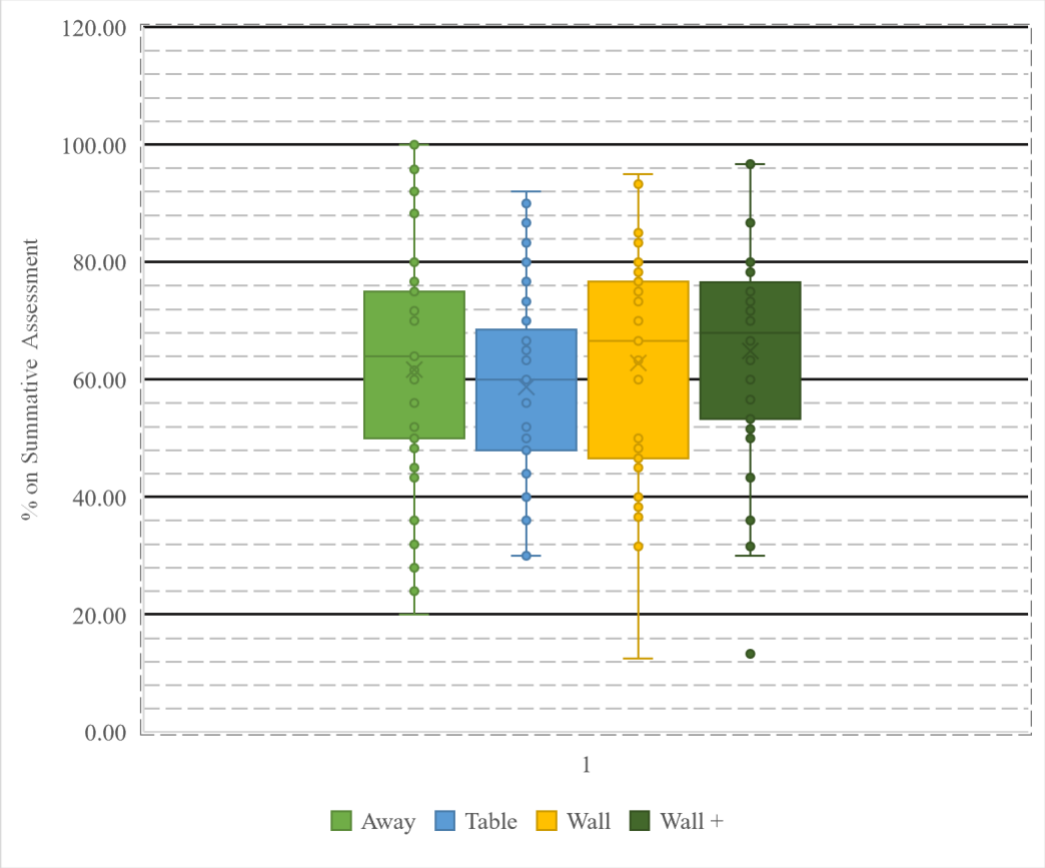


Figure 2: Distribution of Student's Scores by Policy, Away (*n*=43), Table (*n*=46), Wall (*n*=47), Wall+ (*n*=46).

Examining the distribution of student's individual scores with regards to cell phone policy provided more illuminating details. Seventy-five percent of students achieved a 53% or higher during the wall+ treatment, while for other policies 75% achieved at least 50%, 48%, and 46.67% or higher for the away, table, and wall policies, respectively (Figure 2). In all regards, the policy that allowed students to have cell phones out and in front of them contributed to lower student achievement.

Roll of Cell Phones in the Classroom

Academic teachers, in general, are more frustrated with student cell phone use than technical teachers. Out of the academic teachers polled, 78.4% (*N*=51) were frustrated to some degree with cell phone usage in their classrooms (Figure 2). The main sources of frustration are distraction, preoccupancy, and lack of quality of work and work ethic. When asked how cell phones have affected the quality of work from your students, one teacher said “The quality of work has lessened each year seemingly; the lack of focus on the content and lesson is the problem. Phones provide a more ‘fun’ alternative.” Another teacher, describing the shift in classroom dynamic said, “For years, I collected cell phones- best decision educationally. Last year because of COVID I did not and it was hard to monitor not having a set policy and the students did not talk to each other at all. It was eerily quiet- I hated it.”

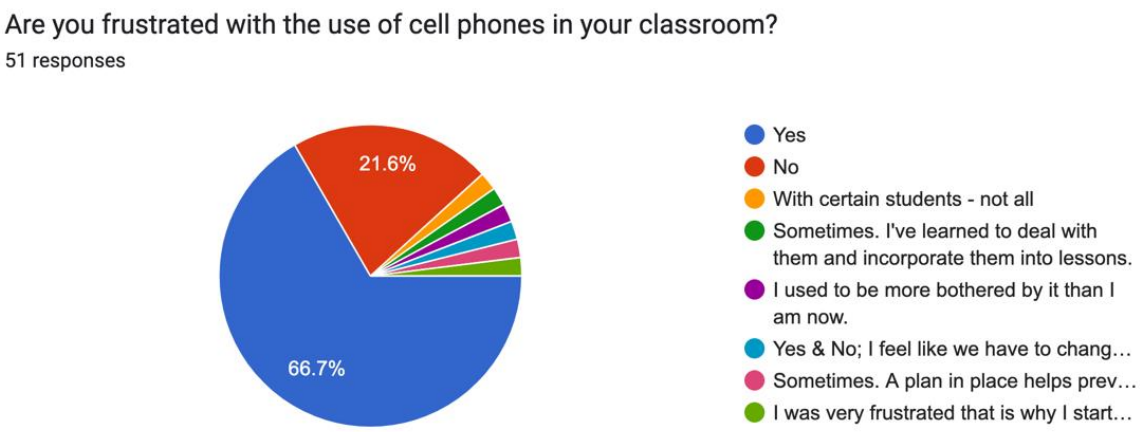


Figure 3: Academic Teachers Frustration Pie Chart, (*N*=51).

Table 5: Full Responses from Figure 2

Responses
Yes
No
With certain students - not all
Sometimes. I've learned to deal with them and incorporate them into lessons.
I used to be more bothered by it than I am now.
Sometimes. A plan in place helps prevent this.
I was very frustrated that is why I started to have students stow then away--Game changer!
Yes & no; I feel like we have to change with the times and allow for some flexibility with cell phone use in our classrooms, yet keep strict guidelines so students learn what is and what is not acceptable cell phone use.

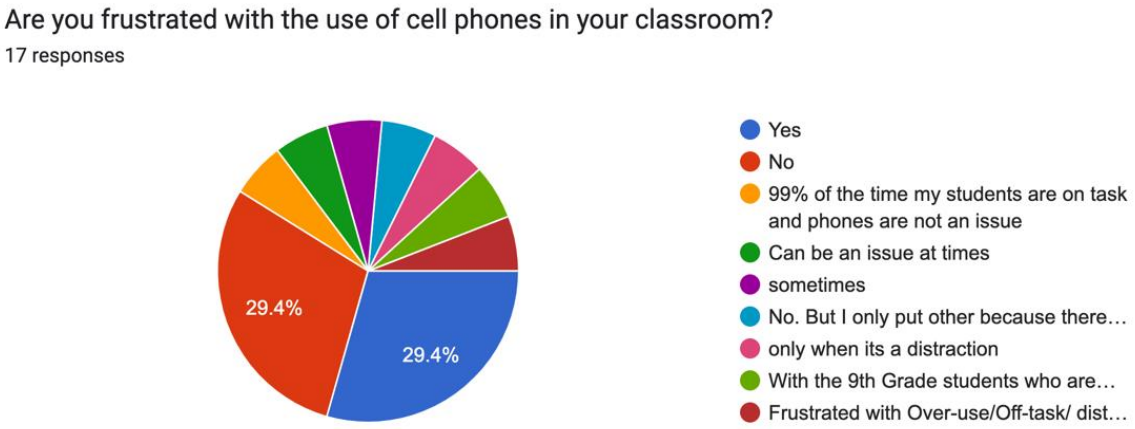


Figure 4: Technical Teachers Frustration Pie Chart, (*N*=17).

Table 6: Full Reponses from Figure 3

Responses
Yes
No
Sometimes
Can be an issue at times
Only when it's a distraction
Frustrated with Over-use/Off-task/ distracting use
99% of the time my students are on task and phones are not an issue
With the 9th Grade students who are visiting shop for 2 days - they are not allowed to have cell phones during class.
No. But I only put other because there is frustration with the 9th grade explore students that come through and want to be on their phones because different teachers let them get away with different things. I don't allow phones at all, so I always have to remind 9th grade explore students. My 10th through 12th graders know the deal and I have no problems with them and their phones.

Allowing students to have cell phones boosts student moral, but makes them more reliant on technology and worse students overall. Generally speaking, when students have access to cell phones, they are disengaged from both the content/lesson, and their classmates. One student said,

"Yes, having it and my earbuds allows me to listen to music which can not only help me focus, but also improve my mood if I was previously having a bad day." Contrastingly, one teacher said that, "In the past 15 years, students focus and patience has decreased because they would rather be checking social media on their phone. They are also dependent upon listening to music or watching videos while working." To further this claim, I offer two more quotes from teachers in my school, "Yes, I think if used properly, student could benefit from the use of phones. Unfortunately, there are too many distractions on the phone that I feel take away from its benefits (social media, YouTube, camera/video, etc.)" and,

> Students tend to quickly read through instructions and not follow directions; because of autocorrect, students do not pay attention to spelling/grammar errors. Therefore, there is no use for them to be mindful of their writing skills. However, they tend to not correct the indicated grammar/spelling even when it is indicated. Students' attention span has also diminished due to how much they demand instant gratification that comes from social media outlets. Therefore, they struggle with stamina and focus on multi-step tasks, projects, tests, and essay.

Impact of Cell Phones in My Classroom

With all things considered, cell phones are a net negative to my classroom. Just allowing my students to have their cell phones out and in front of them made them perform worse (Figure 2). If just cell phones in front of students lowers academic performance, than allowing them some or complete access to them will be sure to result in even lower performance. If it is true that students need a "give" like charging their cell phones in order to do better on summative assessments, that means there is some deep psychological connection at work – possibly one I can do nothing about outside a cell phone policy. At best, cell phones are a way to ease a student that is completed their work early, or an easy way for students to check their work, and at worst they are digital pacifiers. One of the biggest impacts I've noticed and noted (Appendix E), is the

immediate change in socialization when cell phones were removed; students went from extremely quiet and withdrawn to talkative and conversational with me and their peers. Several students noted how socialization is different now. One student said when phones are available, other students are “slow and occupied in the classroom” and “other students get so mad and cocky when asked to put phone away.” Another one said “they rely on online connection to start in person connection” rather than the other way around. To contrast with that, students also agreed that “it’s harder to get to know someone in person with cell phones”, meaning that when people actually get together, cell phones act as a buffer and promote superficial understanding of another, rather than a deep knowledge. Another student said “I would go insane if I couldn’t listen to music.” Another student said they “can’t even fall asleep without talking to someone on the phone”. Finally, a student who has had their phone taken away several years ago said that “people (other students) don’t see me as a real person”, and they’re often asked by acquaintances “when are you getting your phone back?” All of the quotes from this paragraph were from an informal impromptu interview of whole classes during the midst and recap of out metacognitive unit.

Student’s Thoughts on Cell Phone Prevalence Post Metacognition

Students cannot see the academic harm that cell phones may be causing, but their perceptions on their well-being and “need of cell phones” can be changed. Questions 7-11 were used to determine a change in students’ perceptions about academic performance after the metacognitive unit, and there was no statistical significance. After I taught my metacognitive unit on cell phones, technology, and social media, there was a significant difference between student perception on both their well-being (Figure 6) and if they can live life without cell

phones (Figure 7), X^2 for well-being (4, N = 49) = 14.688, p = .005), X^2 for life without cell phones, (4, N = 49) = 12.468, p = .014). Differences in questions 19 and 21-23 were used to determine shift in student perception on well-being, and questions 24-31 were used for "need of cell phones". One student, when asked if they think they would do better in school without their phones, prior to the metacognitive unit, had this to say from her technical experience in school, "In all honesty, I think I would. I only say this because in my technical shop, Allied Health, we have to turn our phones in whenever we are in shop and at first everyone thinks it's absurd but you realize how much you can learn and get done without your phone being a distraction to you". After the metacognitive unit, the student who had their phone taken away years prior said they "do not have a cell and I am completely fine!". List of Likert survey questions are in Appendix A. Chi^2 test results can be found in Appendix F.

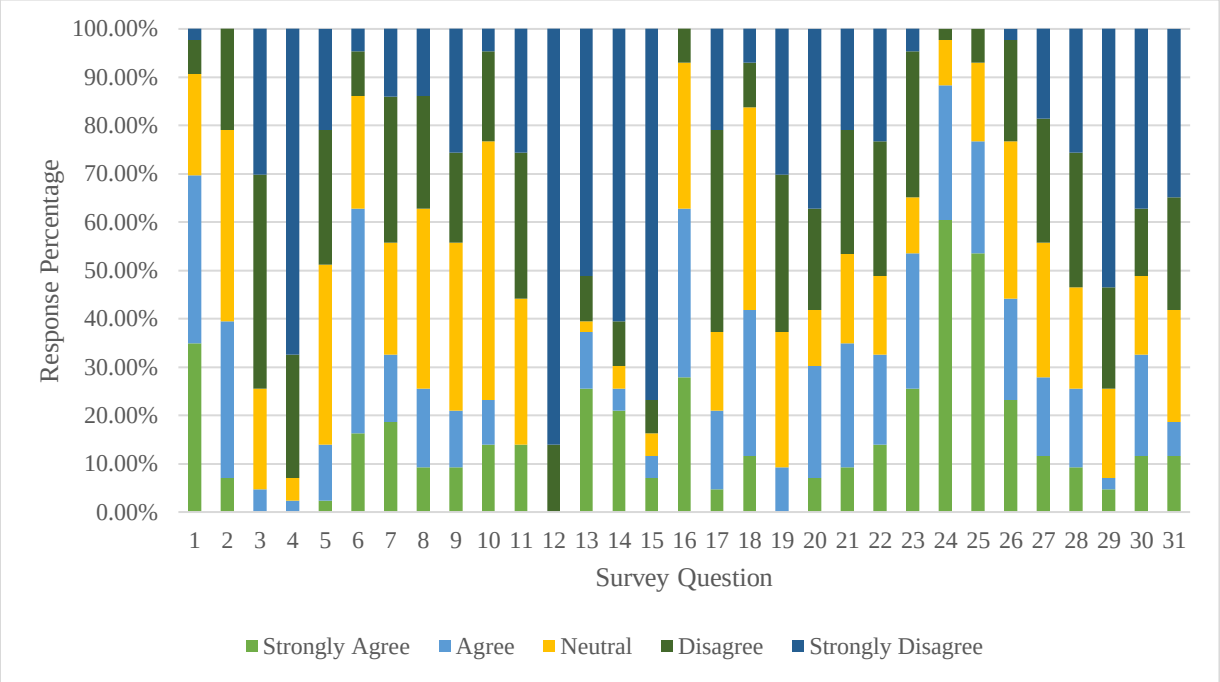


Figure 5: Metacognitive Unit Pre-Survey, (N = 43).

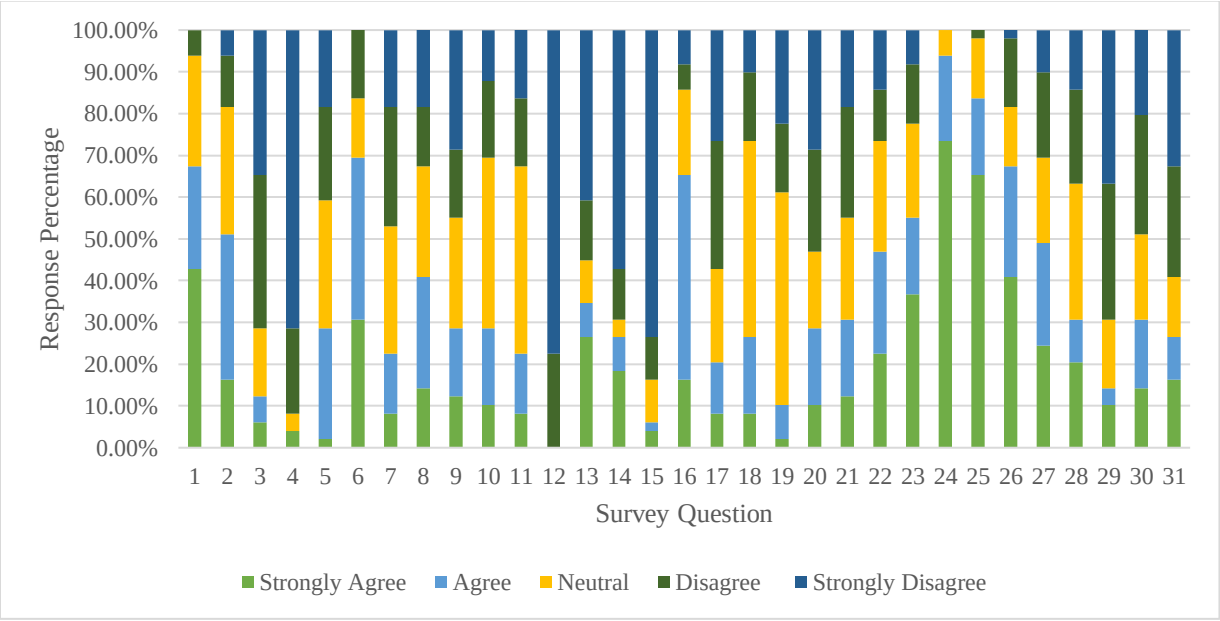


Figure 6: Metacognitive Unit Post-Survey, (N=49).

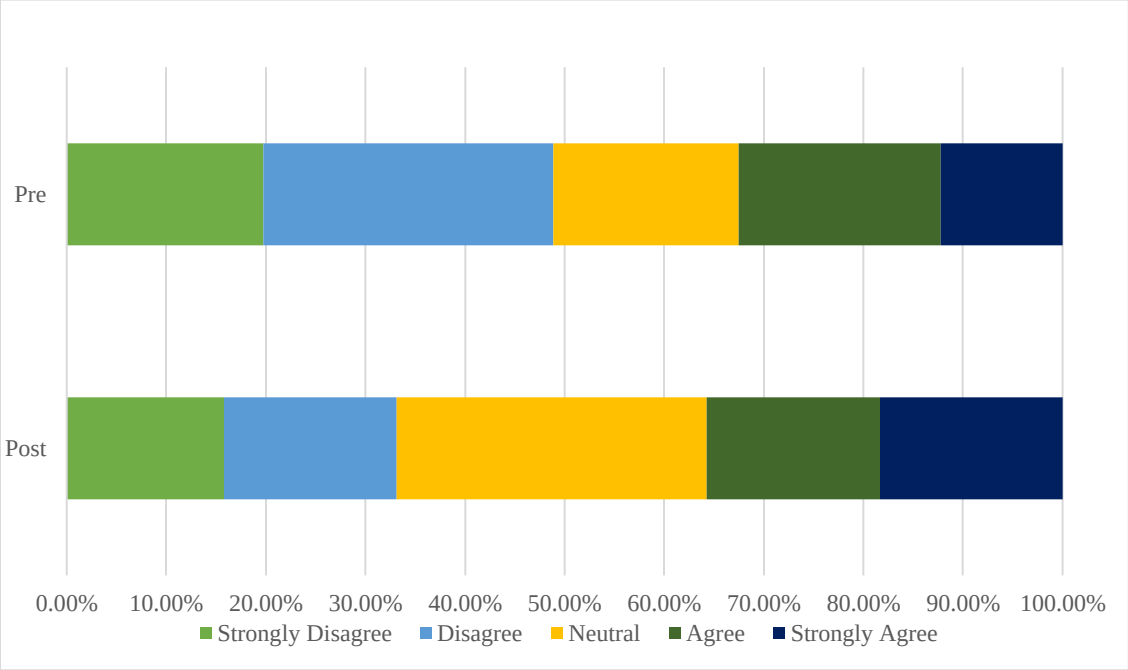


Figure 7: “Cell Phones Affect My Well Being" Pre (*N* = 43) vs. Post (*N*= 49)

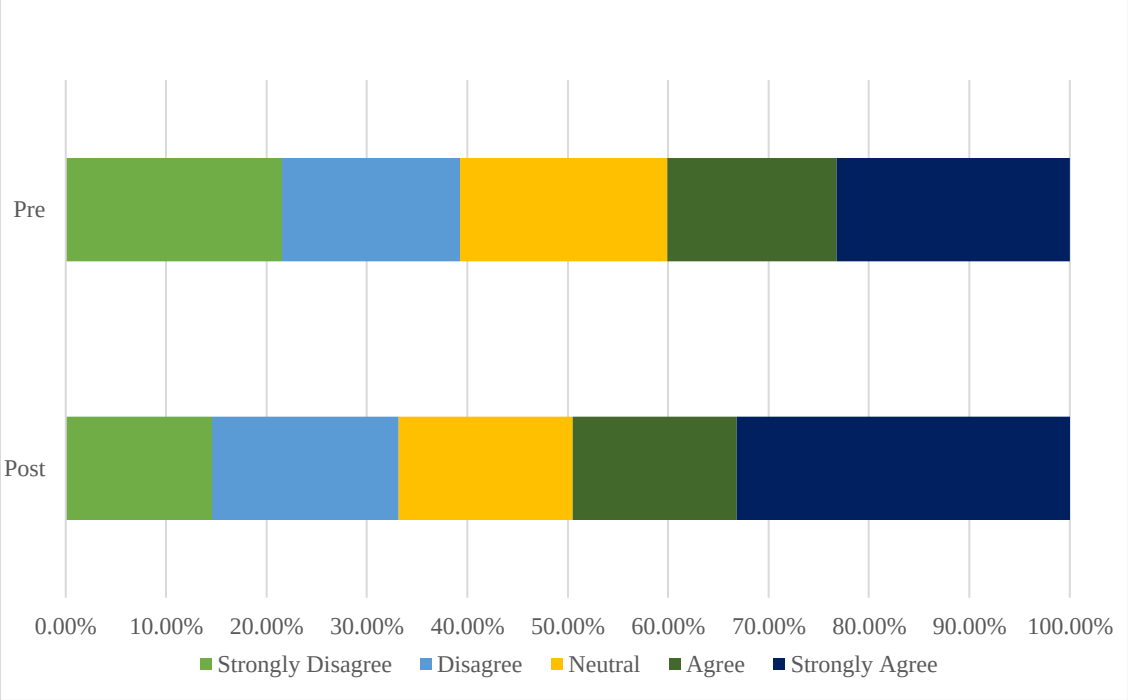


Figure 8: "I Can Spend X Amount of Time Without My Cell Phone" Pre (*N* = 43) vs. Post (*N* = 49)

CHAPTER FIVE

CLAIMS, EVIDENCE, AND REASONING

Claims From the Study

Due to class differences (talent, motivation, responsibility, etc.), different cell phone policies may not prove better than one another if compared between classes, so a class should be compared against itself unless a large enough sample size is achieved. While Eric Etter (2019) and his work had a huge influence on me when designing my experiment, I wanted to take it one step further. If students only improve on summative assessments when cell phones are put in a phone caddy and allowed to charge but not when they're not allowed to charge, the improvement may not be based on the proximity of the phone to the student as previously suggested. Rather, the give/take of giving phones up but being allowed to charge them might produce improvements in academic achievement. This leads me to believe there may be deeper psychological underpinnings that affects us that we are not aware of. I like to think of it as leaving your baby (phone) at home (in caddy); if it is being charged it is with a sitter, if it is not allowed charge, it is home alone.

In response to my question on which cell phone policy was best, when comparing each block's scores, it was found that wall + was actually the best policy, in relation the units for each class, rather than comparing between classes. Why I think this is significant is because Etter (MSSE 2019) proved that cell phones away and charging improved student performance but not away or on person. If on wall and not charging doesn't improve scores, then it's not a function of proximity to cell phones, it's something psychological with the charging of the phones. The

general trend of score can be attributed to “ease of content”. For example, unit six was essentially just naming chemicals and unit seven was very math heavy. Student’s exact summative assessment scores can be found in Appendix D.

It is possible that the wall policy with no charging created the largest distribution of student’s grades due to differences in student temperament/addictedness towards cell phones. While achievement was slightly more elevated for the wall+ scores, the bottom performing students benefitted from the ability to charge more so than the top performing students (Figure 2). This could be due to the ensuing anxiety of being separated from their phones without a variable like charging to ease that anxiety (Cheever, 2014). It might not be about helping the top scorers do better, but ease the anxiety of all students so the class as a whole does better.

Teachers are frustrated with cell phone usage, and rightfully so. In response to my question on how other teachers manage cell phones in the classroom, it was found nearly 80% of the academic teachers in my school are frustrated which is much higher than the technical teachers (41%). I think this is due to the nature of the education, academic work can be seen as “more boring”, and not as pertinent to their lives as the shop they may be able to get a job out of. In general, the content of a technical shop is more hands on, so the propensity to slack or multitask is lower since more attention is needed, or the task they’re completing will not get finished. The general consensus of all the teachers that I surveyed is that student quality of work and work ethic is through the floor, while student preoccupancy is through the roof. Young demonstrated in 2006 that if students had access to technology, they would slack behind. I believe this is due to the fact this is a rapidly evolving technology and if a school doesn’t have a

set cell phone policy, the lack of set expectations and congruence between classroom policies can sow seeds of discontent in both students and teachers.

Although students claim that access to cell phones and listening to music allows them to focus, access typically limits optimal cognitive function. Students often say that music helps them focus and concentrate, but Dolegui (2013) proves again that the best environment for cognition is silence. I think that since students have been allowed to listen to music and they've been so accustomed to multitasking, there is a level of cognitive dissonance not allowing them to believe what many studies would suggest. We have to remember that they are generation Z, a generation that has almost always had the option to multi-task in the aforementioned way, and Gerrow et al. (2010) may not actually be able to conceptualize the possibility that multi-tasking in this way could negatively affect them.

In response to my question on how cell phones effect my classroom, it was found cell phones are net negative in my class. At the start and throughout the duration of the research, I enjoyed teaching more (Appendix E). There was more activity amongst students, and I felt as though I had real classes with palpable energy and I wasn't just sharing a room with a bunch of mindless automatons. When I finished my treatment, I pulled back on the strictness of the policies and definitely don't like it as much. Again, the slacking and preoccupancy is extremely frustrating when you're trying to provide quality education. If I try to take cell phones away without providing them charging, or another "give", students may become anxious (Cheever, 2014) and could contribute to the rise of declining mental health the Centers for Disease Control and Prevention (2023) have recently reported on. I think it is interestingly coincidental that right before my metacognitive unit, the county my school is in decided to sue big tech companies, and

one of the former teachers at my school is a county commissioner who was there at the press conference about it.

In response to my question on if a metacognitive unit can shift students' perception about cell phones, it was found that students don't feel cell phone usage affects their academic success, but can appreciate how it effects their well-being and the perception of being able to live without them. I think they can't see how it affects them academically for the same reason Gerrow et al. (2010) said students don't see a problem with multi-tasking: they don't know any other way. Student's emotions can change rapidly, and it is something they can feel/track, so I think it is something that once they realize that it can affect them, they see that is does. I'm glad they recognize this, because the real reason I did this study is because I care about the well-being of the students. After seeing how their mental health has changed (Centers for Disease Control and Prevention, 2023), how technology predict ill-being (Rosen et al., 2014), and how their sleep can be disrupted (Royant-Parola et al., 2018), I want my students to know what they're up against and make adjustments to improve the quality of their lives. Students have shown that they believe, more so than before the treatment unit, that they can live without cell phones for specified periods of time. In order to show students how cell phones can affect them, we first need to be able to show them that they can live lives separate from their phones and be unharmed. I would imagine if students were able to remove smart phones from their life, they would find results similar described in Grace (2022).

Opportunities for Further Research

I would like to continue this research on a much larger scale. I think there is not enough collaboration on what works the best. This can be attributed to teacher style, but as teachers, we

must find what is in the best interest of our students and adopt it. I think this study, or a study related to mine with modifications, should be done at multiple grade levels and over every content area. I am deeply interested in if there is a psychological component to this study. Does wall vs wall and charging always make a significant difference? Will they continue to need to be a give/take so our students can consider their phones "taken care" of, so they can do as best as possible on their classwork? This research would pave the way for the next generation of students and teachers, and hopefully provide some evidence of what would benefit school age children at a societal level. I would like to have collected research over more time, but I wanted to make sure I was on schedule to complete my data analysis in a timely manner.

Impact of Action Research on Author

At the beginning of next school year, I will be starting my cell policy of cell phone caddy with charging option, and allowing my students to have their cell phones on special occasions. Having a policy makes me a happier teacher, and if I can provide a policy that improves their academic performance, I will be even happier. I will inquire to the administration and discipline committee at my school about running a large-scale research project, with a modified methodology related to what I've done here. I have already been in cahoots with members of my school staff who are interested in adopting a consistent cell phone policy, so I think I may be able to use the research I've collected here as a basis for further study.

The reason I am a teacher is because I care about the well-being and development of younger generations; I am a humanist. I originally wanted to be a doctor, a pediatric oncologist, but I eventually could not see myself living that lifestyle, so I switched to science (biology and then chemistry) teaching because I think that understanding things at a fundamental and basic

level is helpful and useful for learning everything that builds from that. I think it's valuable for everybody to be exposed to chemistry, but I know most will not utilize the finer details of it regularly. Even so, I think that I can communicate lessons that will benefit them throughout their lives, and make them better. I want them to leave my class being a better and healthier version of themselves, and it kills me to see them being negatively affected by the ails of the times. If the students are being negatively affected by something that hurts them as people, it also hurt them as students. If it is possible to help them as people, then that helps them as students, which helps me as a teacher, which in turn helps me as a person: If I help them as people, it helps me as a person. It is good knowing that something I did is possibly helping my students to some degree. This is a very meaningful position to me, and I will continually work to benefit my students.

I did the entirety of my college course work in a pre-pandemic world, and have only worked professionally in a career in a post-pandemic world. I do not know what it is like to teach as a career professional prior to the COVID-19 pandemic, so I can't say if it is better or worse. What I do know is there is a migration of teachers leaving the field, and there is currently a teacher shortage. I truly took this experiment as an opportunity to find out if teaching is something I would like to continue to do. I used this as a proxy to determine if this was a field worth staying in. If nothing worked, and I didn't have the ability to help students or allow them to reshape their perception, it is possible I wouldn't return. Regardless of the results, I needed to do this research not just to get my masters in science education, but also to help my students and my school community. The idea of Nietzsche's eternal reoccurrence comes to mind, and as he speculated the question "Do you desire this once more and innumerable times more?" in front of a lake in the Swiss Alps, I will ponder the same thing in front of Fairy Lake in the Bridgers. I

believe I do want this again, to create meaning in a world purportedly devoid of it, to help guide young minds through the trials and tribulations of the days yet to come.

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APPENDICES

APPENDIX A

METACOGNITIVE UNIT BREAKDOWN AND MATERIALS

The metacognitive unit included:

- Screening of “The Social Dilemma”
- Discussion of research I’ve found while working on this project and studies about technology usage/screen time and children’s health
- Presentation of Mental health data for the school age generation from the Center for Disease Control and Prevention
- Presentation on circadian rhythm and it’s dysregulation from technology usage
- Completion of a pro/con chart for cell phones in general, and social media
- Completion of a 7-day long cell phone usage log that showed the students how much time they actually spent on their phones
- A reading of a current event article where our county (Bucks County, PA) is suing Big Tech companies for harm done to children.

Name:_____ Block:_____

Phone Log Assignment

In this chart, please keep track of how much time you spent on your phone, and what you were spending your time doing. (ex. Internet, music, social media, etc.) You can give a rough estimate with percentage, or break it down generally by time.

Day	Hours Spent on Phone	How was that time spent?
Thursday - 3/16		
Friday - 3/17		
Saturday - 3/18		
Sunday - 3/19		
Monday - 3/20		

Tuesday - 3/21		
Wednesday - 3/22		
Total		
Average		

APPENDIX B

INTERVIEW QUESTIONS

Teacher Interview Questions:

- Are you frustrated with the use of cell phones in your classroom?
- Do you have a set of cell phone policy in your classroom?
- Please choose the policy that most closely resembles your own
    - No set policy
    - No cell phones in classroom
    - Cell phones are collected
    - Cell phones can be used before and after instruction
    - Cell phones can be used during independent/group work
    - Utilize cell phones in class
- Do you see a use of cell phones in education?
- How has education changed since widespread use of cell phones?

Student Interview Questions:

- To you, what is learning?
- Do you have a cell phone?
- Do you think having a cell phone benefits you? How?
- Do you think a cell phone harms you? How?
- Do you use your cell phone in class?
- Do you think your cell phone effects your learning? If so, why?
- Do you think you would do better in school without your cell phone?
- Does there need to be a change in education now we have cell phones – what would that look like?
- What is the ideal use of cell phones in the classroom?
- You have access to limitless information – how should that change what you learn here?
- It has been said "you are the generation with the largest amount of information most readily available, but you don't know how to research - you don't know how to find the answer". Thoughts?
- After learning about cellphones, social media, and what they can do to your brain, how has that changed how you feel about spending time on your cell phone?

Pre/Post Likert Scale Student Survey Questions:

- I think using my cell phone for 1 hour a day is healthy.
- I think using my cell phone for 4 hours a day is healthy.
- I think using my cell phone for 8 hours a day is healthy.
- I think using my cell phone for 12 hours a day is healthy.

- I think I use my cell phone more than the average person my age does.
- I think that I can control the amount of time I spend on my phone.
- I think schools should allow students to use their phones at any point during the school day.
- I think schools should have a set cell phone policy.
- I think cell phones negatively effects my academic performance.
- I think cell phones positively affect my academic performance.
- I think that I would be a better student without a cell phone.
- I think my social media presence and followers matter more than school.
- I take a selfie every week. (Snapchat included)
- I take a selfie every day. (Snapchat included)
- I take a selfie every waking hour. (Snapchat included)
- I get the majority of my entertainment from my cell phone.
- I get the majority of my stress/anxiety/sadness from my cell phone.
- I feel better after using my cell phone.
- I feel worse after using my cell phone.
- I feel alone if I don't have my cell phone.
- I feel anxious if I don't have my cell phone.
- I think my cell phone messes with my mind/body.
- I think my cell phone messes with my sleep.
- I can go 1 hour without my cell phone and be comfortable.
- I can go 2 hours without my cell phone and be comfortable.
- I can go 4 hours without my cell phone and be comfortable.
- I can go 8 hours without my cell phone and be comfortable.
- I can go a day without my cell phone and be comfortable.
- I can go through a work week (M-F) without my cell phone and be comfortable.
- I can go through a weekend (Sat-Sun) without my cell phone and be comfortable.
- I can live without my cell phone.

APPENDIX C

IRB EXEMPTION

Administrator Exemption Regarding Informed Consent

I, Dr. Leon Poeske, Administrative Director of Bucks Country Technical High School, verify that the proposed classroom research to be conducted by Kenneth Sperling is in accordance with established or commonly accepted educational settings involving normal educational practices. To maintain the established culture of our school and not cause disruption to our school climate, I have granted an exception to the Principal Investigator (Researcher) regarding the need for informed consent/assent, and I approve this research project.

(Signed Name, Title of Position)

LEON POESKE

(Printed Name)

10.20.22

(Date)

IRB Protocol #2022-386-EXEMPT APPROVED Inbox ×

NoReply@topazti.net
to walter, me, kelly.beiswanger

Hello Sperling, Ken,

Your protocol was reviewed by the IRB and has been approved.

PI: Sperling, Ken
Approval Date: 11/18/2022
Title: The Effect of Cell Phone Policy on Student Achievement

Protocol #: 2022-386-EXEMPT
Review Type: Exempt Review
Expiration Date: 11/18/2027

Work described under this protocol may now commence. The PI is responsible for ensuring that the protocol accurately describes research practices being conducted.

> Review Category designation determined by the IRB can be found in the final section of your protocol.
> IRB-stamped active Consent Forms are attached within your protocol where applicable.
> Any changes must be submitted via Amendment prior to implementation.
> Per the Common Rule, research only requires Interim (annual) Review by the IRB if 1) it was reviewed via Full Committee or 2) is sponsored by the FDA.
> All research is subject to post approval monitoring.
> All protocol types must be renewed 5 years after approval.
> Inform the IRB once your research is complete so that the protocol may be inactivated.

Please contact your IRB Program Manager with any questions or if you are in need of assistance. Thank you for your diligence in the care of human subjects research pa

Institutional Review Board for the Protection of Human Subjects | Office of Research Compliance | Montana State University

Access your protocol anytime at https://montanaprod.topazti.net//Elements?emailLink=11%2c102%2c8443.

APPENDIX D

STUDENT SUMMATIVE ASSESSMENT SCORES

Table 7. Block 1 Treatment Scores

Block 1	Unit 1	Unit 2	Unit 3	Unit 4
Policy	Wall	Wall +	Away	Table
Student	4	5	6	7
1	18	19	29	12
2	32	26	n/a	17
3	32	24	46	n/a
4	30	24	43	15
5	24	22	39	12
6	32	19	32	13
7	28	16	n/a	15
8	n/a	19	57.5	10
9	n/a	21	34	14
10	28	26	58	17
11	20	21	53	16
12	34	26	60	23
13	28	24	26	14
14	18	20	30	9
15	20	17	37	14
16	5	9	n/a	n/a
17	18	4	20	9
18	28	13	34	11
Average	24.69	19.44	39.90	13.81
Average Grade	61.72%	64.81%	66.50%	55.25%

Table 8: Block 2 Treatment Scores

Block 2	Unit 1	Unit 2	Unit 3	Unit 4
Policy	Table	Wall	Wall +	Away
Student	4	5	6	7
1	28	21	19	23
2	n/a	15	43	n/a
3	26	14	58	16
4	20	22	36	14
5	18	11	58	13
6	12	n/a	30	7
7	28	20	47	16
8	32	22	n/a	5
9	24	14	n/a	8
10	16	14	34	n/a
11	16	12	34	13
12	12	20	n/a	9
13	20	20	31	11
14	28	19	47	19
15	16	20	31	19
16	26	15	32	16
17	24	20	45	6
18	n/a	20	45	20
Average	21.63	17.59	39.33	13.44
Average Grade	54.06%	58.63%	65.56%	53.75%

Table 9: Block 4 Treatment Scores

Block 4	Unit 1	Unit 2	Unit 3	Unit 4
Policy	Away	Table	Wall	Wall +
Student	4	5	6	7
1	20	15	50	16
2	30	18	44	17
3	n/a	23	48	11
4	20	18	28	9
5	40	26	47	19
6	18	16	23	13
7	28	25	29	18
8	28	19	46	17
9	28	22	56	20
10	26	23	57	16
11	28	27	47	18
12	24	16	19	n/a
13	28	19	51	18
14	n/a	20	38	17
Average	26.50	20.50	41.64	16.08
Average Grade	66.25%	68.33%	69.40%	64.31%

APPENDIX E

TEACHER'S NOTES

Beginning of Treatment:

- Students said verbally they would be okay with teachers keeping their phones if they could charge them
- Some students do not socialize, almost as if they've forgotten how to
- Some students are having conversations while working, a good thing
- Some students will get "bored", that can result in some not so good side conversation or class disruption
- Some students will still use school issued Chromebook to access the internet
- I immediately got more attention from students, and I enjoyed teaching more as I felt we were learning as a class and we could get more covered

During Treatment and Metacognitive Unit:

- Students acquired smart phones sometime between 1st and 8th grade
- During COVID quarantine, students developed habits resulting in more screen time
- Quarantine is when Tik-Tok got extremely popular for their generation
- Students admitted that quarantine worsened their social skills and one student said that COVID made me develop minor agoraphobia"
- Students agreed that listening to music may make them more productive, but less social
- One student said they "can't even fall asleep without talking to someone (on the phone)"
- In regards to the concept that cell phones are like drugs, one student said "we need to think about the younger generation"
- A student said "I would go insane if I couldn't listen to music"
- A student said "I've had my phone taken for two years, but I'm fine!"
- The previous student said "Other students get so mad and cocky when asked to put their phones away" and "they're so slow and occupied in the hallways and in the classroom"
- The same student said "people (other students) don't see me as a person" and they always ask "oh, when are you getting your phone back?"
- A different student said "It's harder to get to know people with cell phones"
- When the pro/con charts were created, not one student said social media had more pros than cons
- One student said "It would be better if no one had cell phones"

After Treatment:

- Students immediately started filling the void time or time they could be socializing with cell phones again
- I do not feel like I have the same engagement level in class as I did with a cell phone policy
- As a result, I do not like teaching as much and am more frustrated

APPENDIX F

CHI^2 TEST DATA FOR LIKERT SURVEY

Table 10: Chi2 Test Data “Academic Performance 1”

Questions	8, 9, & 11
Significance Level	0.05
Degrees of Freedom	4
Test Statistic	7.058
p-value	0.133
Critical value	9.488

Table 11: Chi^2 Test Data “Academic Performance 2”

Questions	7 & 10
Significance Level	0.05
Degrees of Freedom	4
Test Statistic	3.986
p-value	0.408
Critical value	9.488

Table 12: Chi^2 Test Data “Student Well Being”

Questions	19, 21-23
Significance Level	0.05
Degrees of Freedom	4
Test Statistic	14.688
p-value	0.005
Critical value	9.488

Table 13: Chi^2 Test Data “Living Without Cell Phones”

Questions	24-31
Significance Level	0.05
Degrees of Freedom	4
Test Statistic	12.468
p-value	0.014
Critical value	9.488